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INTERNATIONAL NUTRITION & HEALTH SYMPOSIUM

THE PROCEEDING OF INTERNATIONAL NUTRITION AND HEALTH SYMPOSIUM

4TH NOVEMBER 2017, YOGYAKARTA, INDONESIA

DEPARTEMENT OF NUTRITION AND HEALTH
FACULTY OF MEDICINE
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WELCOME FROM HEAD OF DEPARTMENT OF NUTRITION AND HEALTH, FACULTY OF MEDICINE, UNIVERSITAS GADJAH MADA

Department of Nutrition and Health, Faculty of Medicine, Universitas Gadjah Mada is pleased to welcome you to the first International Nutrition and Health Symposium. This event is organized as a part of internationalization of Universitas Gadjah Mada and to meet the vision to become a world-class university. The organizing committee has done their best to arrange this event since the beginning of the year, which I mostly appreciate.

We hope that all symposium participants enjoy the meeting with colleagues. This symposium acts as a meeting point, where we all gather and each share perspectives and findings. Nutrition science is growing fast and practitioner are challenged with evidence of poor quality. This condition should be tackled with providing nutrition society with high level of evidence. This symposium shall be the small step for us who work in nutrition to bring improvement in the health care.

Together we learn, grow, and excel.

Dr. Toto Sudargo, SKM, M.Kes
Head of Department of Nutrition and Health
Faculty of Medicine
Universitas Gadjah Mada

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FOOD TO GROW AND STRONG: INFANT FEEDING PRACTICES IN KARANGSARI VILLAGE, WEST JAVA

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ABSTRACT

Background: Malnutrition is a problem of infants and toodlers health. Ministry of Health has prepared guidelines for healthy infants feeding as a reference for health workers in providing information to parents. But in reality, culture has an important role to influence people in feeding practices.
Objectives: The study aimed to identify infant feeding practices and cultural aspects that influence the practices.
Methods: A qualitative approach was be done in this study. A Total of 21 mothers from Karangsari Village, Garut District who had baby 6 to 12 months old were interviewed. Informants were choosen by using purposive sampling. Interviews provided data for the content analysis.
Results: This study showed that most of the mothers started breastfeed their babies at the third day and discard their colostrum. They planned to breastfeed for up to 2 years. Complementary food was given when age of their babies 3 to 6 months. The food were instant packaging food, rice porridge, biscuits and banana. The complementary food less varied and did not followed guideline that recommended. During the breastfeeding period, mothers were encouraged to consume a lot of leaf vegetables, papaya leaf and grilled fish. While prohibited foods during breasfeeding period were spicy and sour foods.
Conclusion: There were some disadvantage practices of infant feeding in Karangsari Village. Therefore, it is need continuous education to mothers, family and community for enhance their understanding about best infant feeding practices.

Keywords: *Infant feeding, Breastfeeding, Supplementary Feeding, Practice, Culture*

INTRODUCTION

Infant mortality and under-five mortality are huge public health issues worldwide. Although there has been a 49% decrease in under-five mortality rates between 1990 and 2013, 17,000 children under five years die every day [1]. One problem of infants and toodlers health is malnutrition. Poor breastfeeding and complementary feeding practices, coupled with high rates of infectious diseases,are the principal proximate causes of malnutrition during the first two years of life. The immediate consequences of poor nutrition during these formative years include significant morbidity and mortality and delayed mental and motor development. In the long-term, early nutritional deficits are linked to impairments in intellectual performance, work capacity, reproductive outcomes and overall health during adolescence and adulthood. Thus, the cycle of malnutrition continues, as the malnourished girl child faces greater odds of giving birth to a malnourished, low birth weight infant when she grows up [2]. Effect of malnutrition in the first 1000 days of life, not only to the physical development, but also to cognitive development which in turn is influential to the intelligence and dexterity of thinking as well as to work productivity. Malnutrition at this time is also associated with the risk of chronical disease in adulthood, obesity, heart disease and vessels blood, hypertension, stroke and diabetes [3].

Adequate nutrition during infancy and early childhood is fundamental to the development of each child's full human potential. It is well recognized that the period from birth to two years of age is a "critical window" for the promotion of optimal growth, health and behavioral development [4]. Early breastfeeding has a positive impact for both mother and baby. For babies, breastfeeding has an important role to support the growth, health, and survival of babies because breast milk is rich in nutrients and antibodies. While for mothers, breastfeeding can reduce morbidity and mortality because the breastfeeding process will stimulate uterine contractions, thus reducing postpartum hemorrhage

(Riskesdas: 2013). Exclusive breastfeeding for the first six months of life confers important benefits on the infant and the mother. It protects infants against common childhood diseases, including repeated gastrointestinal infections and pneumonia, and hence against some of the major causes of childhood mortality. Timely introduction of adequate and safe complementary foods at six months of age helps to fill the dietary gaps that cannot be met by breast milk alone. Continued breastfeeding for two years or beyond confers major nutritional benefits and is an essential component of appropriate complementary feeding [2]. Breastfeeding, especially six months of exclusive breastfeeding, has a significant effect in the reduction of mortality from the two biggest contributors to infant deaths: diarrhoea and pneumonia, as well as on all-cause mortality [5, 6].

Nutritional problems of children under five in Indonesia are still apprehensive. Basic Health Research 2013 noted that 18,8% of the children were underweight and 29% of them were stunting because of chronical malnutrition. While in West Java, prevalence of children under five that underweight were 15,7% dan stunting were 35,3% (7). Garut District is one of districts in West Java that have high prevalence in underweight and stunting of children under five (8). Beside that, initiation of early breastfeeding in West Java was only 35,7% and in Garut District lower that was 25% (7).

Patterns of infant feeding in any community have an underlying basis in cultural beliefs concerning, among other things, the nature of children, the nature of food, and how, when and what kinds of food children should eat. In turn, patterns of infant feeding can have a major effect on the nutritional status, health, and growth of children. Therefore, a first step toward understanding malnutrition and infant health in a particular community is a thorough knowledge of the beliefs and practices associated with infant feeding in that community (9). The way we humans look after our babies is invested with moral value and cultural and personal meaning. Infant care practices can differ in significant ways between cultures or social groups and yet be justified in similar ways. Conversely, different groups' practices may be similar but the meanings ascribed to them may vary (10). Understanding cultural differences in beliefs and practices relating to infant well-being is important for the successful delivery of health messages and health services to diverse populations (10). Infancy is the time when the foundations for dietary habits and nutritional adequacy over a person's lifetime and initial contact with and orientation to foods typical of the person's culture are established (11).

Indonesia Ministry of Health produced implementation guidelines of complementary food (12) and balanced nutrition guidelines (13) as a reference for health workers in providing information to parents. But in reality, culture has an important role to influence people in feeding practices. In Karangsari Village, Garut District, women prefer to follow the parent-derived practices of parenting as well as in feeding their children. Therefore, the main objective of this study was to identify infant feeding practices in this village. This study also wanted to know cultural aspects that influence the practices.

METHODS

This research was conducted in Karangsari Village, Garut District at Januari 2017. This study chose a qualitative approach as the best design to allow women to describe their opinion. Informants were choosen by using purposive sampling. The criteria were women who had babies 6 to 12 months old and resided in Karangsari Village, Garut District. Infant feeding practices of the women and also cultural beliefs that influence their practices were explored by engaging in conversation with them using an interview guideline. Before interviewed, the women were asked for informed consent. For anonymisation purposes, women were assigned a code that was used for data collection and analysis. Transcript of interview were analyzed in an open way using content analysis.

RESULTS AND DISCUSSION

Karangsari Village is one village in Pakenjeng Sub-district, Garut District. Distance from this village to Sub-district Pakenjeng City is about 12 kilometres and distance to Garut City about 75 kilometres. Area of this village about 1.642 hektares which consists four sub-villages that were Mekarlaksana, Cicalengka, Parabon and Cidahon. Number of population was about 5.793 people. Their occupation mostly as a peasant. 50% of them only finished elementary school and 32% finished Junior High School. Health care facilities in this village were one auxilliary community health center that gave services twice a week. There

were a village midwife who assigned in this village and two traditional birth attendant (maraji) who helped women during their reproduction cycles.

Number of research's informant was 21 women. All of them had babies 6 to 12 month old. Age of the mothers were between 17 to 33 years. Education level of the mothers were 18 (85,7%) finished Junior High School and three mothers (14,3%) finished Elementary School. All of the mothers were a housewife. The mothers had one to three children.

Table 1. Profile of Informants

No	Age	Education	Occupation	Number of children	Age og baby (Month)
1	22	Junior HS	Housewife	1	9
2	20	Junior HS	Housewife	1	7
3	18	Junior HS	Housewife	1	7
4	33	Elementary	Housewife	3	6
5	24	Junior HS	Housewife	2	8
6	32	Elementary	Housewife	3	7
7	24	Junior HS	Housewife	2	9
8	32	Elementary	Housewife	3	12
9	26	Junior HS	Housewife	2	6
10	26	Junior HS	Housewife	2	9
11	24	Junior HS	Housewife	2	8
12	17	Junior HS	Housewife	1	6
13	17	Junior HS	Housewife	1	9
14	20	Junior HS	Housewife	1	8
15	22	Junior HS	Housewife	1	11
16	18	Junior HS	Housewife	1	10
17	24	Junior HS	Housewife	2	6
18	21	Junior HS	Housewife	1	11
19	18	Junior HS	Housewife	1	7
20	23	Junior HS	Housewife	2	7
21	31	Junior HS	Housewife	2	10

Breastfeeding Practices

Mothers in Karangsari Village usually gave their babies breastmilk as first food. If the breastmilk had not come out, the baby would given mineral water, honey or formula milk. At the third day after delivery, the breast milk has been out. The mothers beliefs that breastmilk is the best food for baby because breastmilk make the child healthy and strong, not susceptible to disease. Some mothers beliefs that formula feeding made babies fat but easy to get sick.

" I just breastfed my baby at the third day, the breastmilk just came out. The first two days, the baby was given honey and mineral water, dripped into his mouth".

" Breastmilk usually come out at the third day, so my mother gave my baby honey, dripped into his mouth. Honey much better than formula milk".

" I don't want to give my baby formula milk. It make a baby fat but not strong, easily attacked by diseases".

Mothers in this village believed that colostrum was dirty and should be thrown away. Colostrum was a barrier to discharging breast milk, so that it must be cleaned.

"The first one out was not milk, it was dirty, must be thrown away"

"The colour is yellowish, it is different with colour of breastmilk, milk should be white"

All of the mothers planned to breastfeed until age of their children two years old. They got information on the duration of breastfeeding from the village midwife and also from religious leaders.

"plan up to 2 years... let her to be strong...midwife said that breastmilk contains immunity"

"explanation from the religious leader that breastmilk to perfect the childcare, so that the child grows perfect"

Complementary Feeding Practices

Most of the mothers said that they started introducing complementary foods to their infants at around 6 months of age.

"I fed my child when her age 6 months, in one month,I gave her only gruel "

"I introduced food to my child at the age of 6 months, first I gave him crushed banana, a few days later I just gave her gruel"

Some mothers, however, told that they introduced complementary foods such as crushed banana before 6 months of age. Common reasons mothers cited for early introduction of complementary foods included that to made the infants growing faster, the child was not satisfied by breastmilk alone, the mother's breastmilk supply was insufficient and to made the infants strong.

"He suckled well but he did not get satisfied. When he finished, he cry and scream...so my mother suggested me to give him gruel, and he looked better"

"I gave her crushed biscuit when she was 3 months of age...because she looked weak and thin..to made her stronger"

The mothers explained any kinds of complementary foods, including gruel made from white or brown rice that mixed with brown sugar, crushed biscuits, crushed banana, instant packaging foods and rice porridge.

" I just give my baby foods that is available in the shop, it is easier to prepare. It just brewed by boiled water. It is all kind of taste. there is a taste of brown rice, green beans... I gave the food 2 or 3 times a day"

" I make rice flour mixed with brown sugar and then cooked. It is given 2 to 3 times a day"

The mothers in Karangsari Village reported that the complementary foods that were given to the infants less varied. They also did not know guidelines of complementary food. They practised the infant feeding that they knew from their mothers, relatives or neighbours.

"Until the age of my baby one year old, I only gave banana and papaya beside gruel and porridge. I had never given him another fruits like oranges, soursop, I had afraid he would be diarrhea"

"I give my baby foods when she cry, I don't follow a shedule...my mother taught me when I have to feed my baby"

Cultural Beliefs and Practices during Breastfeeding

The mother in this village believed that during breastfeeding period they had to keep their food. It was because something they ate would influence their babies condition directly. There were some food that was recommended to eat any kind of nuts and green vegetables like katuk leaf, papaya leaf shoot, spinach, cassava leaf shoot. Mothers also proposed to eat steamed or grilled goldfish. Drunk a lot of water and ate sweet foods also recommended to breastfeeding mothers. This is to increase quality and production of the breastmilk.

"My mother and my neighbour told me to eat a lot of vegetables to make the production of milk a lot"

"I proposed to eat a lot of fish, so that the milk is nutritious...and also drink a lot of water, to make much breastmilk"

In breastfeeding period, the mothers were also prohibited to eat some food with spicy or sour taste. It were believed that would caused the babies diarrhea.

"Breastfeeding mothers have to pay attention to their food. It is because the baby digestion is still weak, they food depend on what we eat. If we eat spicy food, baby can be diarrhoe"

"As long as I am breastfeeding I will not eat spicy and sour food. Because once I ate, my child got diarrhea"

DISCUSSION

Result of this study showed that all of the mothers in Karangsari Village gave breastmilk to their infants. They believed that breastmilk was the best food for their babies. This is similar with finding of Dettwyler (9) in Mali that breast milk is the best food for infants and makes the infant strong and healthy. Despite this recognition, breastfeeding during the first week of life was not exclusive; most of them fed water or honey in the first two days of their infants life. It was similar previous study (14, 15, 16). Even though, exclusive breastfeeding for the first six months of life confers important benefits on the infant and

the mother. It protects infants against common childhood diseases, including repeated gastrointestinal infections and pneumonia, and hence against some of the major causes of childhood mortality (2, 5).

Although the mothers recognized the advantages of breastmilk but they assumed that colostrum was dirty. This was the reason of mothers throw away the colostrum and did not give to their babies. It was different with Minella et al finding (14) that majority women in Mexico recognized the importance of colostrum.

The mothers in Karangsari village have understood the importance of giving breastmilk until age of their children 2 years. They recognized getting information about breastfeeding from the village midwive and also religious leaders in their village. This practice is good because continued breastfeeding for two years or beyond confers major nutritional benefits and is an essential component of appropriate complementary feeding.(2).

There were some mothers that gave complementary foods to their infants before their age 6 months old. Early introduction of solid food also found in previous study (11). This practice was dangerous for infants because the baby's digestion was not yet ready to process solid foods.

On the other hand, the complementary foods that were given to the infants less varied. This would affected nutritional adequacy of the babies. The mothers in Karangsari Village were only gave gruel, porridge, some fruits (papaya and banana), and instant packaging foods like biscuits and instant milkporridge (Promina, Cerelac) until age of their baby one year old. They did not introduce fish, egg, vegetables and any kaind of fruits for infants under one year old. It was different with Minella et al finding (14) that in Mexico mothers introduced many kind of fruits and vegetables to their infants. Whereas balanced nutrition is very important to support growth and development of infants. Finding of Tirtaningtyas et al (17) study in Pamongan Village, Demak District showed that there were a meaningful relationship between supplementary feeding practice and weigh gain of babies with age more than 6 months old.

Mothers in this village did not follow a guideline to give complementary feeding to their infants. Eventhough, WHO recommended guiding principles for complementary feeding that for the average healthy breastfed infant, meals of complementary foods should be provided 2-3 times per day at 6-8 months of age and 3-4 times per day at 9-11 and 12-24 months of age, with additional nutritious snacks (such asa piece of fruit or bread or chapatti with nut paste) offered 1-2 times per day, as desired (4). Indonesia Ministry of Health also composed balance nutrition guideline as a guidance for health care provider in giving information to mothers and community.

In Karangsari Village, mothers' dietary habits changed during lactation. Some foods recommended to eat more during this period. The purpose was to increase production and also quality of breastmilk. On the other hand, mothers prohibited to eat some foods that were believed harmful to their infants. Spicy and sour taste foods were avoided. It is similar with previous study (14).

CONCLUSION

There were some disadvantage practices of infant feeding in Karangsari Village. Although mothers in Karangsari Village believe that breastmilk was the best food for infants, but the breastfeeding was not exclusive because in the firt two days the babies were given another food like mineral water, honey or formula milk. Some mothers gave complementary food early to their children. The complementary food less varied and did not followed guideline that recommended. During the breastfeeding period, mothers were encouraged to consume a lot of leaf vegetables, papaya leaf and grilled fish. While prohibited foods during breasfeeding period were spicy and sour foods. Therefore, it is need continuous education to mothers, family and community for enhance their understanding about best infant feeding practices.

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EFFECT OF 3-WEEK SUPPLEMENTATION WITH BEETROOT JUICE DURING AEROBIC EXERCISE PROGRAMME ON BLOOD PRESSURE AND CARDIORESPIRATORY FITNESS IN HEALTHY OVERWEIGHT POSTMENOPAUSAL WOMEN: A PRELIMINARY STUDY

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ABSTRACT

Background: Nitrate and aerobic exercise have been reported to reduce blood pressure (BP) and increased cardiorespiratory fitness (CRF), two predominant markers of cardiovascular diseases. Nitrate may also improve a range of physiological responses during exercise. However, this topic has never been explored in postmenopausal women facing oestrogen depletion which diminishes nitrate oxide production.

Objectives: To investigate the effect of 3-week beetroot juice supplementation during moderate exercise programme on BP and CRF measured as $\dot{V}O_2$max in postmenopausal women.

Methods: In a trial with parallel design, nine healthy overweight postmenopausal women were randomly assigned to either group employing 6.45 mmol NO_3^-/day along with exercise (NR+EX) (n=4) or exercise-only (EX) (n=5). Before and after interventions, BP was taken on two consecutive days and $\dot{V}O_2$max was predicted from submaximal tests.

Results: During exercise programmes, both groups expended similar amount of energy (NR+EX: 2299.2±499.6; EX: 2381.2±234.8 kcal, $p>0.05$). Systolic BP (SBP) significantly decreased by 9.0 and 7.2 mmHg in NR+EX and EX groups, respectively ($p<0.05$). Neither of the intervention affected diastolic BP (DBP). In NR+EX group, $\dot{V}O_2$max increased significantly by 2.1 ml/kg/min ($p<0.05$) while change in EX group was not significant. Changes in SBP, DBP, and $\dot{V}O_2$max were not significantly different between both groups.

Conclusions: Our preliminary findings suggest the promising impacts of regular beetroot juice supplementation during exercise programme on SBP and CRF in postmenopausal women and that it may benefit cardiovascular health. Further research is required for better statistical power.

***Keywords**: beetroot, nitrate supplementation, blood pressure, cardiorespiratory fitness, postmenopausal women*

INTRODUCTION

As one of the global leading causes of mortality, cardiovascular diseases (CVD) is accounted for nearly 18 million of all age deaths in 2015 [82]. Among its risk factors, low cardiorespiratory fitness (CRF) is an independent marker of CVD attributed to increased risk of CVD [11] and all-cause mortality [9, 51]. Maintaining a high CRF also protects from metabolic syndrome (MetS) [33] including hypertension which has drawn greater attention due to an increase in prevalence of hypertensive heart disease by 37.1% from 2005 to 2015 [81] and greater lifetime burden of CVD [66]. Hypertension and CRF thus become aspects of concern to promote cardiovascular health.

As a predominant risk factor of CVD, MetS increases with advancing age and differs across genders [80]. Compared to men at the same age group, postmenopausal women are at a greater risk of developing MetS [19] due to an eventual depletion in oestrogen [68]. Age and oestrogen play a central role in the aetiology of endothelial dysfunction and postmenopausal hypertension through alterations in nitric oxide (NO) bioavailibility [6, 27, 37, 67]. NO is a key molecule in numerous physiological processes which protects arterial health and blood flow [74] with oestrogen as a vasodilator agent responsible for NO production via activation of endothelial nitric oxide synthase (eNOS) in endothelial cells [29]. The age-mediated excess in free radicals subsequently leads to the uncoupling of eNOS resulting in less synthesis of NO through the L-arginine-NO pathway [17, 24, 53, 72]. Additionally, loss of oestrogen contributes to deterioration in NO

bioavailability [58, 70] and abdominal obesity [15, 42, 75] which are frequently accompanied by dyslipidaemia, insulin resistance, elevated blood pressure through endothelial dysfunction [52]. It is unequivocal that postmenopausal women are faced with more pronounced depletion of NO bioavailability due to their physiological changes and thus greater risks of MetS and CVD.

Studies involving postmenopausal women have revealed the associations between aging, body composition and CRF where aging, increased total and central adiposity, and reduced skeletal muscle diminish CRF [4, 59]. Menopause significantly influences CRF as it was shown to reduce maximum oxygen uptake ($\dot{V}O_2max$) by 17% in postmenopausal women [55]. This decline in CRF potentially induces deterioration in lipid profiles and may eventually promote high prevalence of MetS [1].

It is evident that postmenopausal women are exposed with abundant adverse health consequences and thus elicits the suggestion to develop a strategy to eliminate the attributed risk factors of CVD [10, 19, 42]. Increasing physical activity such as undertaking moderate to high intensity exercise programme has been frequently proposed to prevent MetS and CVD [3, 20, 69] as it may provide a range of cardio protective effects in lowering blood pressure [21, 62, 83]. Exercise stimulates haemodynamic adaptation which leads to improved blood flow and blood pressure [35]. There is also evidence that exercise programmes as short as 4 weeks improved $\dot{V}O_2max$ in postmenopausal [73] and adult women [56]. Regular exercise results in increased blood flow into both skeletal and cardiac muscle and other body tissues as well as $\dot{V}O_2max$ [31]. Although its effect varied across different types and volumes, engagement in exercise programmes matching current recommendation of physical activity has been extensively prescribed as the first-line strategy to prevent or treat elevated blood pressure [36, 56]. Public health recommendations have been established in many developed countries encouraging older adults to participate in either 150-minute of moderate intensity or 60 minutes of vigorous intensity exercise per week [26, 84]. However, a national survey confirmed that only less than 10% of US adults actually adhered to the current guideline [78]. Thus, the evidence seems to suggest the urge to seek out other approaches to gain the ultimate benefits of exercise among postmenopausal women.

Dietary modification has been recommended as a potential co-strategy which may amplify the benefits from exercise on countering CVD risk factors [5]. Recent studies indicated that consumption of exogenous dietary nitrate improved endothelial function by increasing NO bioavailability via the eventual reduction of nitrate-nitrite-nitric oxide pathway [24]. Dietary inorganic nitrate is reduced to nitrite by the facultative bacteria in the dorsal surface of the tongue and subsequently converted to NO when it is exposed by the acidic environment in the stomach [7, 54]. Nitrate is found abundantly (>250 mg nitrate/100 g) in vegetables such as beetroot, spinach, celery, lettuce, and watercress [34].

In recent years, studies have been conducted to investigate impacts of chronic (>1-week period) and single dose of beetroot juice supplementation on blood pressure in different populations with no participation in any supervised exercise training [24]. However, the results were still inconsistent, with some indicating lower values in both SBP and DBP [12, 23, 43] while some showing no effects on one or both variables [13, 32, 38]. Daily supplementation with 5.2 mmol NO_3^- from beetroot juice for at least 15 days was reported to reduce SBP and DBP [43, 79]. However, when the same drink was given during a shorter period or lower dose, no change was reported on blood pressure [32, 38]. Hence, the evidence still remains inconclusive depending on the dose and duration of supplementation. Furthermore, the chronic effect of nitrate supplementation taken during exercise program is still unexplored in postmenopausal women.

A recent review of beetroot juice supplementation studies suggested impacts on CRF [28] despite the ambiguous findings regarding its parameters. An increase in $\dot{V}O_2max$ was achieved after a few weeks of beetroot juice supplementation during exercise training [60, 65]. However it did not affect exercise performance [65]. On the other hand, there is some evidence on the improved performance measured as time-to-exhaustion (TTE), power output, or muscle and kinetic function after beetroot juice supplementation despite no change [47] and even reductions in $\dot{V}O_2max$ [7, 8, 41, 77, 79, 85]. Ingestion of beetroot juice during at least three days prior to a single exercise session was reported to help with mitochondrial efficiency [64], increased muscle and arterial oxygenation [14, 45, 57], reduced oxygen and ATP cost of exercise [8, 40, 48, 50], and higher ATP production [49]. Although evidence seems to be inconclusive, dietary nitrate indeed stimulates exercise tolerance via modulation in physiological and metabolic responses during exercise which may be translated into impacts on functional performance.

A few studies on the effect of beetroot juice supplementation during exercise programme have been recently conducted in adults of mix genders or younger individuals [60, 65]. At present knowledge, however, there is no current literature investigating chronic effect of this intervention in postmenopausal women experiencing reduced NO bioavailibility. Therefore, this study aimed to: 1) investigate the impacts of 3-week nitrate-rich beetroot juice supplementation during exercise programme on BP and CRF in healthy overweight postmenopausal women, and 2) generate appropriate sample size using power calculation based on data obtain in the present study.

METHODS

Participants

Study participants were healthy postmenopausal women aged between 45-65 years with body mass index (BMI) between 25-35 kg/m^2 and stable body weight for at least three months. Participants were Caucasian women based in Glasgow, non-smokers, with no more than thirty minutes of weekly planned exercise, and not on any dietary supplementation, medication, and weight-loss programme. Eligibility of participants was assessed by a Physical Activity Readiness Questionnaire (PAR-Q) and health screening questionnaire. This study was approved by the College Research Ethics Committee (CREC) of the University of Glasgow. Signed informed consents were obtained from all participants before the commencement of study.

Study design

This study was a preliminary trial with parallel and non-blinding design. Participants were randomly allocated into either nitrate-rich and exercise (NR+EX) or exercise-only (EX) group using an online random sampling test. Subjects allocated into NR group received daily beetroot juice supplementation while participating in exercise programme for three weeks. Meanwhile, those in EX group were only involved in the exercise programme. Participants continued their habitual diet and lifestyle apart from the given intervention. Before the intervention, a baseline blood pressure was taken in the morning after 12-hour overnight fast. Then on the next day, a second blood pressure was taken and fitness level was measured as well as body composition using a body composition analyser (TBF-300A, TANITA, Japan). During the fitness test, participants performed a submaximal cycle ergometer test to predict their $\dot{V}O_2$max. Participants recorded their dietary intake for two days prior to the baseline test on provided food diary. To minimise bias from dietary intake, participants replicated this baseline diet prior to the post-intervention test. Following the baseline test, participants were randomly assigned to one of the study groups and started the intervention immediately after the determination of their exercise intensity and duration. Upon the completion of the three-week intervention, participants were measured for their post-intervention outcomes. Protocol of the present study is summarised in Figure 1.

<table>
<tr><td rowspan="2">BP Day 1</td><td rowspan="2">Submaximal Test,
BP Day 2</td><td>Week 1
Bouts of cycling
600 kcal</td><td>Week 2
Bouts of cycling
750 kcal</td><td>Week 3
Bouts of cycling
900 kcal</td><td rowspan="2">Submaximal Test,
BP Day 1</td><td rowspan="2">BP Day 2</td></tr>
<tr><td colspan="2">Baseline Test</td><td colspan="3">Intervention Period</td><td colspan="2">Post-Intervention Test</td></tr>
</table>

Figure 1. Protocol of study

Exercise programme

All exercise sessions and fitness test were supervised by a researcher and performed on a cycle ergometer (Monark Ergomedic 874E, Sweden). The sessions took place at the Exercise and Metabolic Room (New Lister Building, the Glasgow Royal Infirmary) or Exercise and Physiology Laboratory (West Medical Building, University of Glasgow Main Campus). The intensity and duration of exercise was determined for each participant based on the data obtained during the baseline test. Intensity/workload was expressed as rotation per minute (rpm) of cycling multiplied by kilogram (kg) of load (rpm x kg). Using the obtained equation based on linear relationship between workload and mean value of oxygen consumption ($\dot{V}O_2$) during the last minute of each stage, intensity for each participant was determined which corresponded to 60% of participants' $\dot{V}O_2$max. Heart rate were recorded every five minutes

throughout the session using a short-range telemetry heart rate monitors (Polar S610i, Polar Electro Oy, Kempele, Finland) and RPE using 15-point Borg scale.

The exercise programme for participants involved several sessions of cycling, depending on participants' convenience, on a cycle ergometer to expend 600, 750, and 900 kcal during the first, second, and third week, respectively. Duration of exercise programme was calculated by taking 60% $\dot{V}O_2$max data to predict caloric expenditure per minute and how many minutes needed to match the expected weekly energy expenditure based on the consensus that approximately five kcals are burnt for every litre of oxygen consumed per minute. The last session of exercise was carried out on the last day of supplementation period, approximately 24-hour before the post-test.

Nitrate supplementation

Participants assigned to NR+EX group consumed daily inorganic nitrate supplementation for 21 days starting on the same day as the start of their exercise programme. Supplementation was administered as 70ml of beetroot juice containing 6.4 mmol NO_3^-/day (Beet IT Sport Shot, James White Drinks, Ipswich, UK). Table 1 summarises the complete nutritional composition of the beetroot drinks. A checklist form to record daily consumption of the juice was given to each participant. Participants were required to ingest the beetroot juice approximately three hours before they exercised and maintain the same time point of ingestion every day. Participants were required to refrain from the use of any kind of mouthwash products after taking the beverage.

Table 1. Nutritional values of daily dose of beetroot juice beverage (per 100 ml) [39]

Nutrients	Amount
Energy (kcal)	97
Fat (gram)	0.2
Saturated fat (gram)	<0.1
Carbohydrate (gram)	20
Sugars (gram)	13
Protein (gram)	4
Salt (gram)	0.3

Prediction of $\dot{V}O_2$max

$\dot{V}O_2$max is the amount of oxygen consumed at maximum heart rate. Submaximal test was carried out by participants at the Exercise and Metabolic Room (New Lister Building, the Glasgow Royal Infirmary) to elicit $\dot{V}O_2$max before and after the intervention based on a well-established protocol [30]. Participants exercised at steady pace with incremental workload starting at 50W or 40W depending on their level of fitness. Every three minutes, the workload was gradually increased at a rate of 15W by adding the load.

Pulmonary gas exchange data including oxygen consumption ($\dot{V}O_2$) and carbon dioxide production ($\dot{V}CO_2$) were monitored breath by breath throughout the test using a metabolic cart (Quark Cardio Pulmonary Exercise Test (CPET), COSMED, Italy). Participants wore a facemask connected to the machine which recorded the gas exchange analysis. A wireless heart rate monitor (Soft Strap Premium Heart Rate, Garmin, United Kingdom) was also worn around the chests and against the skin which monitored heart rate and transmitted the data to a computer device. Rate of perceived exertion (RPE) was indicated by participants using the 15-point Borg scale at the end of each stage. The test was finally concluded when participant's heart rate reached and stabilised at around 85% of the age-predicted maximum heart rate (HR max = 220 – age). $\dot{V}O_2$max was then determined by extrapolating mean values of $\dot{V}O_2$ obtained during the last minute of each stage to the age-predicted maximum heart rate. Using Microsoft Excel, mean values of heart rate and $\dot{V}O_2$ were plotted in a scatter chart to attain an equation based on their linear relationship which was then used to calculate their $\dot{V}O_2$max.

Blood pressure measurements

Blood pressure measurements were conducted on two consecutive days pre- and post-intervention. Blood pressure was taken during lab visits using a mercury-free sphygmomanometer (UM-102A, A&D Medical, Japan) with appropriate cuff for adults. All measurements were performed on the right upper arm with a stethoscope placed on the brachial artery. Measurement of blood pressure was

done in a relaxed and standardized manner, avoiding any measurement bias. Upon arrival to the laboratory, participants were asked to sit and relax for five minutes before having their blood pressure taken. When taking the blood pressure, participants sat with their backs supported and legs uncrossed, remained still, and silent throughout the measurement. When possible, day two measurement was taken in the morning upon participants' visits. Otherwise, participants took their home blood pressure measurement in the morning using an automated oscillometric blood pressure monitors (Boso-Medicus PC 2 Blood Pressure Monitor, Boso, Germany) provided by the researchers. Participants were facilitated with a brief training of taking home blood pressure measurements as well as an information sheet regarding the procedure and a table to record the readings. Mean values of blood pressure were calculated from two readings taken at two-minute intervals.

Dietary intake

Dietary intake was recorded during two days prior to baseline test. Participants were asked to provide information regarding the name of the foods, ingredients, as well as cooking methods. Where possible, estimations of the weight of the foods in metric were also recorded. Otherwise, portion size in household measurement was stated for each ingredient. A copy of the food diary was given to participants prior to the setting up of post-intervention trial to replicate.

Data cleaning and analysis

Data collected was first cleaned from outliers before analysis. Breath-by-breath $\dot{V}O_2$ and heart rate data obtained during submaximal tests were cleaned from any values above or below two-standard deviations (2SD). Statistical analyses were performed using Microsoft Excel and IBM SPSS 22. All variables were tested for normality using the Shapiro-Wilk test. Characteristics of participants within groups were analysed using descriptive statistic test. Since data was normally distributed, paired t-test was carried out to compare mean values of $\dot{V}O_2$max, SBP, DBP, heart rate overtime and characteristics between pre-and post-intervention within group. Independent t-test was employed to compare $\dot{V}O_2$max, SBP, DBP, changes in heart rate overtime, total energy expenditure, and characteristics between two groups at corresponding time point. In addition, repeated one-way ANOVA was performed to detect significant difference of heart rate at stages throughout the submaximal tests. Power calculation of the present study and sample size calculation were carried out using Minitab 17. Significant difference was set at 95% of Confidence Interval (CI) and p value <0.05.

RESULTS

Participants

Twenty-three women initially responded to take part in the study. Thirteen of them were assessed for eligibility, and nine women were finally cleared to participate in the study. By random allocation, four participants were assigned to NR+EX group and five to EX group. All participants completed the assigned interventions. No drop-out was reported throughout the study and data on nine participants were analysed (Figure 2). Mean age of participants in NR+EX and EX groups were 58.8±6.9 years and 57±7.3 years, respectively (p>0.05).

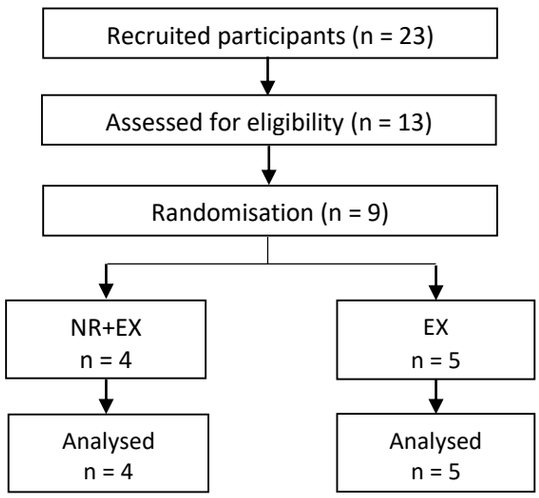

Figure 2. Flow chart of subjects' recruitment and participation in the study

Self-reported compliance towards daily beetroot juice supplementation was 100% even though a couple of participants found that the palatability of the given juice was not very pleasant. Participants tolerated the exercise programme well although sometimes reported about the inconvenience of the bicycle's saddle. All participants in both groups completed their exercise sessions and both groups expended similar amount of energy (Figure 3). Total energy expended over the 3-week exercise programme was not significantly different ($p>0.05$) between the two groups (NR+EX: 2299.2±499.6; EX: 2381.2±234.8 kcal). No serious complain was reported by participants regarding the given intervention.

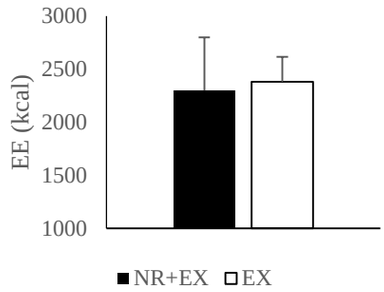

Figure 3. Total energy expenditure (EE) in nitrate supplementation and exercise group (NR+EX, n=4) and exercise only group (EX, n=5) during 3-week exercise sessions. Values are mean±SD (kcal). No significant difference was found between groups ($p>0.05$)

Body weight, percentage body fat, and body mass index

Impact of nitrate supplementation with exercise (NR+EX) and exercise only (EX) on physical characteristics is presented in Table 2. Before interventions, body mass, percentage of body fat, and BMI were not significantly different between NR+EX and EX groups ($p>0.05$). Both interventions had no significant impact on all measured anthropometric variables ($p>0.05$). Changes induced by interventions in body weight, percentage of body fat, and BMI were not significantly different between groups ($p>0.05$).

Table 2. Impact of nitrate supplementation and exercise programme (NR+EX, n=4) and exercise only (EX, n=5) on physical characteristics (values are mean±SD). No value was significantly different ($p>0.05$)

	NR+EX (n = 4)			EX (n = 5)		
	PRE	POST	Δ	PRE	POST	Δ
Body weight (kg)	78.3±10.9	78.1±11.5	-0.2±1.0	76.3±12.8	76.2±12.7	-0.1±0.5
Body fat (%)	41.3±4.7	39.8±4.3	-1.5±0.6	43.6±3.4	41.5±8.8	-2.1±2.1
BMI (kg/m^2)	27.4±3.0	27.3±3.0	-0.1±0.4	29.7±5.9	29.7±5.8	0.0±0.2

Blood Pressure

Effects of both interventions on blood pressure are presented in Figure 4. SBP was significantly reduced ($p<0.05$) in NR+EX group (Pre: 123.8±12.8 mmHg; Post 114.7±12.4 mmHg) and EX group (Pre 122.3±15.3 mmHg; Post 115.1±13.8 mmHg). No significant impact was found on DBP in NR+EX and EX groups ($p>0.05$). Figure 5 summarises changes in blood pressure following both interventions. Changes in SBP (NR+EX: Δ-9.0±3.4 mmHg; EX: Δ-7.2±2.3 mmHg) and DBP (NR+EX: Δ0.2±5.3 mmHg; EX: Δ-1.2±2.3 mmHg) were not significantly different ($p>0.05$) between both groups. Individual changes are presented in Figure 6. Reduction in SBP was found in all participants following both interventions while DBP was increased in two participants.

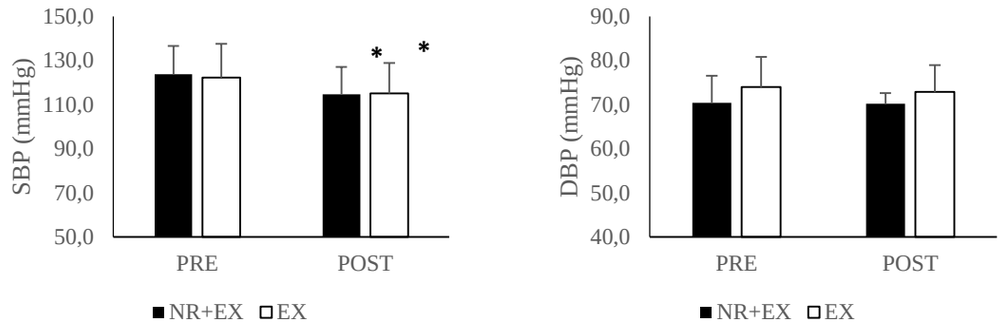

Figure 4. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) before (PRE) and after (POST) 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5) groups. Values are mean±SD (mmHg). * Significant difference from PRE within corresponding group (p<0.05)

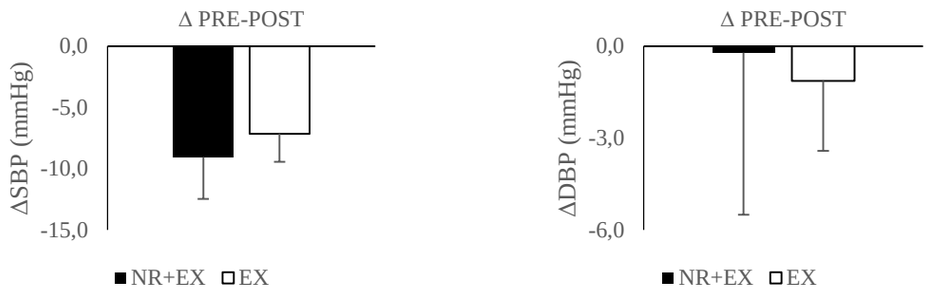

Figure 5. Changes in systolic blood pressure (SBP) and diastolic blood pressure (DBP) following 3-week interventions with nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5). Values are mean±SD (mmHg). No significant difference was found (p>0.05)

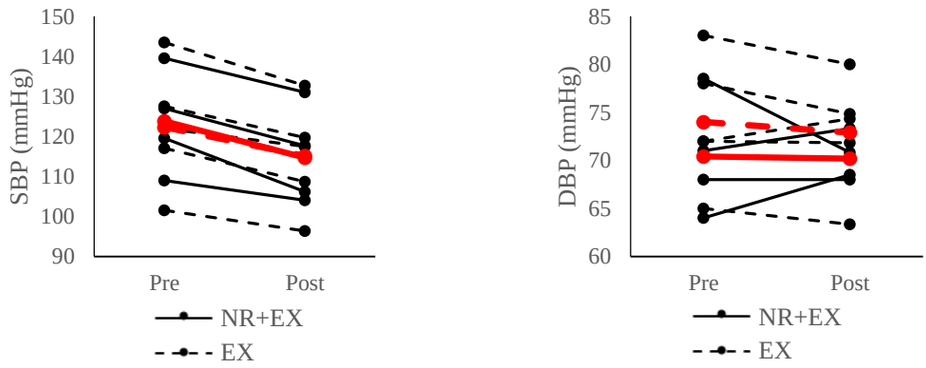

Figure 6. Individual changes (black lines) and mean changes (red lines) in systolic blood pressure (SBP) and diastolic blood pressure (DBP) following 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5) groups. Values are mean±SD (mmHg)

Cardiorespiratory Fitness (CRF)

Impacts of interventions on cardiorespiratory fitness measured as $\dot{V}O_2max$ are reported in Figure 7. In NR+EX group, $\dot{V}O_2max$ significantly increased (p<0.05) compared to baseline value (Pre 24.4±5.4; Post 26.4±5.2 ml/kg/min) while in EX group change was not significantly (P>0.05) different (Pre 21.3±1.0: Post 20.9±3.7 ml/kg/min). There was no statistical difference (p>0.05) in changes in $\dot{V}O_2max$ between both groups (NR+EX: Δ2.1±5.1; EX: Δ-0.4±3.3 ml/kg/min) (Figure 8). Individual changes in $\dot{V}O_2max$ are summarised in Figure 9. In NR+EX groups, all participant had increased $\dot{V}O_2max$ while in EX group, 2 participants experienced reduced $\dot{V}O_2max$.

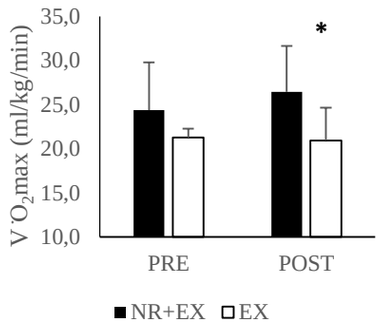

Figure 7. Maximal oxygen uptake (VO_2max) before (PRE) and after (POST) 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5) groups. Values are mean±SD (ml/kg/min). * significant difference from PRE within group

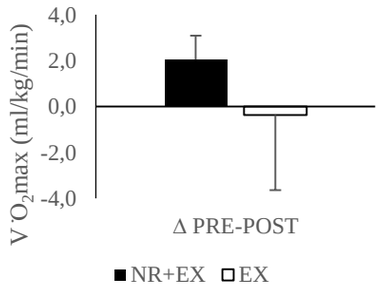

Figure 8. Changes in maximal oxygen uptake (VO2max) following 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5) groups. Values are mean±SD (ml/kg/min). No significant difference was found (p>0.05)

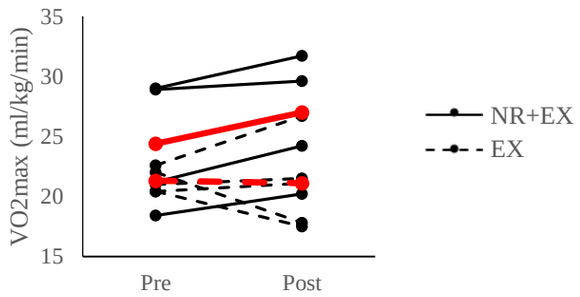

Figure 9. Individual changes (black lines) and mean changes (red lines) in maximal oxygen uptake (VO2max) (ml/kg/min) following 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5) groups. Values are mean±SD (mmHg)

Heart rate at each stage during pre- and post-interevention submaximal tests is presented in Figure 10. No significant change was found in heart rate following intervention in NR+EX and EX groups. Mean heart rate overtime during submaximal tests conducted before and after interventions did not change within and between groups (Figure 11). Changes in heart rate overtime were not significantly different between NR+EX and EX groups (Figure 12).

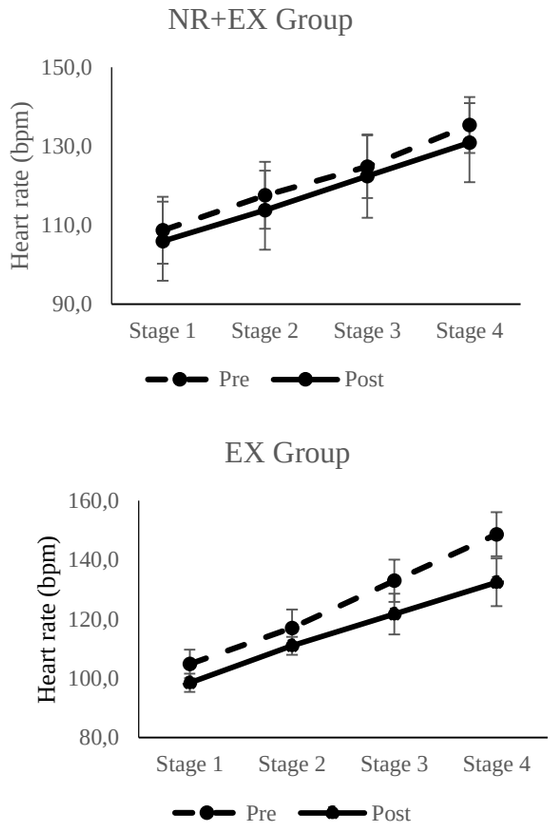

Figure 10. Heart rate (bpm) during stage 1 (50W), stage 2 (65W), stage 3 (80W), and stage 4 (95W) of the submaximal test before (PRE) and after (POST) 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX n=5) groups. Values are mean±SE. No significant difference was found (p>0.05)

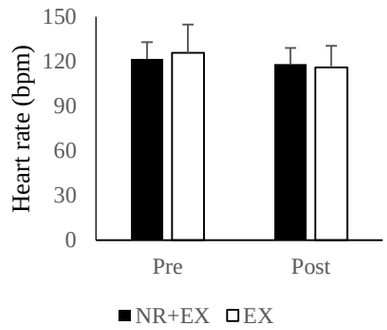

Figure 11. Mean heart rate overtime (bpm) during submaximal tests before (PRE) and after (POST) 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5) groups. Values are mean±SD. No significant difference was found (p>0.05)

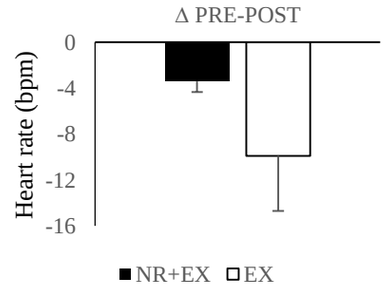

Figure 12. Changes in heart rate overtime (bpm) during submaximal tests before (PRE) and after (POST) 3-week interventions in nitrate and exercise (NR+EX, n=4) and exercise only (EX, n=5) groups. Values are mean±SD. No significant difference was found (p>0.05)

DISCUSSION

The present study was a preliminary study investigating the impact of three-week nitrate-enriched beetroot juice supplementation during moderate intensity exercise programme on blood pressure and cardiorespiratory fitness in postmenopausal women. This was the first study investigating this topic in postmenopausal women. The principal finding in this study was that three-week of supplementation with beetroot juice during aerobic exercise at moderate intensity substantially reduced SBP and increased $\dot{V}O_2$max, a measure of cardiorespiratory fitness [86], in postmenopausal women. However, the effect of the given intervention on $\dot{V}O_2$max was found to be not significantly different in EX group. Furthermore, changes in SBP and $\dot{V}O_2$max following both interventions were not significantly different between groups. This study also found a substantial reduction in SBP in exercise-only group where no supplementation was given. Thus, this preliminary study may suggest that co-ingestion of daily beetroot juice supplementation while participating in a 3-week moderate aerobic exercise programme did not significantly enhance the effect of exercise on lowering blood pressure and enhancing cardiorespiratory fitness. However, it is important to note that data obtained was preliminary and only nine participants were involved in the present study. Therefore, final conclusion can be drawn only when study was completed on a bigger number of participants.

Following three-weeks of incremental aerobic exercise, SBP was markedly reduced by 5.9% (-7.2 mmHg) in exercise-only group. When participants in NR-EX group consumed daily beetroot juice supplementation during exercise programme, the reduction was 7.3% (-9.0 mmHg) and this change was not significant in comparison to EX group. However, the present study was unable to demonstrate the beneficial impacts of nitrate supplementation and exercise training on DBP. These findings are in line with a recent evidence where the reduction in blood pressure from nitrate supplementation was limited to SBP at a rate relative to the dose and duration of supplementation. Siervo and colleagues (2013) summarised results from previous studies conducted in adults which investigated the acute and chronic effects of dietary nitrate supplementation up to 15 days on both components of blood pressure. Pooled analysis resulted in significant reductions in SBP by 4.4 mmHg and no change in DBP. This meta-analysis also performed a meta-regression analysis and established a strong association only between nitrate supplementation and SBP. [71]. In a previous study involving older and overweight population of mixed genders, 3-week supplementation with 8 mmol NO_3^-/day lowered SBP by 7.3 mmHg but did not influence DBP [38]. It may also be implied that even when a higher dose of supplementation was administered, this reduction was lower compared to finding in our study. This difference may be explained by the employment of exercise training along with supplementation in our study. Therefore, our findings may further emphasise the current evidence on the protective effect of prolonged nitrate supplementation on SBP and that the effect seems to be more pronounced along with regular exercise.

DBP was unchanged following both interventions in our study which may be elucidated by the insufficient duration of intervention and intensity of exercise. Exercise training in the present study was performed at moderate intensity (60% VO_2max) expending 600, 750, and 900 kcal energy during week 1, 2, and 3, respectively. A study in overweight and obese postmenopausal women employing exercise programme at different intensity demonstrated that aerobic exercise programme at low intensity was able to considerably reduce SBP while reduction in DBP was achieved only after high intensity [76] and at least 4 weeks of exercise [21]. Meanwhile, effects of nitrate supplementation with no exercise training on lower DBP were reported after at least 4 weeks of intervention [43]. However, these changes were more pronounced in hypertensive subjects and those taking BP-lowering medications compared to healthy subjects [21, 43]. Hence, the duration and intensity of our exercise programme were insufficient to elicit reduction in DBP considering our participants were healthy individuals.

Although both interventions in our study did not provide beneficial impacts on DBP, the reduction in SBP found in our study can be associated with improved cardiovascular health. In adults, reduction in SBP by 5 mmHg has been correlated with 17% reduction in risk of major cardiovascular diseases [2]. Our findings may suggest that regular aerobic exercise at moderate intensity may provide a range of cardioprotective effects and prevent CVD in postmenopausal women and that this effect may be more pronounced with daily beetroot juice consumption. However, further studies recruiting a bigger number of participants are needed to confirm beneficial impact of nitrate enriched beetroot juice on blood pressure.

A marker of CRF analysed in the study was $\dot{V}O_2$max measured during submaximal tests. Our study found no significant change in $\dot{V}O_2$max in EX group. This finding was not expected in our study since evidence has been consistently supporting the positive impact of regular exercise on improved fitness level. Based on current evidence, 8-week aerobic exercise was shown to increase $\dot{V}O_2$max in overweight women of younger age. [56] However, participants in this study expended a substantially higher amount of energy up to 1300 kcals/week compared to our study. Meanwhile, another study in postmenopausal women reported that increased $\dot{V}O_2$max was achieved after 12-week when exercise was performed at moderate intensity on cycle ergometer for 150 min/week [25]. It can be concluded that, without any supplementation, 3-week moderate aerobic exercise expending 600-900 kcals/week is not adequate to induce increase in $\dot{V}O_2$max.

Surprisingly, data on individual changes following 3-week interventions in EX group indicated two participants experiencing reduced $\dot{V}O_2$max by 2.9 and 4.2 ml/kg/min which may be explained by body weight gain. Even though body weight changes were neither statistically significant within or between groups, $\dot{V}O_2$max in our study were relative to participants' body weights as values are expressed in ml/kg/min. However, it is important to note that exercise programme in our study was not meant to significantly reduce body weight to avoid confounding from weight loss. Based on the total of calories burnt over the 3-week programme, only 0.3 kg of body weight loss could be theoretically expected from our exercise programme [44]. Hence, our study was able to isolate the effect of exercise and supplementation on changes in blood pressure and $\dot{V}O_2$max from weight loss.

Although $\dot{V}O_2$max did not improve in EX group, it is worth mentioning that mean heart rate overtime and during each stage of the post-intervention submaximal test were lower compared to baseline data. Following both interventions, subjects in our study constantly exercised at lower heart rate throughout the second submaximal test even though this reduction was not statistically significant. This finding may further amplify that both exercise and supplementation in our study were insufficient to reduce heart rate by a substantial number in our population. Indeed, it was previously reported that significant reduction in heart rate during exercise occurred after 10 weeks of high intensity exercise among middle-aged individuals [22]. This lower heart rate may be associated with improved exercise tolerance due to reduced oxygen cost of exercise to produce energy at the same work rate [18]. It may be suggested that despite the reduced $\dot{V}O_2$max, exercise with or without nitrate supplementation potentially stimulates physiological adaptation towards exercise, such as increased exercise tolerance, and likely to improve exercise performance.

In contrast to EX group, we found a significant rise in $\dot{V}O_2$max by 2.1 ml/kg/min (8.6%) in NR+EX group. Data on individual changes showed a consistent increase as experienced by all participants in NR+EX group. This finding is possibly the novel finding in the present study. To date, no studies have been conducted to explore the benefits of adding beetroot juice supplementation while undertaking an exercise programme in postmenopausal women. Recently, Muggeridge and associates (2017) investigated this topic with similar aims and designs employing 3-weeks of sprint interval training (SIT) and daily nitrate supplementation. $\dot{V}O_2$max increased in the group receiving SIT as well as group receiving SIT and nitrate by 5% and 6.3%, respectively, but these values did not significantly different between groups [60]. This finding further confirmed the evidence where a 6-weeks intervention demonstrated 9% and 5% increase in $\dot{V}O_2$max in nitrate supplemented and control groups, respectively. Both groups in this study performed exercise on a cycle ergometer at high intensity corresponding to 150 min/week [65]. However, these previous studies were all conducted in males of younger age with a relatively higher baseline of $\dot{V}O_2$max (42.4 and 60.5 ml/kg/min) compared to our study [60, 65]. It must be noted that our participants were overweight postmenopausal women with low baseline $\dot{V}O_2$max ranging from 18.4-29.0 ml/kg/min. Thus, it may be implied that daily consumption of beetroot juice along with regular exercise may help improve CRF regardless individual's baseline fitness level.

Despite the significant rise in $\dot{V}O_2$max in NR+EX group, this was not significantly different in comparison EX group possibly due to insufficient sample size to detect a significant effect. Furthermore, the increase in $\dot{V}O_2$max by 2.1 ml/kg/min in the NR+EX group may be insufficient to potentially induce clinical implications regarding cardiovascular health. According to a meta-analysis by [46], 1-MET (3.5 ml/kg/min of $\dot{V}O_2$max) increment in CRF was associated with 13% and 15% reductions in all-cause mortality and CVD events. Longer duration of intervention including higher intensity of exercise and dose

of nitrate supplementation are possibly needed to obtain the clinical effects of nitrate supplementation during exercise training. Thus, for post-menopausal women, taking beetroot juice while exercising at moderate or higher intensity may benefit cardiovascular health when maintained for a prolonged duration.

Our finding regarding the increased $\dot{V}O_2$max in nitrate supplemented group however was contradictive to previous study where nitrate supplementation was found to reduce $\dot{V}O_2$ during exercise [7, 41, 63]. Recently, findings from 29 RCT with placebo-controlled design investigating this topic were pooled and demonstrated a fall in $\dot{V}O_2$ by 0.29 and 0.33 ml/kg/min when measured during moderate (<60 ml/kg/min) and heavy (60-80 ml/kg/min) intensity exercise. However, some studies included in the review demonstrated acute effect of the supplementation where ingestion of supplementation happened within few hours prior to the trials [63]. A very recent study was conducted to distinguish the chronic effect of 4-week nitrate supplementation and sprint interval training (SIT) by allocating three study groups: nitrate and SIT, placebo and SIT, and control. It was demonstrated that both groups with exercise had lower $\dot{V}O_2$ but interestingly higher power output. More importantly, power output was significantly higher with nitrate supplementation [77]. It can be suggested that the beneficial effects of nitrate on exercise performance may occur although its association with $\dot{V}O_2$ remains inconclusive.

The present study may be attributed to some strength. In terms of study design, our present study compared two groups employing exercise training with one of these receiving nitrate supplementations. This grouping system allowed us to distinguish whether the reported beneficial effects, especially in NR+EX group, were obtained from exercise alone or in addition with nitrate supplementation. Moreover, total energy expenditure in both groups was matched. All exercise sessions were all supervised by at least one researcher which led to higher participants' compliances throughout exercise sessions. Our study also eliminated potential bias from dietary intake since the similar diet was replicated prior to both trials.

Interpretation of our findings, however, should also consider some limitations, with small sample size possibly being the major drawback. In terms of study design, the present study adopted a parallel design which might introduce bias from inter-individual variability. Additionally, placebo treatment was not carried out thus it was not possible to adopt blinding in our study that may introduce ascertainment bias. Analysis of plasma nitrate concentration was also not performed in our study. Data of this objective measurement would allow researchers to assess participants' compliance towards beetroot juice consumption. In addition, $\dot{V}O_2$max measured in our study was predicted from data during submaximal test and obtained from equations based on linear relationship between $\dot{V}O_2$ and heart rate. Maximal exercise is indeed a gold standard to measure $\dot{V}O_2$max. However, the practicality is often questionable in most situations [61] such as in our study involving elder women with a history of high sedentariness.

It is important to note that our study was a preliminary study since study on this topic has never been conducted in postmenopausal women. Therefore, the results of this study were used to calculate the appropriate sample size for future study. Our study involved a small number of participants (n=9) and may be attributed to low statistical power. This low power may explain the non-significant results of our study where chance of revealing the true effect of the given intervention is undermined [16]. Power calculation has been performed on the obtained data in our study and indicated that at least 10 participants in each group will be needed to attain 85% power. Even though no drop-out was reported in our study, attrition rate should be taken into consideration particularly when future work is to be conducted for a longer period of interventions.

CONCLUSION

The present study was the first study investigating the effect of 3-week nitrate-rich beetroot juice supplementation during aerobic exercise at moderate intensity on BP and CRF in postmenopausal women. Our study demonstrated a novel finding including increase in CRF measured as predicted $\dot{V}O_2$max in postmenopausal women and further supported the evidence on the cardioprotective impact of nitrate supplementation along with exercise (NR+EX) on SBP although the effect was not significantly different compared to exercise-only group (EX). These preliminary findings provides promising results and strong recommendations for further investigation in this topic employing a cross-over and double-blind design and longer intervention period in a bigger sample size. Overall, our study may endorse the potential

health effects of daily consumption of beetroot juice along with participation in exercise training programme in overweight postmenopausal women.

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THE IMPACT OF THE TINUTUAN EATING HABITS ON COMMUNITY IN THE MANADO CITY

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ABSTRACT

Background: Tinutuan or commonly known manado porridge is a traditional food of the people of Manado that comes from local food. Tinutuan is not just a filling food, but there are impacts felt by the people of Manado so that the power of tinutuan as a traditional food can survive amid the consumption style in this globalization era.
Objective: The purpose of this study to determine the impact of eating habits tinutuan traditional food that still exists, despite grappling with fast food in the city of Manado.
Methods: Research data obtained through observation, interview, document study by using qualitative approach. Informants were determined by purposive sampling with the principle of snowball sampling. Problem analysis uses relevant literature review theory.
Result: The results showed that tinutuan had an impact on health, social welfare and economic prosperity so it was found that imaging hegemony made the tinutuan eating habits unacceptable to be presented as a menu at the festival party.
Conclusion: It is recommended that the inheritance system of household tinutuan eating habits does not break.

***Keyword**: tinutuan, eating habits, health effects, welfare impacts*

INTRODUCTION

Eating can not be separated in human life. Whatever ethnicity, nation and culture. Although eating is influenced by the pattern of life of each society as an element of culture and local wisdom. The influence is one part that distinguish between ethnic communities in Indonesia. Differences in life patterns can be seen from the diet in the social organization, cultural behavior and can also be seen from the food ingredients it produces. Thus, each culture can grow and develop in accordance with the values, norms, rules and knowledge of each society manifested in cultural behavior and the forms of social institutions that apply.

Tinutuan is one of the local food community in Manado city as a form of culture. Most of the mixture consists of vegetable foodstuffs and has become an icon of this city has also been the slogan "city of Manado, Tinutuan city". Eating tinutuan is derived from the root of Minahasa culture which is hereditaryly implemented and is a cultural ritual of eating together that is held within the immediate family, in this case the existence of blood ties. However, it is not uncommon in a wider scope, such as the brotherhood of a tribe, although there is no blood relation. Kinship and gotong royong already felt in the first stage in the process of preparing food, because cooking is done together.

Culinary tinutuan is a socio-cultural reality that is inseparable from the socio-cultural structure of the Manado City community derived from the Minahasan ethnic food culture. Culinary tinutuan which is food is a cultural product that can be distributed to various communities. By groups existing in society, culinary tinutuan is the result of cultural diffusion modified in accordance with the cultural and environmental systems of the receiving groups.

Although, the diet in big cities has changed from traditional patterns that contain lots of carbohydrates and fiber into a modern pattern with high protein, fat, sugar and salt content (Muchtadi, 2001), but rich culinary rich vegetables remain a pattern of eating habits for the people of Manado City. Changes in eating patterns mentioned above because of the influence of globalization that has invaded almost all walks of life throughout the world since the 20th century ago. The symptoms that appear in

globalization can be said almost the same between one country with another country where the relationship between countries is now no longer limit (borderless). And what followed was that market civilization not only changed the local lifestyle into a global lifestyle, but also colored the development, resilience, and fate of various cultural products and civilizations that were labeled locally.

Tinutuan is one of the locally labeled food products of rural ethnicity in North Sulawesi Province, but also has been a habitual eating pattern in urban areas of North Sulawesi Province. Tinutuan not only from local food, but is a traditional food of nutritious ancestral heritage. The influx of globalization that can not be dammed in the culinary world to all the urban and rural areas in North Sulawesi Province and contributes to the fast food fast, the researchers feel the need to do a search about how the impact of culinary eating patterns as a local food tinutuan urban communities City of Manado in North Sulawesi Province.

Research purposes

To know the impact of tinutuan culinary eating habits as local food in urban area of Manado City in North Sulawesi Province.

LITERATURE REVIEW

A study of traditional eating habits in literature searching has shown that some research has become a reference and a support for authors to compare which parts of the study have not been touched. Among them are research by Rina Palisuan Pamantung (2015) in her research entitled "Taxonomy of Nomina Aspect of Food and Minuman Taste of Minahasa in Manado Malay Language" identifying, analyzing, and describing the naming system of food and beverage that appear on Minahasa cultural tradition based on folklore myth which has symbols and mythic values that function and meaningful as the concept of Minahasa culture. This research has relevance to the author's research because there are similarities in interpreting the culinary naming system tinutuan that appears in the tradition of Minahasa culture, and apply in the people of Manado City. The difference, the above representation has not yet covered the sections relating to this research, especially those related to the impact of culinary tinutuan to eating patterns in the city of Manado.

The results of research by Grace Debbie Kandou (2012) in Manado City with the title "Ethnic Minahasa Vulnerable Heart Disease?" Describe, that someone who consumed the type of food at risk of CHD (Coronary Heart Disease) such as swine pigs with eating frequency more than twice / month has the possibility of CHD 4.43 times greater than people who consume less than once / month, also someone who has a habit of eating fatty menus with frequent frequent risks recorded 5.4 times greater for affected CHD than those who eat rarely.

The results of that study after taking into account various factors such as gender, family history of CHD and diabetes mellitus. Interestingly in this study, Kandou recommends to the relevant agencies in this case the Ministry of Health to conduct extension efforts to the ethnic Minahasa community to reduce the frequency of eating menus that are at risk of CHD and replace foods at risk with types of foods that are not at risk, one of which is tinutuan. Therefore, Kandou's research is used as a comparison by researchers to lead to cultural studies, ie identifying impacts that affect the behavior of culinary eating patterns tinutuan on food frequency and diet patterns in the daily life of Manado.

The research conducted by Dwi Agus Setiawan (2012) under the title "Student Perceptions About Nusantara Food Course Materials", has similarities with the author's research, which is exposing perceptions about tinutuan. The difference is that Setiawan only explained the students' perceptions about the material of the Nusantara food course in Manado and not examine the impacts that affect the perception.

Similarly, with research Vinny Wasty Nanariaini and his friends with the title "Factors that affect the existence of culinary tourism activities in the corridor Tinutuan Wakeke Manado" can be used as reference writers. Despite the different targets and research sites Nanariaini and his colleagues also did not assess the impact of culinary existence of tinutuan. Some of the above studies indicate that research on the existence of culinary tinutuan to eating patterns in the city of Manado has not been studied. Therefore, the authors believe this research will add a positive discourse in order to improve the health status of the community by maintaining local food in Manado City, North Sulawesi Province.

Pattern of Eating Habits

According to Guthe and Mead 1945 (in Notoatmodjo, 2010), the pattern of eating habits is as the way individuals or groups of individuals choose, consume and use the available foods based on the sociocultural factors in which they live.

Culinary Tinutuan

Culinary tinutuan is one variation of nutritious food from basic ingredients mixture of green leaf vegetables, cereals and tubers so that can be eaten by all age groups including babies who have received additional food. Tinutuan also known as manado porridge, a typical breakfast or smokol food, generally eaten with side dishes and sambal. The side dish is nike (freshwater nike / sea fish), skipjack (fufu / smoked) fried, fried / roasted fried fish, tofu boiled / fried, mild / young corn cakes, and sambal / dabu-dabu roa or shrimp paste skipjack tuna that is preserved).

Local Food

Food is anything that comes from biological resources and water, whether processed or unprocessed which is destined as food or drink for human consumption (Soetardjo, et al, 2011). In relation to food security policy, the definition of food is grouped based on its processing, namely: 1) Processed food ingredients, ie food that required further processing, before finally ready to be consumed. Processing here is a process of converting basic materials into finished materials or semi-finished materials for a particular purpose by using certain techniques as well. Examples of processed foods are rice, sago making, wheat processing, cassava processing, corn processing, and so forth. 2) Unprocessed food ingredients, ie food that is directly consumed or does not require further processing. This type of food is often found for groups of fruits and some vegetables. Food raw materials in general can be said to be processed further or can be directly consumed (without processed).

METHODS

According Suparlan (1994: 25) that the target or study or research is social life or society as a holistic whole. Thus qualitative research emphasizes the nature of socially constructed reality and attaches value-rich inquiry. The research procedure that produces descriptive data in the form of written or oral words of people and behavior, and the meaning of the elements of form (objects, symbol activities) that can be observed and emphasize the true state of a research object.

In this study aims to reveal, understand, and know about the impact of culinary tinutuan in the pattern of eating habits Manado City using qualitative methods. In this study, an interpretive and naturalistic approach (Denzin and Lincoln: 2009) was applied to the subject of the study. This approach seeks to illustrate the phenomena occurring in Manado City society as a text and its natural context to understand, interpret and clarify the process, actions, meanings and implications behind the phenomenon from the perspective of the researcher. This phenomenon is not possible to measure accurately because fundamentally qualitative research depends on the observation of researchers in interaction with the community at a certain time. The design of this research is fluid may change directly related to the context and time. Thus, the emphasis is not on measurement, but rather on a holistic explanation.

The conducting of the research is focused in Malalayang sub-district on the consideration that this region represents various ethnic from North Sulawesi Province even ethnic from outside North Sulawesi Province, so there are different pattern of eating habits of tinutuan culinary or even have never consume them.

The type of data in this study is the type of qualitative data and supported by quantitative data. Types of qualitative data in the form of descriptions, and items relating to the existence of tinutuan, were delivered orally obtained during interviews with informants, especially in Malalayang sub-district. The data source consists of primary data and secondary data. Secondary data sources in this research are documents related to the impact of tinutuan in Manado city. Primary and secondary data will be analyzed using several theories related to this problem such as; gastronomic theory, deconstruction theory, and semiotics. These theories will not be tested but are used as guidelines for analysis by the researcher to answer emerging problems that are related to the impact of tinutuan in the customs of people in Manado City.

Each study would require respondents as informants. This study also requires information on data obtained from a number of informants. Informants are those who provide information, this information is also called the subject to be studied, because he is not only a source of data, but also determine the success of this research. In qualitative research, researchers with informants have the same position (Mulyana, 2001: 53).

The main data source in this research is informant who live in Manado City. Determination of informants as a source of data is based on the conditions put forward by Maskun (2005: 134), namely: 1) physically and mentally healthy. Physically healthy means not flawed in language and has a sharp hearing to capture the questions properly, while the spiritual healthy means not senile, and 2) can speak Indonesian. Data obtained from informants can be used as a complement of observation and documentation data.

In this research, to get information both in the form of secondary data and primary data used some technique that is interview, observation, and document. This is done because qualitative research is not intended to obtain generalization of findings, but rather to clarify the phenomena studied in depth and meaningful.

After all the data were collected, this study was analyzed by qualitative data analysis. Analysis of qualitative data Bogdan and Biklen (1982) in (Moleong, 2005: 248) is an effort done by working with data, organizing data, sorting it into manageable units, synthesizing it, finding and finding patterns, finding what is important learned, and decided what can be told to others.

The results of data analysis are presented formally and informally. Formally, the results of data analysis are presented in the form of photos, tables, drawings, and relationships between categories. Informal presentation of data can be presented in narrative form with written words in a variety of scientific languages. The presentation of the results of data analysis is done in a systematic and simple so easily understood by the reader. The entire study will be prepared in the form of a major report relating to this research problem.

RESULTS AND DISCUSSION

The existence of culinary tinutuan brings changes to ideas and praxis in the pattern of eating habits in the city of Manado. Pronunciation of praxis of culinary eating patterns of tinutuan has a positive and negative impact. The impact of culinary existence of tinutuan is health, social welfare, and economic prosperity. A look at it can be described below.

1. Health

Compared to other countries the quality of Indonesia's resources is still lagging behind. This is indicated by the position of Indonesia Human Development Index (IPM) which is in the order of 108 of 177 countries. The measure of the quality of human resources can be seen in HDI, while the size of the welfare of the community can be seen, among others, at the level of poverty and nutritional status of the community. HDI is an aggregate measure that is influenced by economic, educational and health levels. Percentage of poor people is also an important factor determining HDI.

In 2006 the poverty rate in Indonesia still reached 17.8 percent, which means that around 40 million people are still below the poverty line. Other facts show vividly about the growing poverty. Data from the Central Bureau of Statistics (BPS) in 2010 said that the number of poor people in Indonesia in March 2010 amounted to 31.02 million people or 13.33 percent.

Poverty is associated with poor food and health. Therefore, food and health can be likened to two sides of a coin. Two things that are simultaneous, can not be sorted or paralleled let alone separated. In the context of health, culinary tinutuan at the time found between the Dutch and Japanese, people do not know about the benefits than the food consumed. Understandable in the living conditions of the refugees, chased enemies so they have to hide for days in the woods that exist dipikiran them then how they should eat to stay alive. There is food which means there is life, so that whatever plants they encounter are picked and processed in a simple way, ie only by boiling.

According to a story obtained by Wiechart (2004) on gedy, the food that thrives in the middle of the forest, the place of refuge in wartime, and easily picked to meet the need for food. So what do the first person continue to be a continuous tradition, because when eating ged, they can survive and not die because of poisoning. Finally, gedy consumption continues to grow in motivation to live in the midst of

economic hardship and colonial times. In order for family members to eat, the words are 'a lot of makang (eat) vegetables so yanda (not) easy to get sick'.

Meanwhile, the tradition of making and consuming culinary tinutuan done generation after Japanese colonialism and in the era of independence, penetrated more widely from one village to another village. As proof of the village the ethnic areas Tountemboan and Tonsea have their own identity tinutuan name. Each acknowledges that the material used is healthy, they do not want to care or think of rationalization or scientific studies of the inventor and why culinary first tinutuan use gedi and staple vegetables. What is important to them is the same as the inventor's concept, that the vegetable's ingredients, the ingredients used when they were eaten did not bring death, so there was enough reason to consume them.

This is what they unknowingly have become a prevailing hereditary health myth. The value of ethnic culture has prevailed at the time, respecting differences between plurality on the grounds that identity and values are seen as definite. However, always in peroses become (becoming). This thinking also makes the writer very difficult to track down who the inventor first, what year and in which village, because no one knows. Wempie Uguy's informant revealed that life is difficult in colonial times, making feelings of gratitude can live let alone enjoy the food made by parents without having to ask where the source and for what eaten. First because of the hegemonic factor of parents, children can not be critical of their parents. The concept of a parent once analyzing something is psychological, and what it does is true so that its children must follow what is said or done. In this case, truth becomes single, and that is what Derrida calls "logocentrism," that is, looking at the truth or value of life is a matter of centralizing or centralizing the value of truth to one (Bertens, 2006). The shackles of parental hegemony at that time were interpreted to have a positive impact with the persistence of tinutuan culinary tradition until now. These impacts shape the mindset and behavior that is different from the people in the past. This assumption is not just a discourse.

Although it is difficult to know when, where and who first discovered this culinary tinutuan. However, as in the gastronomic motto that reads "food has its tale, cibus habet fabula", so does culinary tinutuan also have a story, be it about philosophy, philosophy, history of cultural behavior that becomes symbol, ritual, , and local wisdom of local people as well as character formers, identity and characteristic of a nation's identity, especially the region.

Characteristics of the identity of Manado City through culinary representation tinutuan make the tourists visit to try it directly in this culinary origin region. Unfortunately not all hotels provide culinary tinutuan. The lack of culinary delights held in the hotel has a negative impact, because the culinary hygine whose presence from outside the hotel can not be guaranteed the quality of preparation, processing, and presentation. Currently, the presence of culinary tinutuan not just food as the main human need. Society began to critically want to see the "world of life" behind culinary tinutuan. To quote Habermas (in Lubis, 2006), the term "world of life" relates to the horizon, knowledge, values, and norms he possesses, and forms the basis for judgment and opinion. The world of life is a generally accepted social reality but it does not mean something that can not be criticized and changed.

Scientists through science present as a representation to find out the answers to the curiosity of society. This seems to reinforce Horkheimer's opinion that traditional theory has failed to emancipatory theories, because of its neutrality to society (Piliang, 1998). Yet the science called by its supporters as neutral and value-free is in fact a dogmatism and an illusion, because their neutrality is an attitude that unconsciously supports the values of the positivist paradigm and maintains the status quo.

Scientists use science as emancipatory knowledge which emphasizes the importance of the role of science and technology as a tool for the process of humanization. Thus, science is not only descriptive. However, it is also related to the human interest (human interest) to increase his dignity. The decision to exercise the essence of science in particular with regard to culinary tinutuan depends on the assumption of society.

Every decision has an impact on yourself and others. Therefore, before making a decision considering useful or not, let alone related to foods that have an impact on health. In theology teaches age, fortune, soul mate and health is a gift of God Almighty who must be kept as good as possible. Maintaining health means "keeping" the food that enters the body.

Although concern scientists are constantly looking behind the dimensions and historical horizons of food. However, it can not stem the effects of globalization that bring significant and significant influence

in the life of Indonesian society. Globalization is competition, because it requires progress and speed. Balancing globalization, scientists also continue to advance and quickly present his work even gastronomy is talking about daily food problems always faced by everyone in Indonesia that has a major influence on the survival of nation and state.

Food is not as simple as the general assumption to sustain life, because there is a healthy diet. However, it cannot be consumed because it is classified as "not food". Although in the food contains many substances needed by the body such as carbohydrates, proteins, fats, vitamins, minerals, and others. Culinary tinutuan was not easy to change the perspective of the people of Manado City, if this culinary is a healthy local food.

Although conscious, lack of food can lead to malnutrition that lowers the body's resistance to infection, causing many chronic diseases, and cause people impossible to work hard. However, many of the nutritional problems stem from the inability of non-industrialized countries to produce enough food to meet the needs of their growing population. Only by increasing the production of food in the world and better methods of agriculture through science can problems be solved.

Advances in science technology with the presence of laboratory equipment and materials, supported by competent human resources produce the discovery of nutrient content contained in food ingredients in culinary tinutuan and its impact on health. It turns out that behind the old man's words 'eat lots of vegetables so that no pain', when consuming gedy and other vegetables, have health effects that with technological progress has been tested for its truth. Similarly, the impact felt by Mother Joice Marasi by eating culinary tinutuan every day, then the diet program to manage the body with a healthy diet is met.

The explanation of the positive effects above, describing every ingredient of food used in culinary tinutuan there are so many positive impacts for human health. If, just about every ingredient, has had a positive impact in large quantities, of course a greater positive impact on health is derived from the mixture of ingredients in culinary tinutuan. However, the dietary needs, especially culinary tinutuan not only closely related to health but also related to individual perspectives. How individual behavior sees culinary tinutuan, when culinary tinutuan is present through a process (long enough), eaten, and believed to bring positive effects for individuals and their descendants.

Culinary tinutuan is a healthy food, each food contains the nutrients needed by the body. However, health impacts will be meaningful when the input, process and output of culinary tinutuan in healthy contextations. Not infrequently healthy foods become unhealthy. For example, cases of ice poisoning of brenebon beans in Manado City, dozens of people became victims even 1 (one) person died (Anonymous, 2014).

Even negative impacts, not impossible to happen in culinary attractions tinutuan, wheelchair, and hotels one-star. That, because the one-star hotel does not provide culinary menu tinutuan as a tourist gastronomy and history. Although culinary tourism tinutuan provide. However, using the sales deadline. The situation, a negative impact for tourists who want to consume culinary tinutuan healthy to be sick because of hunger and not guaranteed culinary hygiene tinutuan obtained from outside the hotel. Not to mention the environmental health problems with the use of plastic food ingredients that endanger health as used by informants Mrs. Hartati Lesmana.

2. Economic Welfare

Culinary tinutuan healthy food, because it consists of several nutrient composition needed by the body, filling and economical. Borrowing the economic principle that says suppress the least possible losses and make as much profit as possible. Healthy foods need not be expensive. Similarly, the representation of economic principles in this tinutuan culinary eating patterns can be felt by the family. Making culinary tinutuan as a pattern of eating habits, then the expenditure for the treatment of diseases due to malnutrition and excess nutrients does not exist. In addition, minimize expenses to buy some foods that filling, and contain carbohydrates, vitamins and minerals that the body needs, because one type of culinary menu tinutuan already filling, and there are some nutrient content. Also the value of the economical price, either self-processing or buying.

The pattern of tinutuan culinary eating habits can improve the family welfare by making it an economic opportunity that affects the improvement of the family's financial economy. Small financial economy capital can take place at home, like most food stalls. If you have a bigger financial economy, a restaurant venue, a school or college cafeteria and an office, or in other public places such as a market.

The impact of this tinutuan culinary business has been felt by business actors in the culinary area "Wakeke Manado". In accordance with the results of research Budianti, et al (2014) at one of the restaurants of the existing restaurant, "El-Shadai" shows the restaurant business has a profit of Rp.13.829.942, - every month. The rationale for food outlets is growing because the business promises great benefits. The average of every restaurant serving the demand for culinary dishes tinutuan fifty to one hundred and fifty portions.

Another case with Sance Tumiwa a widowed mother who started a business selling culinary tinutuan in his home food stall. The business he manages for about 20 years, and only the culinary menu tinutuan has made him able to send his two children to undergraduate. Even with this effort his son was able to build a house and buy two-and four-wheeled vehicles.

Nevertheless, the economic improvement of tinutuan business is influenced by several factors that have negative impact on some small financial economy actors, so stop or go bankrupt to sell culinary tinutuan. Among other things, the inability factor to compete with global food hegemony, such as Kentucky Fried Chicken, McDonald's, and Pizza Hut on consumer interest, especially young people. This is because, the development of global television as a fundamental business building has put the core activities of consumer culture, visual-based advertising, in the front row of its activities (Mattelart and Mattelart, 1992). In fact, it's not just television. However, mobile phones, computers and all Internet-based communications tools are central to the production and reproduction of promotional cultures for global capitalism.

These small financial economic actors can not afford the use of a global commodity visual image to create a brand with added value or commodity marks. Let alone for global commodities, only regional territorial commodities can not afford. They are only able to advertise in front of their restaurant with handwritten on a piece of cardboard or triples in the arena of imaging war with symbols as identity. If, this small finance economy is only able to use baliho generally the size of one and a half meters with hyperrealitas information and imaging. According to Buadrillard, the delineation of the structure of social meaning comes from external agencies such as advertising and media, whereas according to Douglas and Isherwood, the production of social meaning is seen as a relatively autonomous form of cultural action (Lee, 2006: 50-51).

In relation to the above context the use of advertising and media is not a factor causing economic actors to go bankrupt or close the business. However, there are other factors causing the negative chaos of human resources and place and utensil facilities. The above statement has the meaning of culinary tinutuan can be a commodity for the financial improvement of the family economy. However, in order to survive, it can even be a down-to-earth food, culinary tinutuan should be commodified by the availability of media used such as room, dinnerware, seating and tables, and quality service.

The essence of this quality service is courtesy of "politeness of manners combined with kindness" (compassion, comportion combined with kindness). The goal, so that customers feel comfortable, memorable, feel welcomed well, respected, cared for, and humanized. Courtesy in this case means that the customers who come in the book

The essence of this quality service is courtesy of "politeness of manners combined with kindness" (compassion, comportion combined with kindness). The goal, so that customers feel comfortable, memorable, feel welcomed well, respected, cared for, and humanized. Courtesy in this case means that customers who come not just buy culinary products tinutuan, but also the comfort and core of the service (courtesy) culinary business tinutuan (WA Marsum, 2005).

Positive impact on family welfare also in family and social kinship. Culinary tinutuan can be consumed by all family members and social environment when eating together. All family members can gather in one taste. When, all doing consumption activities, then social interactions can be done well, and communication relationships went well. However, there will be a disorder in one community, although only one family member or one community in a social environment can not eat because of binary segmentation factor. Meaning, culinary tinutuan can unify binary segmentation differences; character, age, finance, education, religion, social, and gender. Even deeper meaning, that is harmony and mutual respect and feel that all family member or social have their own function, although small still mean. Like all ingredients of food as a sign in the marker (culinary tinutuan). Markers present without gedy or any

other type of food, then the marker (meaning) culinary tinutuan was reduced the amount of nutrients to meet the needs of the body.

Although culinary tinutuan can be present in the pattern of family and social eating habits that have a positive and meaningful impact, the culinary irony of tinutuan has never been present as a dish at the wedding and traditional feast / thanksgiving party. Compared to the Sangir islands, Talaud, Siau and Tagulandang in the same province as Manado City, in all social and government events, tubers that became their eating patterns, were present as dishes. Even when the event was held in Manado City. When the author asked the reason behind the absence of culinary tinutuan in the two events the Queen was unable to find the answer.

Rattu's comments are also supported by Wempie Uguy who said that culinary tinutuan more attractive for those who are elderly than consume other party dishes that contain lots of fat and cholesterol. However, the statements of these two men, in contrast to Meisy Manopo. According to him, the image built by the community that culinary tinutuan not appropriate as a wedding feast. Is something embarrassing to embarrass the party guests by providing vegetable dishes. Similarly for the traditional party / thanksgiving dishes.

From the perspective of these three informants there is no trace. The fact, the absence of culinary tinutuan, because the value of the use of food is taken over by other values beyond that value, especially the value of the mark. As Gardner and Sheppard (in Pilliang, 2011) say, consumption is now the arena of hyper-reality, in which illusion and falsehood are packed through dazzling signs, making it look better and more real than reality itself, making people more comfortable there rather than in the real world.

Culinary tinutuan that became an icon, could become a family financial commodity, and become a pattern of family and social eating habits. However, unable to penetrate its representation as a local food at weddings and traditional feast / thanksgiving parties. If it says culinary tinutuan is a kind of vegetable food. However, why cap cae, whose composition is almost all made up of vegetables can be a meal. Even in all menu lists of restaurants and hotels offered for menu selections, cap cae is always recorded, and culinary tinutuan never existed. Is it because the cap cae menu is adopted from a foreign country (China) so it occupies a superior dish on the show 'superior', and culinary tinutuan local food marginalized on its own land.

There is a phenomenon of hyper-reality consumption here. Tinutuan cuisine is presented as a food that does not recognize binary segmentation; upscale, rich-poor in the themes of family and social events. These signs are deprived of the context and reality of their origin in both events which theme local places, atmosphere and imagery. Local food that lost its identity in the event itself, even marginalized, as a guest was not invited. In fact, amid the government's enthusiasm to strengthen its identity by introducing and motivating culinary consumption as a traditional food tinutuan through the race, and cultural promotion. This is what Pierre Bourdieu may have referred to (in Barker 2000), that taste is the practical driver of changing something into different and differentiating signs.

In addition, tinutuan culinary eating patterns also have a positive impact on the success of government programs in food diversification. Therefore, as much as any effort from scientists scientists can not change the public's assumption to replace staple foods with other foodstuffs. Various efforts are made in the development of food products through various forms of processed foods to replace these staple foods such as noodles, taro with the same value as a source of carbohydrates (Ariani, 2005). Although, these processed forms are consumed by the community can not change the consumption of staple food patterns such as rice or rice (Lumba, 2012).

Indeed, the food diversification program has not been able to succeed fully because of its very strong community attachment to rice consumption (Rachman, 2008). Rice is the most common source of carbohydrates consumed by the community, while Indonesia is rich in other carbohydrate sources such as cassava, corn, sago, taro and other tubers (Budjianto and Yuliyanti, 2012). The meaning of culinary eating patterns tinutuan able to replace the dependence of society. Consumption of most carbohydrates that rely on one type of food just like rice is no longer valid, because. sources of tubers and serelia, culinary tinutuan have diversified the food.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The description is as follows.

First, culinary tinutuan health effects because culinary tinutuan is a healthy food. Each of the foodstuffs used in culinary tinutuan contains the nutrients needed by the body. Therefore, culinary tinutuan have a positive impact. However, it has a negative impact if the input, process and output of culinary tinutuan in healthy con- textations are ignored. For example, it deals with preparing materials, tools, processing, and presenting them. It also includes preparing cooking and feeding utensils, selection of foodstuffs, and foodstuff leaching.

Second, the impact of economic prosperity when making culinary tinutuan as a pattern of eating habits, then the expenditures for the treatment of diseases due to malnutrition and excess nutrients does not exist. In addition, minimize expenses to buy some foods that filling, and contain carbohydrates, vitamins and minerals that the body needs, because one type of culinary menu tinutuan already filling, and there are some nutrient content. Also the value of the economical price, either self-processing or buying when culinary tinutuan made economic opportunities that have an impact on improving the family's financial economy.

Recommendations

In accordance with the objectives and research findings, the suggestions and recommendations that can be submitted are as follows. To the community and educational organizations the results of this study can be used as a reference for further research and can develop this research in the design of different research methods.

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EFFECT OF NUTRITION COUNSELLING AND COMPLEMENTARY FEEDING TOWARD A PICKY EATERS PRESCHOOL CHILDREN (AGED 3-5 YEARS) IN PUUWATU DISTRICT AREA KOTA KENDARI

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ABSTRACT

Background: Riskesdas data (2013) show that the prevalence of malnourished under five children is remained high (19,6%). Study in Jakarta also found that the prevalence of pre-school children who experienced by eating difficulty is 33,6% and among 44,5% are suffering from mild to moderate malnutrition. The purpose of this study is aimed to determine the effect of nutrition counselling and complementary feeding toward a picky eater pre-school children in the Puuwatu district area.

Method: This study was a quasi-experimental design with non randomized pretest-posttest group design. The population was all of preschoolers enrolled in kindergarten in the Puuwatu district. The sample of this study was 100 preschool children aged 3-5 years who have difficulty in eating (picky eater) in the kindergarten of Puuwatu district (divided into 2 groups 50 samples as the treatment group, and 50 samples as a control group). The data were collected by interview using structured questionnaires through the mother or caregiver along with physical examination of the child's health. Nutrient intake was obtained by filling out a 24-hour recall. Analysis was done through independent t - test.

Result: Picky eaters preschool children who are categorized inadequate of energy intake is 79%, while 22% categorized inadequate in protein intake. The result of study in nutrition counselling treatment groups with control groups shows there is a difference in energy intake between baseline (p=0.025) and endline of observation (p=0,006), likewise difference in protein intake between baseline (p=0.000) and endline of observation (p=0,000). In the complementary feeding treatment groups show the same pattern with nutrition counselling treatment groups there is a difference in energy intake between baseline (p=0.025) and endline of observation (p=0,003), also difference in protein intake between baseline (p=0.000) and endline of observation (p=0,000).

Conclusions: There is a difference in energy intake between baseline and endline of observation likewise difference in protein intake between baseline and endline of observation in nutrition counselling treatment groups compare with control groups. In the complementary feeding treatment groups show the same pattern with nutrition counselling treatment groups there is a difference in energy intake between baseline and endline of observation, also difference in protein intake between baseline and endline of observation.

Recommendation: Socialization of appropriate basic feeding rules is needed to be implemented by mothers or caregivers.

Keywords: *Nutritional counselling, complementary feeding, picky eater, nutrition.*

INTRODUCTION

Children aged 3-5 years is preschool children who are experiencing growth processes and classified as active consumers. This age range classified as golden age of a child growth and development especially related language, cognitive and emotional functions. To support the growth and development, nutritional intake takes play an important role.[1] Children with poor feeding practice from their mothers tend to have difficulty in eating and resulting reduced levels of consumption both of energy and protein. If this situation lasts long it will affect its nutritional status.[2]

Based on Riskesdas 2013 prevalence of underweight under five children is 19.6%, including preschool children (aged 3-5 years).[3] Whereas in Puskesmas Puuwatu the prevalence of underweight under five children is 13.3%.[4] Research conducted in Jakarta shows the prevalence of feeding difficulties in preschool children aged 4-6 years is 33.6% while 44.5% suffer from mild to moderate malnutrition, and 79.2% has lasted more than 3 months.[5]

Difficulty eating (picky eater) is the behaviour of children who experience eating disorders in the form of rejection of food, do not want to eat, length of time to eat more than 30 minutes, and only want to eat certain foods.[6] Difficulty eating in children is often associated with failure to grow. Failure to grow in general can be caused either by organic or non organic factors. Including organic factors such as abnormalities of anatomical structures, digestive system, metabolic abnormalities, mechanical obstruction, cranial nerve damage, food allergies, and dysphagia. While non-organic factors include psychosocial factors, inability of parents to provide adequate food intake, as well as ignorance / misinformation about how to feed the child.[7]

Child with picky eaters can experienced lacking of macro nutrients as well as micronutrients, which can ultimately interfere with physical growth that is characterized by less weight and height or difficulty to increase weight and also cognitive growth disorders.[5]

Harinda's research in Semarang shows that 96.8% of children have difficulty eating categorized as inappropriate feeding practice type, nutritional status of picky eaters children consist normal as much as 90.3% and 5.4% as underweight.

Improvement in coping the problem of difficulty eating is providing such as by nutrition counselling for parents/caregivers or by complementary feeding to children with eating difficulties (picky eater). Nutrition counselling is one of the effective communication process to help mothers in overcoming children feeding practice problem (picky eater). Nutrition counselling is provided with nine Guidelines for Feeding the Children or known as Basic Feeding Rules.[5,9] Complementary feeding (PMT) is an intervention to restore or increase the nutritional intake of picky eater in the form of additional food outside of food consumed by children in their family environment.

Based on some problems related to feeding difficulties (picky eater) in preschoolers, the researcher tries to raise the problem of whether nutritional counselling and complementary feeding effect the preschool (aged 3-5 years) nutritional intake who have difficulty in eating (picky eater) at Puuwatu district of Kendari in 2015?

METHODS

The type of research in this study is experimental design (quasy experiment). The research design model is non-randomized experimental design or also called non-randomized pretest-posttest control group design.

Place and time research

This research was conducted from June to October 2015. The place of research located in some Kindergarten of Puuwatu sub-district Kendari, Southeast Sulawesi Province.

Population and sample

The population in this study was all preschool-aged children enrolled as Kindergarten students in Puuwatu sub-district Kendari. Samples in this study were preschool children who had difficulty in eating (picky eater), which amounted to 100 samples (50 samples of treatment group and 50 control group samples). The treatment group was a picky eater child whose mother was given counseling and supplemental feeding for child, while the control group was a picky-eater whose mother was not given counseling and was not given any additional food to the child. Inclusion criteria: Preschoolers who had nutritional status were wasting and underweight (based on indicator BB / TB, BB / U), have difficulty in eating (picky eater) with type inapropriate in feeding practice (parental miss perception) and parents/caregiver willing to participate (sign the inform consent) along with follow counseling.

Exclusion Criteria: Infantile Anorexia, Sensory Food Aversions, Posttraumatic Feeding Disorder, Feeding Disorder Associated with a concurrent medical condition.

Sample selection

1. The selection of the sample area is done by purposive sampling by selecting one sub-district which is estimated to have high nutritional problem especially wasting and underweight in preschool child (aged 3-5 years) in Puuwatu sub-district Kendari.
2. Samples of preschool children who experience picky eater are selected after screening by filling out a questionnaire and examining the preschooler to determine the type of picky eater.
3. Respondents in this study are mothers/caregiver who have children experienced picky eaters type inappopriate feeding practice and parental miss perception.

Data collection method

1. The general identity of the sample, the type of picky eater experienced is obtained by conducting direct interviews to the mother/caregiver based on the structured questionnaire.
2. Mother's nutritional knowledge and picky eater child eating habits; data collected through interviews using structured questionnaires.
3. Nutrition intake is measured by doing recall consumption (food recall) 24 hours for 2 consecutive days.

Research instruments:

1. The measuring tool used to determine the type of picky eater by using questionnaires and physical examination of the child.
2. Child nutritional intake recorded by food recall 24 hours form for 2 consecutive days, and done before, during and after the intervention.
3. Materials used in counselling are flipcharts, leaflets on feeding guidelines for preschoolers and materials on how to deal with Picky Eater in preschool children.
4. Provision of additional foods in the form of carrot pudding and balls-chicken ball sweet sour sauce.

Data processing and analysis plan

Data processing is done by computerized system. Data analysis was performed to test the variables studied by using independent t-test.

Data presentation

Presentation of data in the form of graphs, tables and accompanied by explanation of research results.

RESULTS

Table 1. General Characteristic of sample

Variables	N	%
Children		
Sex	51	51,0
Boys	49	49,0
Girls		
Age (months)		
12 – 36	1	1,00
37 – 72	99	99,0
Energy intake		
Inadequate	79	79,0
Adequate	21	21,0
Protein intake		
Inadequate	22	79,0
Adequate	78	21,0
Age get food		
0 – 6	86	86,0
7 – 12	14	14,0
Mother		
Knowledge		
Inadequate	83	83,0
Adequate	17	17,0
Attitude		
Inadequate	99	99,0
Adequate	1	1,00

Bivariate analysis

1. **Differences in nutritional intake of preschool children with difficulty eating in the baseline and endline of observation in the treatment group (mother was given nutritional counseling).**
   a. **Average energy and protein intake in the baseline and endline of observation**

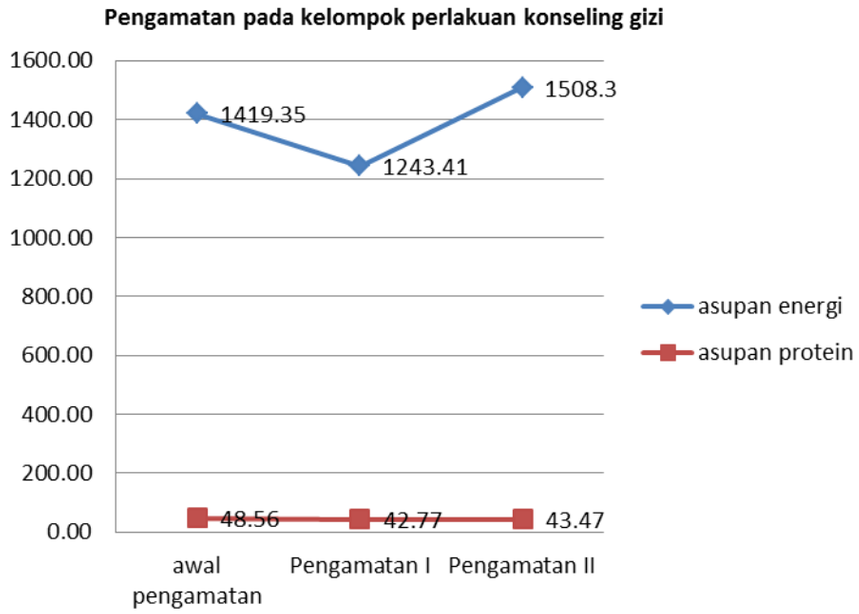

Figure 1. Graph of average energy and protein intake at baseline to end of observation for treatment group with nutritional counseling.

The average energy intake in the nutrition counseling group experienced an increase at the end of the observation. At the beginning of the observation energy intake of 1419.35 kcal, the first observation decreased to 1243,41 kcal and then increased to 1508.30 kcal at the end of the observation. In contrast to energy intake, protein intake tends to decrease. At the beginning of the protein intake of 48.56 grams, the first observation decreased to 42.77 gr, then 43.47 gr at the end of the observation.

   b. **Differences in energy and protein intake at baseline and endline of observation in nutrition counseling group**

Table 2. Differences in intake in the group of counseling interventions

Variables	Baseline	Endline	Sign (p)
Energy intake	1419	1508	0.392
Protein intake	48,5	43.4	0.081

2. **Differences in nutritional intake of preschool children with feeding difficulties at baseline and end of observation in the control group (mother/caregiver not given nutritional counseling).**

   a. **Average initial and final energy and protein intake in the control group for nutritional counseling treatment**

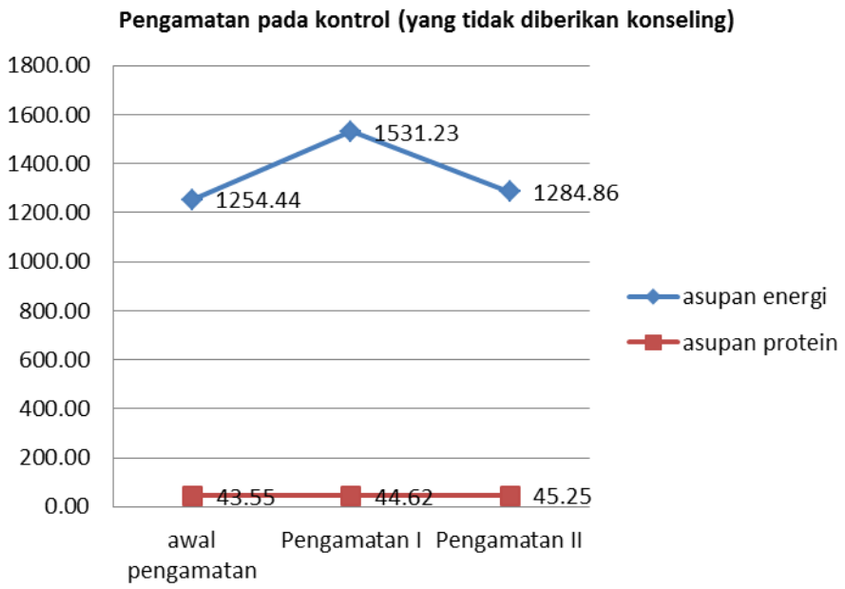

Figure 2. Graph of average energy and protein intake at baseline to end of observation for the control group (not given nutritional counseling).

   b. **Differences in energy and protein intake at baseline and end of observation in the control group (not given nutritional counseling)**

Table 3. Differences in intake control group counseling

Variables	Baseline	Endline	Sign (p)
Energy intake	1254	1284	0.000
Protein intake	43,5	45,2	0.000

3. **Differences in changes in nutrient intake between treatment groups and control groups at the beginning and end of the school**

Table 4 Differences in changes nutritional intake of treatment and control groups on nutrition counseling interventions at the baseline and end of observation

Variables	Baseline		Sign (p)	Endline		Sign (p)
	Treatment	Control		Treatment	Control	
Energy intake	1419,35	1254,44	0,025	1508,3	1284,86	0,006
Protein intake	48,56	43,55	0.000	43,47	45,25	0.000

At baseline, there is a difference between in the intervention group and the control group on energy intake (p = 0.025) and protein intake (p = 0.000). While at the end of the observation there is also a difference between the intervention group and the control group on the energy intake (p = 0.006) and protein intake (0.000). The result based on independent t test analysis shows the interpretation H0 rejected because the probability value <0.05.

4. **Differences in nutritional intake of preschool children with the treatment of complementary feeding at the baseline and end of the observation.**

   a. **Average nutritional intake of preschool children with complementary feeding treatment at baseline and end of observation**

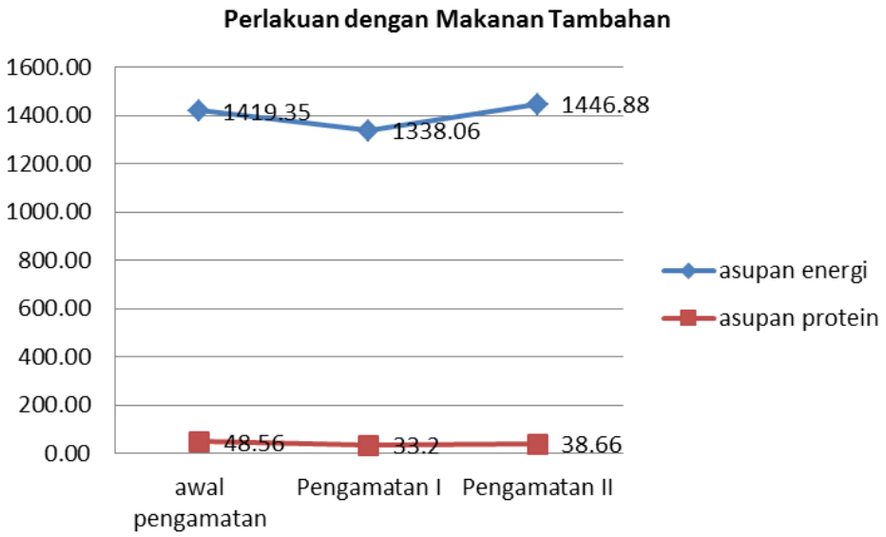

Figure 3. Graph of average energy and protein intake at baseline to end of observation for treatment group with supplementary feeding.

The average energy intake in the complementary feeding treatment group experienced a slight increase at the end of the observation. At the baseline of the observation energy intake is 1419.35 kcal, at the first observation decreased to 1338.06, then increased to 1446.88 kcal at the end of the observation. In contrast to energy intake, protein intake decreased. At the beginning of observation protein intake from 48.56 grams decreased to 33.2%, then increased again to 38.66 grams at the end of the observation.

b. **Differences in energy and protein intake at baseline and end of observation in the control group (not given complementary feeding)**

Table 5 Differences in intake in the group of supplementary feeding treatment at the beginning and end of the observation.

Variables	Baseline	Endline	Sign (p)
Energy intake	1419	1446	0.75
Protein intake	48,5	38,6	0.21

Based on table 5, the energy intake of preschool children at the beginning and end of observation in the treatment group did not have a significant difference (p = 0.752). While protein intake of preschool children at the beginning and end of observation in treatment group also did not have significant difference (p = 0.215). The result of the analysis using paired sample t test shows interpretation H0 accepted, with probability value > 0.05.

5. **Differences in nutritional intake of preschool children who have difficulty in eating who are not given complementary feeding (control group) at the baseline and end of observation.**

   a. **Average nutritional intake of preschool children who were not given complementary feeding (control group) at the baseline and end of the observation.**

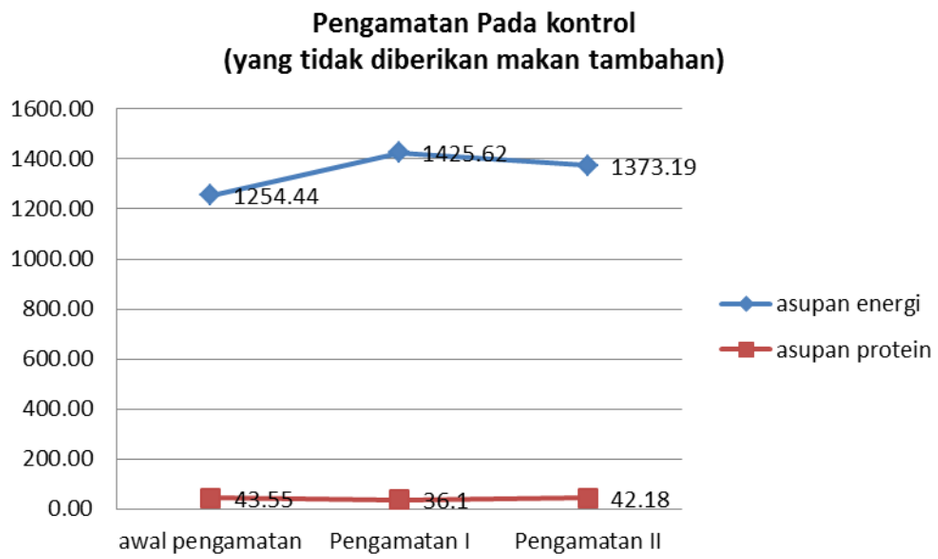

Figure 4. Graph of average energy and protein intake at baseline to end of observation for control group not given complementary food.

The average energy intake in the control group of complementary feeding treatment experienced a slight increase at the end of the observation. At the beginning of observation the energy intake is 1255.44 kcal, increased to 1425.62 kcal, then decreased 1373.19 kcal at the end of the observation. In contrast to energy intake, protein intake tends to decrease. At the beginning of observation protein intake of 43.55 gr, at first observation down to 36.1, then increased to 42.18 gr at the end of the observation.

b. **Differences in intake in the control group were not given additional food at the beginning and end of the observation.**

Table 6 Differences in intake in the control group were not given complementary feeding

Variables	Baseline	Endline	Sign (p)
Energy intake	1255.44	1373,19	0.19
Protein intake	43.55	42.18	0.00

Based on table 6, the energy intake of preschool children at the beginning and end of observation in the control group who were not given supplementary food did not have a significant difference (p = 0.186). While protein intake of preschool children at the beginning and end of observation in the treatment group had significant differences (p = 0.000). The result of the analysis using paired sample t test with interpretation H0 accepted, with probability value> 0.05 on energy intake, whereas H0 is rejected, with probability value <0.05 on protein intake.

6. **Differences in nutritional intake between treatment groups and control groups at baseline and end of observation**

Table 7 Differences intake of treatment groups at baseline and end of observation

Variable	Baseline			Endline		
	Treatment	Control	p	Treatment	Control	p
Energy intake	1419	1254	0,025	1446	1373	0,003
Protein intake	48,5	43,5	0,000	38,6	42,1	0,000

At baseline, there was a difference between the intervention group and the control group on energy intake (p = 0.025) and protein intake (p = 0.000). while at the end of the observation there was also a difference between the intervention group and the control group on the energy intake (p = 0.006) and protein intake (0.000). The result is based on analysis result using independent sample t test with interpretation H0 rejected because probability value <0.05.

DISCUSSIONS

1. **Differences in changes in nutritional intake between treatment groups (given nutritional counseling) and control group (not given nutritional counseling)**

The results showed that there was a difference between treatment groups (given nutritional counseling) and control group (not given nutritional counseling) on energy intake and protein intake at the beginning and end of observation.

The average of energy intake in the treatment group (given nutritional counseling) at the beginning of observation was 1419,35 kcal, whereas in the control group (not given nutrition counseling) was 1254,44 kcal. This shows the difference in food intake in preschool children who have difficulty eating. Provision of basic feeding rules education to parents / carers involved in the process of child feeding is an intervention that can be done to overcome the picky eater.

The result of this research is in line with research of Kadarhadi (2012), that is there is difference of nutritional status of children with feeding difficulties at the beginning and end of observation in treatment group whose parents are given feeding rules counseling seen from HAZ score.

Preschoolers are semi-active consumer groups, so the fulfillment of nutritional needs is still dependent on others, especially mothers or caregivers (Soedibyo, 2008). Differences in food intake in the treatment group (given nutritional counseling) with the control group (not given nutritional counseling) were caused by the mother's behavior on basic feeding rules. As many as 99% (n = 99) of preschool mothers / caregivers who have difficulty eating have basic feeding rules in less categories.

The results show that nutritional intake is strongly associated with mother and child rather than between father and child. In addition, the eating habits of parents have an impact on nutritional intake in preschool children (Oliveria, 2008). Research shows that poor feeding practices of the elderly or because of insufficient experience can cause the child to fail to grow (williams, 2005).

Types of feeding difficulties inappropriate feeding practice is a practice of feeding the child that is not in accordance with age or stage of development. Most of the improper feeding practices conducted by the subject's parents in this research in the form of feeding children while playing and watching television.

Feeding children accompanied by playing and watching television can cause children to be unfocused on their diet, so often children can not eat their food. In addition, improper feeding practices, but often encountered in this study, are child feeding that is incompatible with the age stages.

Management that can be done to overcome this problem of improper feeding practices is to provide education about basic feeding rulester to parents and all caregivers who are involved in the process of feeding the child.

2. **Differences in changes in nutritional intake between treatment groups (given PMT) and control group (not given PMT).**

The results showed that there was a difference between treatment groups (given PMT) and control group (not given PMT) on energy intake and protein intake at the beginning and end of observation.

The average of energy intake in treatment group (given PMT) at the beginning of observation was 1446,88, while in the control group (not given PMT) equal to 1373,19 kcal. This shows the difference in food intake in preschool children who have difficulty eating where the provision of PMT aims to increase nutrient intake, especially energy and protein on the recipient.

The study was inconsistent with the Mayasari (2011) study in schoolchildren aged 7-12 years, who stated that there was no difference in energy and protein intake between primary school recipients and non-PMT-US recipients. Supplementary feeding has not been able to contribute sufficiently to increase energy and protein intake in the recipients. It is influenced by many factors including nutritional content in supplementary foods not in accordance with the stipulated provisions due to limited funds.

Many factors that cause children to experience difficulty to eat (picky eater) such as history of exclusive breastfeeding and history of giving of breast milk. Preschool-aged children in Puuwatu sub-district have a history of breastfeeding and formula milk of 55%, while breast milk alone is only 28%, while 86% of preschool-aged children get food at 0-6 months. Supplementary feeding aims to increase intake, especially energy and protein intake for preschoolers that impact their nutritional status.

Basically eating is a learning process, so introducing the food menu in children should be done gradually. Starting from the finest textured food to the rough, from simple to complete side dishes. Then when the child is willing to do by him/her self, parents need to motivate thus the child feels comfortable and so eager to eat.

CONCLUSIONS

1. The energy intake of preschool children with category less than 79% and enough equal to 21%, while for protein intake category less by 22%, and enough equal to 78%.
2. There is no difference in energy and protein intake in preschoolers who have difficulty eating at the beginning and end of observation in the treatment group with nutritional counseling.
3. There is a difference in energy and protein intake in preschoolers who have difficulty eating at the beginning and end of observation in a control group that is not given nutritional counseling.
4. There is a difference in energy and protein intake in preschool-aged children who have difficulty eating in the treatment group with nutritional counseling with the control group (who were not given nutritional counseling) at the beginning and end of the observation.
5. There is no difference in energy and protein intake in preschoolers who have difficulty eating at the beginning and end of observation in the treatment group with supplementary feeding.
6. There was no difference in energy intake in preschool-aged children who had difficulty eating at the beginning and end of observation in the control group who were not given nutritional counseling, and there was a difference in protein intake in preschoolers who had difficulty eating at the beginning and end of observation in the control group who were not given nutritional counseling.
7. There is a difference in energy and protein intake in preschool-aged children who have difficulty eating in the treatment group with supplementary feeding with a control group (not given supplementary feeding) at the beginning and end of the observation.

RECOMMENDATIONS

The need to socialize to the Mothers / caregivers about the Basic Feeding Rules to be applied early for preschool children.

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NUTRITIONAL KNOWLEDGE AND CONSUMPTION PATTERN ON NUTRITIONAL STATUS OF SHIFT WORKER IN PUSAT KEAMANAN, KESELAMATAN, KESEHATAN KERJA, DAN LINGKUNGAN KAMPUS (PK4L) UGM YOGYAKARTA

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ABSTRACT

Background: Shift worker spends their time at the working field approximately 35% in every single day. Consumption pattern for instance snacking already more happened by night worker. Though it contains a lot of fat, salt, calory, and less fibre. Whether we have good nutritional knowledge and consumption pattern, it will make nutritional status become more healthier. Beside that, shift worker has different activity, sleep pattern, and lifestyle among common people.
Objective: To determine the relationship between nutritional knowledge and consumption pattern on nutritional status of shift worker in Pusat Keamanan, Keselamatan, Kesehatan Kerja, dan Lingkungan Kampus (PK4L) UGM Yogyakarta.
Methods: This study used cross sectional study design. Number of samples this study as many as 81 people were taken by purposive sampling. Statistic tests that used in this study were *Fisher test, Chi Square test, Mann Whitney test*, and logistic regression.
Result: For general, subject has obesity category. Relationship between nutritional knowledge and nutritional status has 0.04 as p value (*Fisher test*). Food consumption and nutritional status has >0.05 as p value (*regression logistic test*). Fast food frequency and nutritional status has 0.5 as p value (*Chi Square test*). Nutritional knowledge and energy, protein, fat, and carbohydrate consumption have 0.02, 0.03, 0.08, and 0.05 as p value (*Mann Whitney test*). Nutritional knowledge and fast food frequency has 0.24 as p value (*Chi Square test*)
Conclusion: There are relationships between nutritional knowledge towards nutritional status and energy, protein, carbohydrate. There are no relationships between food consumption and fast food frequency toward nutritional status and also nutritional knowledge towards fat consumption and fast food frequency.

***Keyword**: Nutritional knowledge, consumption pattern, nutritional status, shift worker.*

INTRODUCTION

According to Almatsier (2011), nutritional status is condition of the body as results from food consumption and usage of elements that contain full nutrition. Worker nutritional status affect several factors for instance food consumption, lean body mass, activity's type, worker factor, economic factor, nutritional knowledge factor, food optional factor, eat pattern factor, and environment factor (Ahmad, 2014). According to Frianie (2006), nutritional status is affected by food consumption. Consume some foods equal to consume one or several nutrition elements. So that whether someone has less consumption about food, then it allows less nutritional status too. Food consumption is affected by habit or consumption pattern. The change of consumption pattern into less carbohydrate, less fibre, and high fat become trend in this era. According to Trisnawati (2010), workers spend their time in working field approximately 35% in each day. So that they should consume good food as according to their work's type and burden. The Circadian Learning Centre, US said that night shift worker more riskable to get several disease for instance sleep disturbance, fatigue, heart disease, hypertension, gastrointestine disturbance and work accident. It is because change of biological time, eat pattern, physical activity, and also stress. According to Karlsson (2001) said that night shift worker more related with occurance of obesity. Night shift work that implemented at PK4L UGM make the worker's eat schedule become unregularly. Not only that, but also it does not belong to proper meal with less quantity and quality. Research about nutritional knowledge, consumption pattern, and nutritional status shift worker important to held because of shift

worker has different activity, sleep cycle, and life style rather than general worker.

MATERIALS AND METHODS

This research using analytic survey with cross sectional method. The subject's research is men as follows:

a. Inclusion criteria
   1) 3 rotation shift worker who work at PK4L UGM Yogyakarta min. 1 year
   2) Ready as subject and statement signature being subject and fill the questionnaire
   3) On duty during the research held
b. Exclusion criteria
   1) Worker who absent

The minimal sample numbers that belongs to inclusion and exclusion criteria were 6 people. While the research has begun, the number of sample that already include in this research was about 81 person. So that, it already include in minimal sample requirement. At research phase, nutritional knowledge data had been taken by using nutritional knowledge form. Consumption pattern data such as fast food frequency and food intake had been reached by SQ-FFQ form, then nutritional status data had been reached by Body Mass Index (BMI).

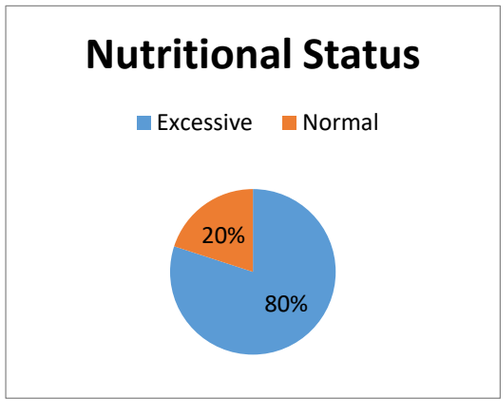
Analysis data of this research consist of univariat analysis and bivariat analysis. Univariat analysis had been done upon nutritional knowledge, fast food frequency, food consumption (energy, protein, fat, carbohydrate) and nutritional stats. While bivariat analysis using Chi Square, Fisher, Mann Whitney, and logistic regression.

RESULTS

This research had been held from February-March 2017. The general characteristic of subjects on table 3 are:

Variable	Amount	
	N	%
Age (mean=34)		
a. 17-25 years old	11	14
b. 26-35 years old	38	47
c. 36-45 years old	26	32
d. 46-55 years old	6	7
Education		
a. High school	78	96
b. University	3	4
Working time (mean=9)		
a. 1-10 years	40	49
b. 11-20 years	35	43
c. 21-30 years	4	5
d. 31-40 years	2	3
Smoking		
a. Yes	32	40
b. No	49	60

The explanation of subject's nutritional status is on picture 6



The correlation result between nutritional knowledge with nutritional status is on table 9

	Nutritional status		Total	P value
	Excessive n (%)	Normal n (%)		
Nutritional knowledge				
a. Less	7 (58%)	5 (42%)	12 (100%)	0.040[a]
b. Enough	59 (86%)	10 (14%)	69 (100%)	
Total	66 (81%)	15 (19%)	81 (100%)	

The correlation result between food intake with nutritional status is on table 10

	Nutritional status		Total	P value
	Excessive n (%)	Normal n (%)		
Energy intake				
a. Less	22 (88%)	3 (12%)	25 (100%)	0.556[a]
b. Enough	14 (74%)	5 (26%)	19 (100%)	
c. Excessive	30 (81%)	7 (19%)	37 (100%)	
Total	66 (81%)	15 (19%)	81 (100%)	
Protein intake				
a. Less	21 (87%)	3 (13%)	24 (100%)	0.459[a]
b. Enough	10 (77%)	3 (23%)	13 (100%)	
c. Excessive	35 (80%)	9 (20%)	44 (100%)	
Total	66 81%)	15 (19%)	81 (100%)	

Fat intake				
a. Less	10 (83%)	2 (17%)	12 (100%)	0.435[a]
b. Enough	13 (93%)	1 (7%)	14 (100%)	
c. Excessive	43 (78%)	12 (22%)	55 (100%)	
Total	66 (81%)	15 (19%)	81 (100%)	
Carbohydrate intake				
a. Less	25 (86%)	4 (14%)	29 (100%)	0.680[a]
b. Enough	14 (74%)	5 (26%)	19 (100%)	
c. Excessive	27 (82%)	6 (18%)	33 (100%)	
Total	66 (81%)	15 (19%)	81 (100	

The correlation result between fast food frequency with nutritional status is on table 11

	Nutritional status		**Total**	**P value**
	Excessive n (%)	**Normal n (%)**		
Fast food frequency				
a. Seldom	31 (86%)	5 (14%)	36 (100%)	0.502[a]
b. Often	35 (78%)	10 (22%)	45 (100%)	
Total	66 (82%)	15 (18%)	81 (100%)	

The correlation result between nutritional knowledge with food intake is on table 12-15

	Energy Intake			Total	P value
	Less n (%)	Enough n (%)	Excessive n (%)		
Nutritional knowledge					
a. Less	1 (8%)	2 (1%)	9 (75%)	12 (100%)	0.02[a]
b. Enough	24 (35%)	17 (25%)	28 (40%)	69 (100%)	
Total	25 (31%)	19 (23%)	37 (46%)	81 (100%)	

	Protein Intake			Total	P value
	Less n (%)	Enough n (%)	Excessive n (%)		
Nutritional knowledge					
a. Less	1 (8%)	1 (8%)	10 (84%)	12 (100%)	0.03[a]
b. Enough	23 (33%)	12 (18%)	34 (49%)	69 (100%)	
Total	24 (30%)	13 (16%)	44 (54%)	81 (100%)	

	Fat Intake			Total	P value
	Less n (%)	Enough n (%)	Excessive n (%)		
Nutritional knowledge					
a. Less	1 (8%)	0 (0%)	11 (92%)	12 (100%)	0.08[a]
b. Enough	11 (16%)	14 (20%)	44 (64%)	69 (100%)	
Total	12 (15%)	14 (17%)	55 (68%)	81 (100%)	

	Carbohydrate Intake			Total	P value
	Less n (%)	Enough n (%)	Excessive n (%)		
Nutritional knowledge					
a. Less	2 (17%)	2 (17%)	8 (67%)	12 (100%)	0.05[a]
b. Enough	27 (39%)	17 (25%)	25 (36%)	69 (100%)	
Total	29 (36%)	19 (24%)	33 (41%)	81 (100%)	

The correlation result between nutritional knowledge with fast food frequency is on table 16

	Fast food frequency		Total	P value
	Often n (%)	Seldom n (%)		
Nutritional knowledge				
a. Less	9 (75%)	3 (25%)	12 (100%)	0.249[a]
b. Enough	36 (52%)	33 (48%)	69 (100%)	
Total	45 (56%)	36 (44%)	81 (100%)	

DISCUSSION

From the result we know that generally the subject has excessive nutritional status. According to Hulsegge (2016) said that night shift worker who have a high night schedule (≥5x/months) tend to have less balance system rather than non shift worker. It makes they have more energy consumption, body mass index (BMI), waist circle, and twice more obesity rather than non shift worker. According to chi square test, the research shows that there are relation between nutritional knowledge with nutritional status. It is similar with research of Sada (2012) that said nutritional knowledge tend to has correlation using Body Mass Index (BMI) rather than waist circle. It is because of BMI is more sensitive than waist circle and also had been recognized as WHO's indicator for nutritional status measurement. This research is using Body Mass Index for that score.

In this research, good nutritional knowledge more happen to subject who has excessive nutritional status (over BMI or obesity) rather than normal nutritional status. It can be proofed by amount of obesity's subjects are higher than normal subject. Based on Acheampong (2013), good nutritional knowledge happen to obesity's subject because of several reasons such as limitation of subject for reading the nutrition fact behind at food packaging, difficult to consume healthy food, long processing food preparation, less access to healthy food, and the price of that meal is too high.

Some factors that affect obesity are less physical activity and modern consumption pattern (Simatupang in Epridawati, 2012). Based on that, we can conclude that nutritional knowledge is not the only one factors. Its indirect factor that can affect nutritional status. Although someone have good nutritional knowledge, it does not mean they will choose healthy food for eating. Moreover, good nutritional knowledge must be followed by real action for better nutritional status. Basic things to fight nutritional problem out is trained some people through social act and so on (Pahlevi,2012)

For general, food intake of subject categorized as high level. It is same with research of Mishra (2009) who said that food intake especially energy, fat, and protein on INDAL industry's worker India shows in high level rather than *Recommended Dietary Allowances* (RDA) value. Excessive energy comes from fat intake and protein intake, especially for worker with many activities.

For Chi Square result, this research shows that there is no correlation between food intake with nutritional status. It is same with research of Rinanti (2014) that said it happen because there are several factors that can be affects such as infection disease, eating portion not prescribed by the regulations, amount of family member, low income, less food variation, and environment sanitation.

Actually, excessive food intake negating the overweight and obesity directly based on UNICEF (1989) and Syahrir (2013) research. The difference between this research with others is about the limitation for instance data making is already done at the same time. It can make the impact and cause unclearly. Using SQ-FFQ is going to be risky (unprecise result) because of the subjects do not explain what they had eaten for last 3 months. It is also tend to be overestimate/underestimate

From this research we know that these subjects often consumed instant noodle rather than the other food. Lorenzo (2003) said that night shift worker whose 35-60 years old tend to consume food which less fibre, high non-nabati protein, high fat, and high glycemics index. Those food categories can increase their fat.

Chi Square result said that there is no relation between fast food frequency with nutritional status. This research is not same with Estima's research on 2014. It shows that there is correlation between 3

times/week fast food consumption with excessive nutritional status. This difference is already happen because of the limitation for instance data taking which is fast food consumption and nutritional status already done at the same time. So its can make the impact and cause unclearly. Beside that, there are several factor that can be affecting fast food consumption which is not include to this research such as income, eating habit, access to food source, and so on. Using SQ-FFQ is going to be risky (unprecise result) because of the subjects do not explain what they had eaten for last 3 months. It is also tend to be overestimate/underestimate

Chi Square result shows that there is correlation between nutritional knowledge with energy, protein, and carbohydrate intake. Its same with Dewi's research on 2013. She conclude that the level of someone's nutritional knowledge will be affect to their attitude and behavior for choosing and eating some foods. Whether more variation consumption , it equals to higher energy and protein value to dietary allowance. Bad nutritional status come up from nutritional problems such as lack nutritional status and mistake in choosing food.

Based on this research, there is no correlation between nutritional knowledge with fat and also between nutritional knowledge with fast food frequency. This result is not same with An (2016) who said that there is correlation between nutritional knowledge with fast food frequency. Less nutritional knowledge followed by more fast food frequency consumption such as high energy, high fat, and high salt. Worthington (2000) in Putri (2015) said that factor which can affect consumption patterns are internal factor (BMI, age, gender, belief, value and norm, food choosing, physiology needs, body image, self concept, psychososial development, healthy lifestyle) and external factors are economic, occupation, education, social culture, parent's role, alter ego, individual's experience, and media's influence.

This research is inappropriate with the previous research. Although someone has good nutrition knowledge, it does not mean they will choose healthy choice for eating. So that it needs real action from them. There are several reason that related to consumption pattern but its not being analyzed on this research. Later on, probably SQ-FFQ's food choice must being modification

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EFFECT OF *Coleus amboinicus* EXTRACT IN LOWERING TUMOR NECROSIS FACTOR- α (TNF- α) EXPRESSIONS ON CISPLATIN-INDUCED NEPHROTOXICITY IN WISTAR RAT

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ABSTRACT

Background: *Coleus amboinicus* (CA) extracts are known to have anti-oxidant activity, anti-platelet aggregations, anti-bacterial, anti-proliferative activity against cancer cells and anti-inflammation. The aims of this study is to evaluate of *Coleus amboinicus* (CA) extracts on cisplatin-induced nephrotoxicity by comparing the level of Tumor Necrosis Factor-α (TNF-α) expressions and level of serum Alkaline Phospatase (AP), Blood Urea Nitrogen (BUN) and Creatinine concentrations in Wistar rat.

Methods: Twenty-four male Wistar rats (Rattus norvegicus), 3 months of age with a body weight (BW) of 200-250 g, were allocated into three groups, with eight animals per group. The control group received CMC solution at 0.1 % (P0). The treatment group were treated with single doses of cisplatin (5 mg/kg bw., ip) (P1) and received 100 mg/kg bw, po, of the CA extracts (P2) respectively for 7 days. Bloods collected for analysis of serum alkaline phospatase (AP), serum creatinine and Blood Nitrogen Urea (BUN) concentrations. The levels of Tumor Necrosis Factor-α (TNF-α) concentrations were analysed by Avidin-Horseradish Peroxidase (HRP) Sandwich-ELISA. All groups were sacrified for histopathology.

Results: *Coleus amboinicus* (CA) extract has a relative fraction of flavonoids, terpenes, saponins, polyphenols and alkaloids by Thin Layer Chromatography. Quercetin as a marker compound of CA extract has stronger bind to the TGF-β1receptor (PDB code: 4X0M) than its of 3WA_601 ligand in silico analyzed. *Coleus amboinicus* extract significantly decreased the level of AP, BUN and creatinine concentrations compared to the control group ($p<0.05$). The level of TNF-α could be detected by its level significantly decreased in CA treatment group ($p<0.05$). In histopathological examination showed that cisplatin-induced severe multifocal hemorrhage, interstitial congestion, cell inflammatory, acute glomerular and tubular injury with necrotic cells.

Conclusion: This study was concluded that CA extract is proven to inhibit on cisplatin-induced Nephrotoxicity. The lowering of TNF-α expression could be indentified together with decreasing of AP, BUN and Creatinine levels in CA treatment groups. CA extract could be used as potential drug agent for cisplatin-induced Nephrotoxicity.

Keywords: *Coleus amboinicus (CA), Tumor Necrosis Factor-α (TNF-α), Cisplatin, Nephrotoxicity*

INTRODUCTION

Nephropathy is a form of acute renal failure characterized by varying lesions of glomerulosclerotic nodules, thickening of the glomerular basement membrane and mesangial cell proliferation, decreased glomerular filtration rate, high persistent albuminuria, high arterial blood pressure and fluid retention. Cisplatin is used to treat various types of cancer, including sarcoma and carcinoma. With a single dose of cisplatin (7 mg/kg bw) rats will develop nephropathy in six to seven days with serum creatinine and BUN increase, and the serum albumin level is reduced. Mechanisms in cisplatin nephropathy are inhibition of protein synthesis, DNA damage, mitochondrial injury and apoptotic cell death in the renal tubules. Cisplatin reduces the bioavailability of nitric oxide, which regulates monocyte chemoattractant protein-1, tissue growth factor and tumor necrosis factor-α, free radical (ROS) high, leading to renal injury and inflammation (1)(2)

Pathogenetically, nephrotoxicity known to involve a variety of cell signaling systems, such as vasoconstrictor factors, inflammatory mediators, growth factors and adhesion molecules. Several methods for studying the pathogenesis of nephrotoxicity has been developed to find an effective therapy,

the compound induced Nephrotoxicity by way streptozotozin, cyclosporine, anthracyclines, electrolytes, etelin glycol, cadmium, aminoglycosides, germanium dioxide, mercury chlorite, cisplatin and maleic acid (3). While the method of induction nephrotoxicity swab cisplatin(uric acid) has been used both as a single agent or predisposing the formation of nephrotoxicity (4) (5) (6) (7)

Chronic nephropathy lesions are one of the most commonly known spontaneous lesions in rats. Microscopic conditions of chronic nephropathy in rats are affected by strains, age, gender, diet, castration, hormonal, or calorie intake and chemical drugs. The pathogenetic mechanism of chronic nephropathy in rats is a complex and multifactorial disorder. Damage to the glomerular basement membrane, protein accumulation, glomerular hypertrophy or glomerular hyperfiltration. But cases of chronic nephropathy in rats do not result in a reduction in nephron function(8). Cisplatin is one of the most widely used and most effective chemotherapy drugs. However, the side effects on normal tissues and organs, especially nephrotoxicity of the kidneys, leading to death and inflammation of tubular cells (9), cisplatin are chemotherapy agents that are widely used and highly effective but have nephrotoxic effects (10).

Torbangun plants are known to have pharmacological activity in experimental animals, known as antioxidants, antiinflammatory, analgesic and antimicrobial both in vivo and in vitro (11), anti-inflammatory on rheumatoid arthritis (12), anti-convulsant (13), anti-inflammatory and antitumor in vitro (14), breast milk secretion stimulants (15), Enhancing neutrophil phagocystosis (16) and anti nephrolithiasis in experimental animals (17).

RESULTS

Based on the results of rats studied, cisplatin induction of mean blood urea nitrogen (BUN) level in control rats ranged between 51.83 mg / dL was still within the normal range (10-58 mg / dL) according to Mitruka and Rawnsley (1981). Group P1 significantly increased blood urea nitrogen (BUN) level 263.97 mg / dl compared to P2 group 129.0375 after cisplatin induction, compared with control rats ($p < 0.05$; Table 1). The creatinine levels in control rats were within the normal range 0.20-0.80 mg / dL according to Mitruka and Rawnsley. (1981). Creatinine levels in the P2 group showed an average increase of 1.93 mg / dL, and P1 of 3.2975 which was a significant improvement when compared to controls ($p < 0.05$). According to Roncal et al. (2007), creatinine levels in rats can improve after cisplatin induction. The standard test for determining the status of kidney function is by measuring serum creatinine and urine production, but serum creatinine measurements may not necessarily reflect injury to the kidneys (Shimada 2010. Kensara.2013). Ganguuan metabolism including cisplatin-induced nephropathy can be observed from the level of alkaline phospatase concentration (AP). In the P1 and P2 groups the blood chemistry test showed an increase in blood urea nitrogen (BUN) and creatinine, followed by an increase in AP levels of 531.38 U/I and 274.63 U/I. In the P2 group with 100 mg / kgbb extract significantly decreased AP levels when compared to group P1 ($p > 0.05$). The expression of TNF-α in treatment group P1 of 491.54 pg / mL, P2 of 323.13 pg / mL and P3 group of 308.65 pg / mL showed significant improvement ($p < 0.05$) than P0 control group 0.76 pg / mL. Increased expression of TNF-α shows the occurrence of inflammation process caused by induction of nephropathy with cisplatin in all groups of white rat treatment.

DISCUSSION

The increasing of serum creatinine (SR) and blood urea nitrogen (BUN) levels in this study were likely due to deposition cisplatin intra renalis. Blood urea nitrogen and serum creatinine clearance increased respectively, in nephrotoxicity rats as compared with controls, indicating kidney disease with a decrease in glomerular filtration rate and renal tubular necrotic. Based on histopathological changes showed decreasing renal function evidenced by hemorrhage, inflammation and necrosis of the renal tubules and sclerotic glomerulus (Figure .6). Based on standard tests to determine the status of kidney function is by measuring serum creatinine and BUN, but measurement of serum creatinine may not reflect the extent of the injury at kidney (6) (7). In group P1 blood chemistry test results showed an increase in BUN and serum creatinine, whereas the AP concentrations inceased at 531.38 U/I. In P2 group with received of 100 mg/kgbw CA extract no significantly decreased of AP at 274.63 U/I when compared with the group P1 ($p>0.05$) (table 2). From previous study, AP was not only equal to BUN indicating the degree of kidney injury but also increased AP showed the renal damage significantly. Furthermore, BUN levels are known to

be strongly influenced by many non-renal factors such as protein intake, dehydration, gastrointestinal bleeding, infection or steroid use (18). In this study, in group P2, expressions of TNF-α showed an average TNF-α of 323.13 pg/mL, which is a significant decreased significantly ($p<0.05$) with expressions of TNF-α (P1) at 491.54 pg / mL (table.3). The administration of *Coleus amboinicus* (CA) extracts to the cisplatin-induced nephrotoxicity rats significantly restored serum biochemical parameters to near control values. But also, CA extracts decreased creatinine clearance in cisplatin-induced nephrotoxicity rats, which exceeds the control values.

The results of Thin Layer Chromatography (TLC) analysis and identification were found that the CA extract contained flavonoid, terpen (essential oil), polyphenol, saponin and alkaloid (Figure .1). The results are consistent with the research report of Soni and Singhai (19) who analyzed phytopharmacologically, the CA has a highly variable content with dominant compounds such as flavonoids, essential oils, polyphenols and glycosides, and contains proteins, carbohydrates, amino acids, quinones, tannins And terpenoids (20)(11).

Flavonoids in natural plants have antioxidant content that has the potential as a natural preservative that can prevent the occurrence of allergies, not toxic and anticarsinogenik by increasing apoptosis of cancer cells. Flavonoids have a basic structure similar to tocopherol (vitamin E) with antioxidant activity and antiproliferation by inhibition of mast cell secretion. Treatment with medicinal plants, which has proved to be much safer than synthetic drugs, is an integral part of many cultures throughout the world and has gained importance in recent years. Medicinal plants contain a wide variety of free radical scavenging molecules, such as phenolic compounds, nitrogen compounds, vitamins, and some other endogenous metabolites,that are rich in antioxidant activity. From previous studies, which have demonstrated that polyphenols extracts of Hibiscus sabdariffa Linnaeus have been found to improve the renal function in experimental (21).

Cisplatin- induced has produced toxic effects on the kidney to increase serum creatinine and level of BUN clearance in rats, our study showed level of SR and BUN were decrease in rats administered CA stem extract when compare with P1 group. Therefore, the mechanisms of this effect in cisplatin-induced nephrotoxicity rats are not yet cleared. These results also indicated that CA stem extracts has the potential to repair and inhibit the progression of renal dysfunction induced by cisplatin apparently by preventing the morphological changes in the kidney. In cisplatin-induced nephrotoxicity, the increase of expressions of TNF-α, was considered as a compensatory mechanism to protect kidney from the damage induced by free radicals.

In silico study, showed that from the calculation of docking with computer program of Molegro Virtual Docker between ligand and receptor TGF-β1, it was seen that the value of rerank score of quercetin was -101,444.and this value was lower than lager scores of liver score 3WA_601 (- 63.460) (table.1). The lower value of the score score means that the energy required to form bonds between receptors and ligands is lower, which means that the bonds are formed more stable, so it can be predicted that quercetin has inhibitory activity against TGF-β1 receptors greater than 3WA_601 ligand. This is supported by the hydrogen bonds and amino acids involved in the ligand-receptor interaction process, wherein the 3WA_601 ligand binds only two amino acids (Asp 281 and His 283), while quercetin may bind 4 amino acids (Asp 281 , His 283, Gly 261, and Ser 280).

Conclusion

Treatment of *Coleus amboinicus* stem extract could be lowering Tumor Necrosis Factor-α (TNF-α) expressions and able to decrease of alkaline phosphatase (AP), Blood urea nitrogen and creatinine concentration on cisplatin-induced nephrotoxicity in rats.

MATERIALS AND METHODS

2.1 Materials

Twenty-four, 3 months old, Wistar rats (Rattus norvegicus) were allocated into three treatment groups: the control group P0 (n=8), had an received normal saline and; Group P1 (n=8), received of sodium carboxymethyl cellulose (CMC-Na) solution at 0.1% and the group P2 received 100 mg/kg bw of *Coleus amboinicus* extracts, once daily for7 days previously and both group P1 and P2 were induced with cisplatin single injection 5 mg/kg bw on the fourth day of experiment. At day 8th all groups were were euthanized for renal tissue collection. All kidney was stored in buffer neutral formalin (BNF) 10% for

histopathological examination with haematoxylin-eosin (HE). Blood was taken via intra cardial for identification of Tumor Necrosis Factor-α (TNF-α) and serum alkaline phospathase (AP), creatinine) and Blood urea nitrogen (BUN).

2.2 Methods

Identification of TNF-α was performed using by avidin-horseradish peroxidase sandwich Enzyme-Linked Immunosorbent Assay (Elabscience,Wuhan). All groups, renal function was evaluated using the colorimetric method (Creatinine and Blood Urea Nitrogen kit DiaSys Diagnostic Systems GmbH, Germany) to calculate the serum concentrations of Alkaline phosphatase (AP), Blood Urea Nitrogen (BUN) and serum creatinine (SR). This was done by measuring changes in absorbance values after 1 min in the sample compared with the standard solution. In-silico analysis by Molegro Virtual Docker 5.5 was used to predict the activity potency, flavonoid compound (quercetin) present in the *Coleus amboinicus* and used as marker compound, against TGF-β1 receptor (transforming growth factor β receptor type 1): 4X0M, which binds to the 4-amino-8H-pyrido (2,3-d) pyrimidin-5-one (3WA_601) ligand (PDB). This research complies with the ethical clearance with the registration number 747-KE from Animal Care and Use Committee (ACUC) Faculty of Veterinary Medicine Airlangga University, Surabaya, Indonesia.

2.3 Data analysis

All the statistical analyses were processed using SPSS for windows, version 22.0. Values of the measured parameters were expressed as mean value ± SD and the difference between the two groups was determined using unpaired student's t-test, and the significance was considered at p values <0.05.

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Conflicts of interest: none

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Figure legend (s)

Figure 1. Flavonoid (A), Terpen (B), Alkaloid (C), Polifenol (D), dan Saponin (E)
Figure 2. Structure of 2-dimensional molecule Ligand 3WA_601 (A) and Quercetin (B)
Figure 3. The secondary structure of the backbone receptor TGF-β1 with ligand 3WA_601 (A) and quercetin (B)
Figure 4. The 2-dimensional structure of the 3WA_601 ligand binds two Aspino 281 and His 283 (A) amino acids, and the Quercetin ligand 2-dimensional structure which binds to 4 amino acids Asp 281, His 283, Gly 261, and Ser 280 (B).
Figure 5. The 3-dimensional structure of amino acids at TGF-β1 receptors bonded by 3WA_601 (A) and quercetin (B) ligands.
Figure. 6. Morphological changes of hemoragea and necrotic lesion on glomerulus and tubulus with Interstitial inflammations of plasma cells on tubulus (Cisplatin-induced group). Focal inflamations by infiltration of polymorphonuclear cell on glomerulus and tubulus on cisplatin induced+ CA extracts group with hematoxylin eosin staining, magnification 400x (**A**).

Table(s)

Table 1. Rerank score of ligand against receptor TGF-β1 (kcal / mol)

ligan	Rerank score 1	Rerank score 2	Rerank score 3	Mean & standart deviation
3WA_601	-63,3113	-63,8678	-63,2010	-63.4600 ± 0,3574
Kuersetin	-100,6990	-101,7800	-101,8530	-101.4440 ± 0,6462

Table 2. Comparison of different serum levels of two markers were significantly elevated in cisplatin-induced nephrotoxicity with the control group

Group	Alkaline phosphatase (AP)	BUN (mg/dl)	SR (mg/dl)
Control (n=8)	185.63±33.92	51.83±13.07	0.68±0.30
cisplatin-induced (n=8)	531.38**±29.63	263.97**±32.64	3.29**±0.73
cisplatin+CA extract (n=8)	274.63*±46.99	129.03*±32.03	1.93*±0.41

Blood Urea Nitrogen (BUN) and Serum Creatinine (SR) were significantly elevated in the cisplatin-inducedversus control group. Anova P-value were < 0.05 (*)

Table 3. Comparison of different expression of Tumor Necrosis Factor-α (TNF-α) were significantly lowering in cisplatin-induced nephrotoxicity with the control group

Group	TNF-α (pg/mL)
Control (n =8)	212.95±56.55
cisplatin-induced (n=8)	491.54**±38.10
cisplatin+CA extract (n=8)	323.13*±38.86

Tumor Necrosis Factor-α (TNF-α)and were significantly lowering in the cisplatin-induced versus control group. Anova P-value were <0.05 (*)

Figure. 1

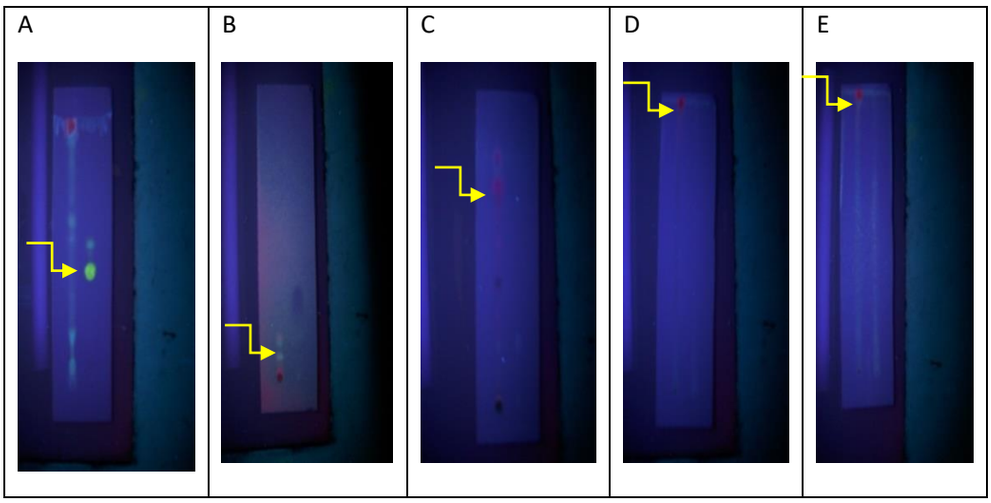


Figure. 2.

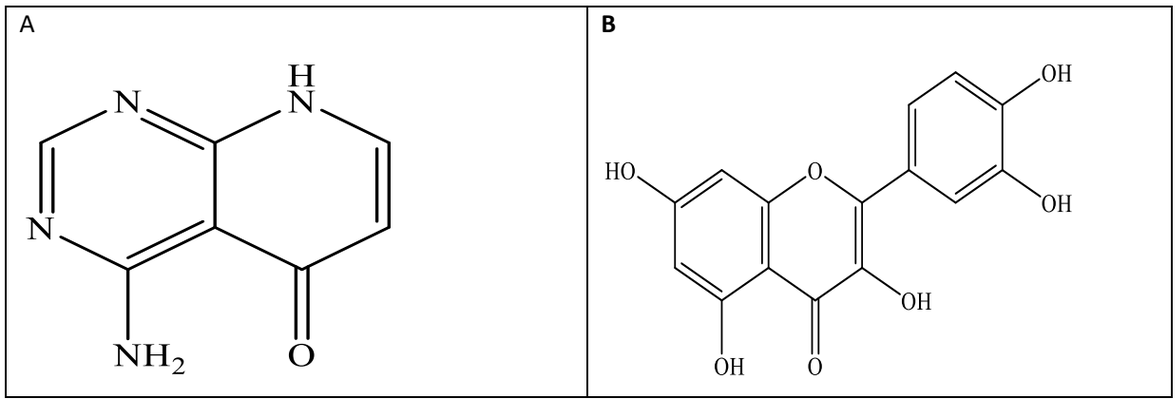


Figure 3

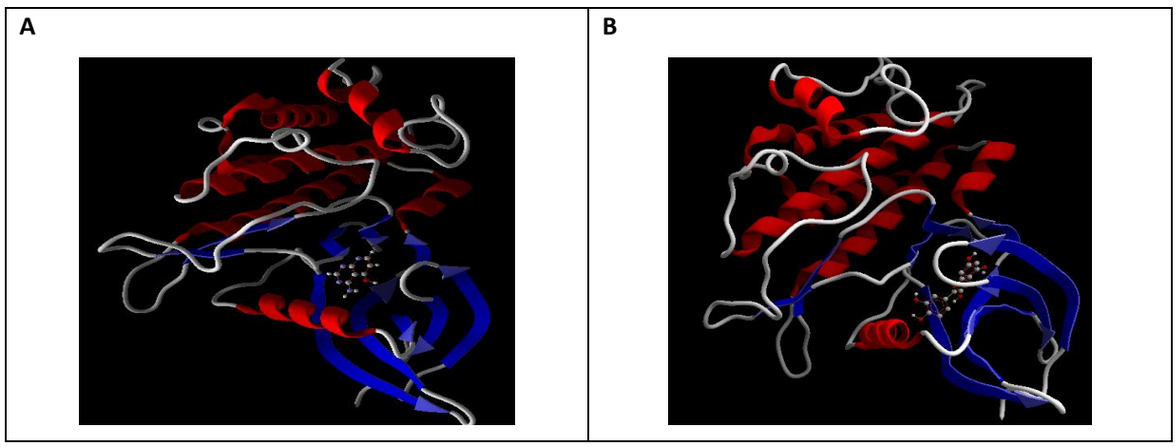


Figure 4.

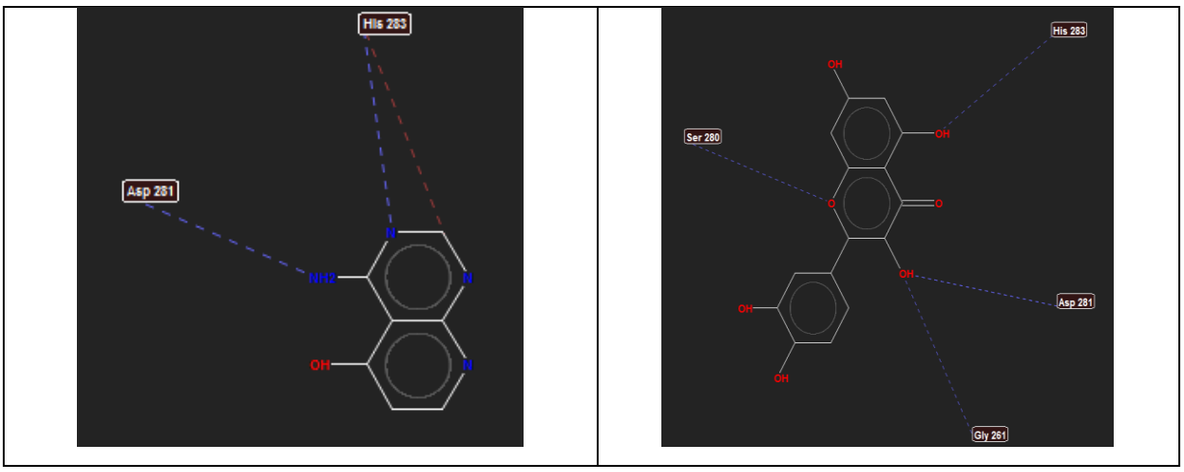


Figure 5.

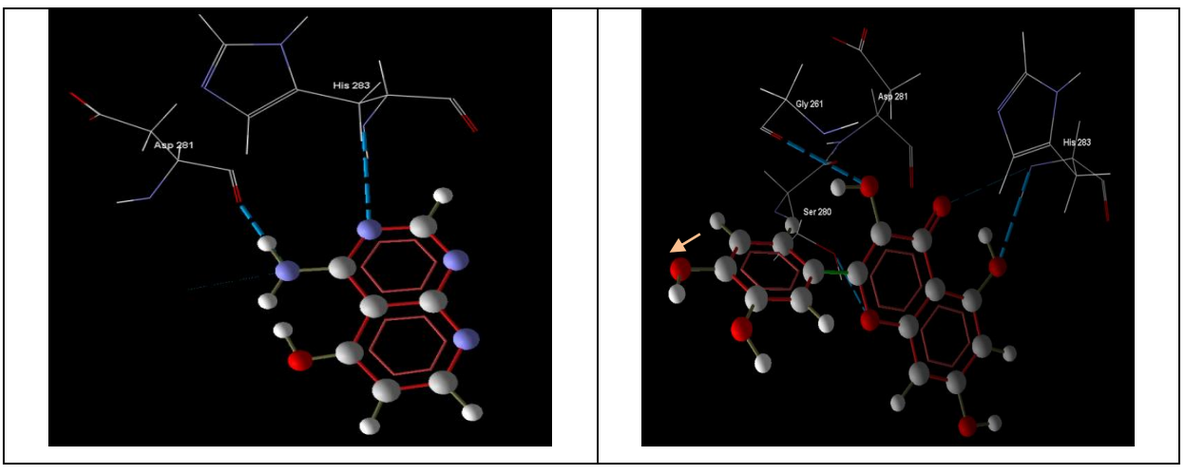
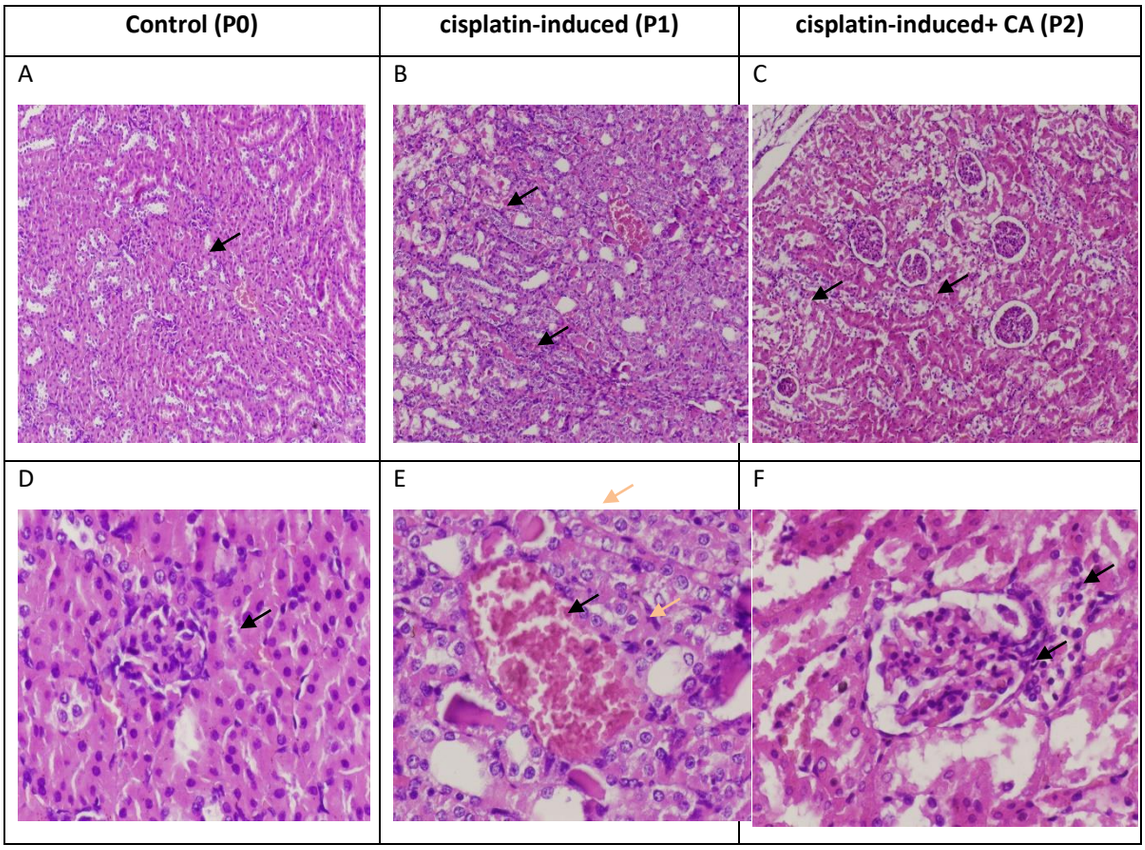


Figure 6.

Histopathological of the control group (P0) showing the cell structure of the glomeruli and the normal tubules (A,D). .Morphological changes of hemorragea-congesti (B, E) and necrotic lesion on glomerulus and tubulus with Interstitial inflammations of plasma cells on tubulus (B) (P1 group). Focal inflamations by infiltration of polymorphonuclear cell on glomerulus and tubulus on cisplatin induced+ CA extracts (C), Hematoxylin eosin staining, magnification 400x



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CLIMATE FACTORS AND LEPTOSPIROSIS IN DKI JAKARTA 2012-2016

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ABSTRACT

Background: Leptospirosis is a zoonosis caused by pathogenic bacteria and diseases spread throughout the world, especially in tropical regions and has high rainfall.
Objectives: The aim is to know the relationship between climate factor (temperature, humidity and rainfall) and leptospirosis incidence in DKI Jakarta 2012-2016.
Method: The study took place in DKI Jakarta using secondary data for monthly Leptospirosis case data from DKI Jakarta Health Office which was published on official surveillance sites and daily climate data converted into monthly data from January 2012 until December 2016 from Tanjung Priok Maritime Meteorology Station.
Results: The results showed a significant correlation between climate variables studied ie temperature (p-value <0.05, r = -0.508), rainfall (p-value <0.05, r = 0.703), and humidity (p-value < 0.05, r = 0.491) on the incidence of Leptospirosis in DKI Jakatra 2012-2016.
Conclusion: In conclusion, there are two variables that have positive correlation to Leptospirosis occurrence namely Rainfall and Humidity while temperature has negative correlation. The highest correlation value is rainfall with strong correlation category. While temperature, and humidity are in the category of moderate correlation.

Keywords *: Leptospirosis, climate, temperature, humidity, rainfall.*

INTRODUCTION

Leptospirosis is a zoonosis caused by pathogenic bacteria spread all over the world, especially in tropical regions and has high rainfall. The incidence of leptospirosis is 1000 times more common in tropical countries than in subtropical countries (Rusmini, 2011). Leptospirosis is a bacterial disease affecting humans and animals. Humans are infected due to urinally contaminated environment (WHO, 2017). The number of cases in humans worldwide is not known for certain. According to current reports, events range from about 0.1-1 per 100 000 per year in temperate regions to 10-100 per 100,000 in humid tropics. During outbreaks and high-risk groups, the incidence of the disease may reach more than 100 per 100000 (WHO, 2003). The number of cases of Leptopirosis in Jakarta due to the great flood that occurred in 2002 reached 113 patients and 20 people died (Case Fatality Rate Leptospirosis was 19.4%) (Ramadhani, 2012).

Epidemiological patterns of leptospirosis differ depending on the ecological setting. In rural areas, transmission is usually associated with agriculture and livestock, with increased risk during warmer months and rain. In urban areas, infections are associated with excessive population density, poor hygiene standards, inadequate sanitation and poverty, all of which usually occur in urban slums in developing countries. In developed countries, infections are now increasingly associated with outdoor recreation and international travel (Lau, 2010).

With the wet climate conditions in Indonesia, the government must organize the environment especially slum housing because this area is usually not paying attention to environmental sanitation. Promotional and preventive activities must be implemented and more intense conducted before the period of prone to transmission that is the rainy season. Therefore, a study of climatic factors associated with leptospirosis cases was conducted to determine the relationship between climate variables and leptospirosis cases in DKI Jakarta 2012-2016.

METHOD

This research is quantitative with descriptive analysis using ecological design study. Knowing the correlation between climate data and Leptospirosis case in DKI Jakarta 2012-2016 can be obtained from this research. This research uses five year data from January 2012 until December 2016 in DKI Jakarta.

The research variables included are cases of leptospirosis as the dependent variable and climate that includes rainfall, humidity, and temperature as independent variables. This study took place in DKI Jakarta using secondary data for monthly Leptospirosis case data from DKI Jakarta Health Office published on official surveillance sites and daily climate data transformed into monthly data from January 2012 to December 2016 from Tanjung Priok Maritime Meteorology Station. The total population of the study were all cases of associated leptospirosis.

Data were analyzed by using univariate and bivariate analysis with statistical data application. Univariate analysis is used to find out the description of a number of cases of leptospirosis and also changes in climate factors such as temperature, rainfall, and humidity. Bivariate analysis is useful to determine the relationship between the independent variables of climate factors and the dependent variable is the case of leptospirosis in DKI Jakarta 2012-2016.

The dependent and independent variables were tested by using the Kolmogorov-smirnov normality distribution to determine the normality of the data and to determine the correlation analysis in the next step. After testing all leptospirosis variables, temperature, humidity, and rainfall were declared normal so that all variables were tested with Pearson correlation.

First, define the correlation value of bivariate analysis. According to Colton, correlation strength can be divided into 4 areas (Hastono, 2016):

r = 0,00 - 0,25 → No correlation / weak correlation
r = 0,26 - 0,50 → Medium correlation
r = 0,51 - 0,75 → Strong correlation
r = 0,76 - 1,00 → Perfect correlation

The second analysis performs interpretation of correlation result using probability value with confidence interval (CI) 95%. If p-value is less than 0.05 then there is a correlation between two variables. If p-value is more than 0.05 then there is no correlation between the variables.

RESULTS

The result of correlation between temperature, rainfall, and humidity shows significant correlation to leptospirosis disease during 2012-2016 in DKI Jakarta. Other studies have shown that climate can affect other disease models such as dengue fever with the highest correlation value is humidity with strong correlation category Ekasari (2016). In the correlation analysis obtained 2 climatic variables with a positive correlation with cases of leptospirosis ie rainfall and humidity while the temperature climate temperature with negative correlation. The highest correlation is precipitation with strong correlation category. While other factors such as temperature, and humidity in the category of moderate correlation. Information on test results is presented in Table 1.

Table 1 : The Correlation Between Climate Factors (Temperature, Rainfall, Humidity) and Letospirosis in DKI Jakarta 2012-2016

Variables	p-value	R
Rainfall	0,000	0,703
Temperature	0,000	-0,508
Humidity	0,000	0,491

The number of cases of leptospirosis in DKI Jakarta in 2012-2016 shows different results with the highest number of cases in February 2014 reaching 63 cases. In the total cases of leptospirosis 2012-2016 there are 198 cases. The picture of leptospirosis is illustrated in Figure 1. Overall, most cases of leptopsirosis occur in January to June. and the highest month is february.

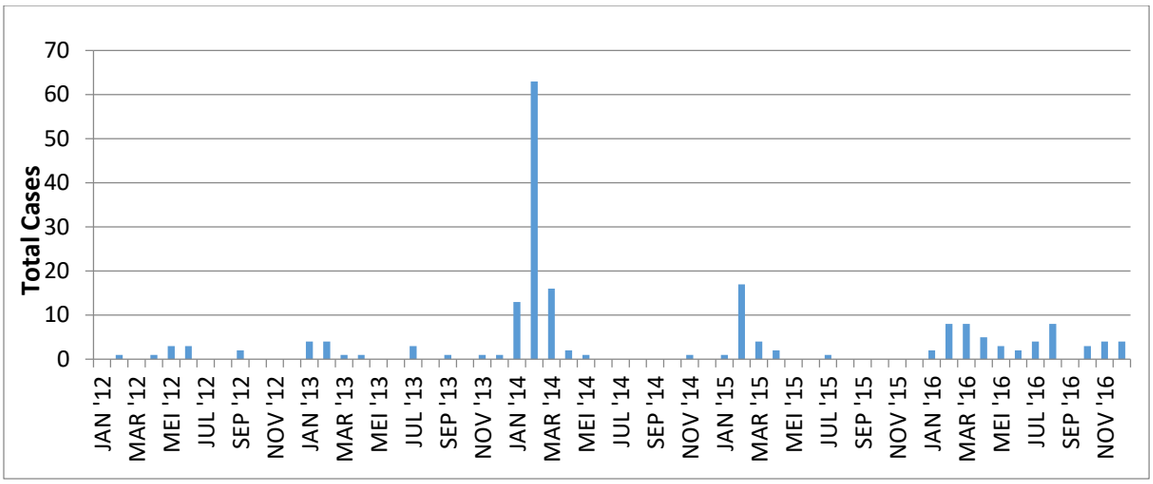

Figure 1 :Leptospirosis Cases in DKI Jakarta 2012-2016

Rainfall in DKI Jakarta fluctuates around 0 mm-963.3 mm in a month. Casewas highest at 963.3 mm in February 2014. The highest rainfall caused the highest case to reach 63 cases in February of 2014. The high rainfall index increased exposure to leptospira sp. in humans by water and contaminated soil (Ramadhani, 2012). The rainfall picture affecting the leptospirosis case is illustrated in Figure 2.

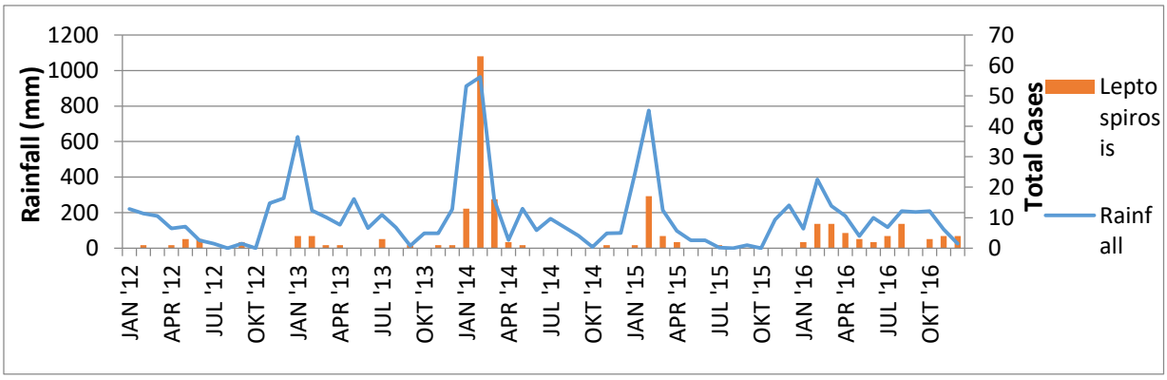

Figure 2 : Correlation Between Rainfall and Leptospirosis Cases in DKI Jakarta 2012-2016

Statistically, there is a significant relationship between rainfall and leptospirosis in DKI Jakarta 2012-2015 ($p < 0.05$) and also a positive correlation between them. Rejeki research (2005) states that high rainfall at risk of leptospirosis by 37 times compared with low rainfall. According to Chin (2009) heavy rain will cause flooding and increase the risk of leptospirosis because it brings bacteria closer to humans. Rainfall increases the exposure of leptospires to humans through water, and contaminated soil.

Temperatures in DKI Jakarta 2012-2016 change every month in a year about 26.87 ^{o}C - 29.89 ^{o}C. The highest case of leptospirosis occurs coinciding at the lowest temperature of 26,87 ^{o}C that is in February 2014. According to research of Arumsari (2012), the temperature between 24 - 29 ^{o}C is not the most suitable or optimal condition for the development of Leptospira bacteria, but at that temperature can still live with reduced virulence. Leptospira grows well in aerobic conditions at 28-30 ° C. (Jawetz, 2010). The temperature picture affects the case of leptospirosis is illustrated in Figure 3.

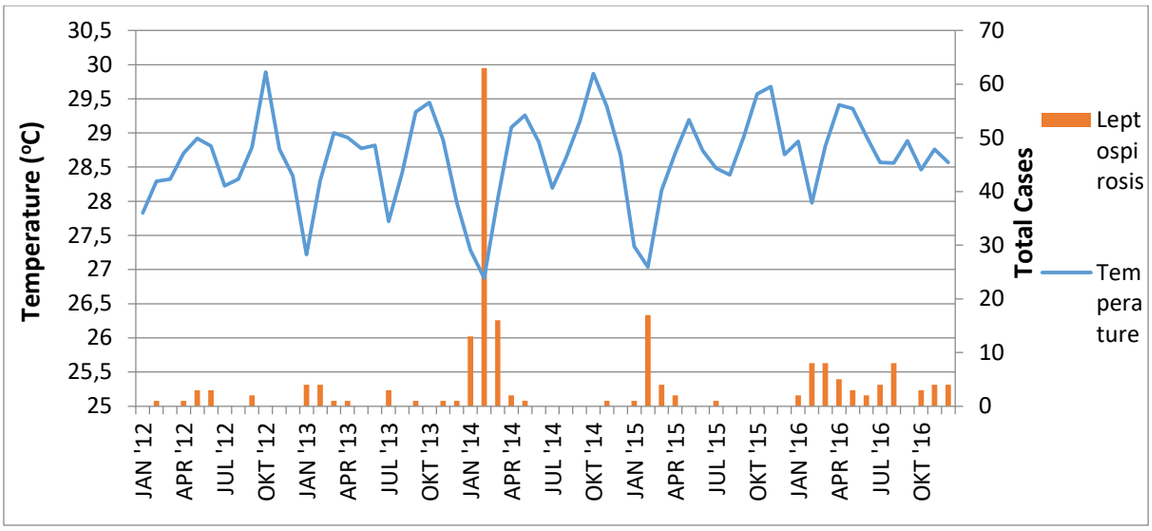

Figure 3 : Correlation Between Temperature and Leptospirosis Cases in DKI Jakarta 2012-2016

There was a significant correlation between temperature and leptospirosis in DKI Jakarta 2012 2016 ($p < 0.05$). Temperature has a negative correlation with leptospirosis. Therefore, the lower temperature is, the higher case occurs. In Zanzi's study (2014) Moderate temperatures and high rainfall contributed to the presence of Leptospira in the study area, as evidenced by the spread of animal infections, and low levels of human cases but endemic.

In addition to temperature and precipitation, moisture is also a factor of increased cases of leptospirosis. Humidity in DKI Jakarta in 2012-2016 is about 63.64% - 85.32%. The highest case occurs in 85.32% humidity in February 2014. Air humidity ranges from 76 - 78% is considered moist and is the most favored condition of bacteria so it is a risk factor for leptospirosis (Arumsari, 2012). The image of moisture affecting leptospirosis cases is illustrated in Figure 4.

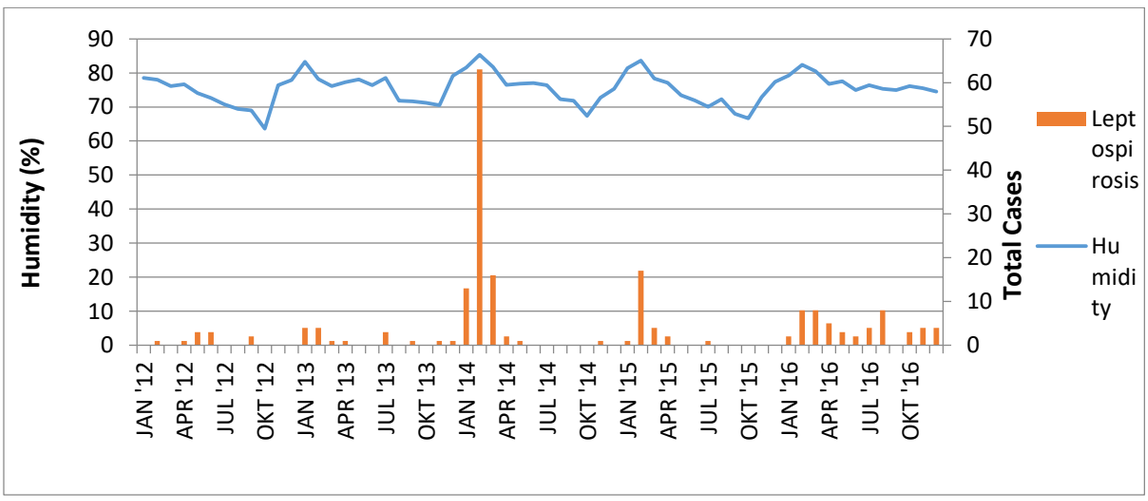

Figure 4 : Correlation Between Humidity and Leptospirosis Cases in DKI Jakarta 2012-2016

There is a significant correlation between moisture and leptospirosis in DKI Jakarta 2012-2016. Humidity has a positive correlation to the higher case of moisture, the higher the number of cases. Based on result of research of Arumsari (2012) it is known that there is statistically significant influence between optimal air humidity (76 - 90%) for Leptospira bacteria development with leptospirois incidence in mice (p value = 0,03).

Limitations in this study are the lack of climate data. The data provided by the Tanjung Priok Maritime Meteorology station are not all available. thus allowing strong correlation with the dependent variable.

CONCLUSION

As mentioned, the highest cases of leptospirosis occur in February 2014. Climatic factors such as temperature, rainfall, and humidity have a significant correlation. The highest correlation value is rainfall with strong correlation category. While temperature, and humidity are in the category of moderate correlation.

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ORGANIC WASTE TREATMENT IN CIKARANG HEALTH TRAINING CENTER

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ABSTRACT

Background : Waste generated from Cikarang Health Training Center in Indonesia, are collected, stockpiled, burned and cause problems for the environment and contamination of water, soil and air. This untreated waste might be a potential breeding place for vectors of various diseases and might affected human health. Starting from 2015, they processed the organic waste by composting.
Objectives : This study aimed to compare the initial conditions and after the implementation of waste processing to reduce the organic wastes by finding out the composition of waste and large depreciation of organic waste by Open Windrow and In-Vessel composting.
Methods : The research was conducted descriptively explaining the organic waste treatment using open windrow composting method and in-vessel composting method.
Results : Organic waste is processed by open windrow and in-vessel composting method. The activities involve 2 officers for sorting, collecting, processing and storage, coordinated by Administration Official and accompanied by Laboratory & Workshop Official. This treatment required 100-square meters area and 8-week fertilization time using natural liquid fertilizer. The products are compost (solid and liquid) that are utilized for the crops.
Conclusion : Composting technique can solve the waste problem generation in Cikarang Health Training Center. This treatment can reduce the organic waste until 96.3% by in-vessel composting process and 92.4% by open windrow composting process. The benefits are less than 8% waste brought to the landfill, good environmental, no odors pollution, reducing breeding vectors, improve soil quality and nutrients added to the plants. It becomes the application of environment health technology in this place and can be implemented to different places

Keywords : *waste treatment, composting, open windrow, in-vessel, compost, liquid fertilizer*

BACKGROUND

Waste that is not managed properly can be a breeding ground for parasites, bacteria, and pathogens as well as disease vector nests such as rats, flies, cockroaches, and mosquitoes (Tobing, 2005) and affect public health status through diarrhea, dysentery, worms, malaria, elephants and dengue fever. The results of the Health Agency and Environmental Agency of Bekasi explained that in 1999 Bantar Gebang Disposal Site (Tempat Pemrosesan Akhir/TPA) found that 34% of the population suffered from tuberculosis (by x-ray), 99% of the residents were exposed to Acute Respiratory Infection (Infeksi Saluran Pernapasan Akut/ISPA) and 8% had gastric ulcers. The impact on the environment was felt by the findings of 40% soil sampling pH exceeded the quality standard, 95% of groundwater samples contain E. coli bacteria and 35% were contaminated with Salmonella bacteria (Tri Bangun et al, 2008). In other way, the habit of people throwing garbage into the river also cause pollution of water and siltation of the river causing flooding in Jakarta (Susmarkanto, 2002). waste can also cause aesthetic problems, odor pollution and a potential greenhouse effect where a ton of solid waste generated in landfill can produce 50 kg of methane gas damaged against the ozone layer reaches 21x of carbon dioxide gas did (Ministry of Environment, 2008).

Waste management in Indonesia is 69% transported by officers and dumped in TPA (Riskesdas, 2013), where most districts in Indonesia handle their waste by landfilling treatment. The Landfilling method has a problem that is the long-time needed process for reducing the waste and the requires the extensive lands. This can lead to many garbage mounts in the landfill and waste generation at the source.

In order to reduce waste generation in landfill or TPA, the Government of Indonesia issued Law No. 18 of 2008, which aims to improve public health, environmental quality and make waste as a resource. Article number 13 states the obligation of the management of residential areas and other facilities to provide waste sorting facilities through 3R (reduce, reuse and recycle). This is in line with the amount of organic components in waste in Indonesia, which 74% of Jakarta's waste is organic materials (Damanhuri, 2010) can be processed by recycle into compost and reduce the burden of landfill.

Cikarang Health Training Center (Balai Pelatihan Kesehatan/Bapelkes Cikarang) located in Bekasi Regency, West Java Province has an area of 4.6 hectares with 11% of Green Open Space (Ruang Terbuka Hijau/RTH) has the potential of organic waste from the dried leaves of many trees and the grass clearance in the garden. The other source of waste comes from the residential population of Wijaya Kusuma Dormitory (capacity 60 people), Hasbullah Dormitory (capacity 80 people), Melati Dormitory (capacity 28 people), Dormitory (12 persons capacity), Bugenvile Dormitory (capacity 8 persons). And other activities are an office with a capacity of 110 employees and consumption services in the Kitchen and Dining Room. The occupancy rate of dormitory in 2015 is about 80%. In 2015, Bapelkes Cikarang processed the organic waste by composting where this method can reduce the weight of garbage up to 50% (Tchobanoglous et al., 1993). Organic waste processed with Open Windrow and In-vessel methods which produces solid and liquid compost.

This study aimed to compare the initial conditions and after the implementation of waste processing to reduce the organic wastes by finding out the composition of waste and large depreciation of organic waste by Open Windrow and In-Vessel composting. Further data on the generation, composition and estimated potential of waste can be used for the development of waste processing at Bapelkes Cikarang.

METHODS

The research was conducted descriptively in organic waste processing using Open Windrow and In-vessel method at Cikarang Health Training Center (Balai Pelatihan Kesehatan/Bapelkes Cikarang. All waste is transported from the sources and taken to the Gerbage Collection Place (Tempat Pengumpulan Sampah/TPS) for measuring the generation and composition of garbage by waste officers. Measurement of waste generation is done using SNI 19-3964-1995 (National Standardization Body, 1995). Measurements are done for 8 (eight) days from August 9-16, 2015. The tools used in measuring the generation and composition of waste are some large plastic bags to wrap the garbage to be weighed, the 35x35x35 cm^3 rubbish volume container, scale of 10 kg, scale of 100 kg and data entry forms. Measurement of the volume of waste generation is done by inserting the waste into rubbish volume container and measuring the height of the waste before and after compression, by dropping that container from a 20 cm-height by 3 times as a compression factor. Waste weight measurement is done by weighing the contents of the garbage in the container. Measurement of volume and weight of this waste are done on each type of garbage to determine the composition of waste.

Sample

Samples were taken from all activities in Bapelkes Cikarang from 5 temporary collection points, ie Dormitory, Office, Kitchen & Dining Room, Lab and Workshop Building (ILBK) and RTH. When sampling was conducted, the occupancy of the training participants amounted to 120 people and the number of 110 office employees who constituted 77.2% of the available capacity.

Generation, Composition and Waste Reduction Analysis

The analysis of waste generation, waste density and waste composition is mathematically done by equations (1), (2) and (3), and then compares to the similar research in other locations. Waste generation is calculated from the total amount of waste per person divided by the number of sampling days, as shown in equation (1). The density is calculated from the total weight of the waste divided by the volume of waste, as shown in equation (2). While the waste composition is the percentage of the total weight of waste by type divided by the total waste, as shown in equation (3). The type of waste are letover food, paper/cardboard, wood, fabric/textile, rubber, plastic, metal, glass and others.

$$\text{Waste Generation} = \frac{\text{weigh of waste per person (kg/person)}}{\text{sampling days (day)}} \text{ ..... Equation (1)}$$

Waste generation = number of waste generated in kg/person.day;
Weigh of waste = weigh of waste in kg/person that counted in sampling;
Sampling days = number of sampling days

$$\rho = \frac{m}{v} \text{ ..... Equation (2)}$$

ρ = waste density in kg/m^3
m = weigh of total waste in kg
v = volume of total waste in m^3

$$\%\ \text{Waste Composition} = \frac{m1\ (kg)}{m\ (kg)}\ x\ 100\% \text{ ..... Equation (3)}$$

m_1 = weigh of each type of waste in kg;
m = weigh of total waste in kg

Waste reduction analysis is calculated on each composting process of open windrow and in-vessel. The waste reduction is done by calculating the reduction percentage of raw materials due to organic decomposition that occurs in each process.

Organic Waste Treatment by Open Windrow & In-Vessel

Composting is an organic waste processing system which need microorganism to form organic fertilizer known as compost (Department of Public Works, 1990). It happened in an aerobic and anaerobic condition (Indriani, 2000). In this study, the raw material treated by composting technique using Open Windrow and In-Vessel method as described in Table 1.

Table 1. Organic Waste Treatment by Open Windrow and In-Vessel Composting

STAGES	OPEN WINDROW COMPOSTING	IN-VESSEL COMPOSTING
Raw material	Raw materials in the form of grass and dried leaves from the green space are brought to the composting site.	New materials in the form of food scraps and food scraps from the Dining Room and Kitchen are brought to Composter.
Size Reduction	The enumeration of raw materials with the size of 1-5 cm is done by organic garbage chop machine. Watering raw materials is done to create a 40-60% moisture. This pile of wet material is arranged 2 m x 1 m x 0.5 m.	Enumeration of raw materials enough done as necessary for the composter space is filled to the fullest. The raw material is fed into the composter and sprayed with liquid fertilizer (the result of the previous process) as a bioactivator.
The Decomposition Period	The decomposition period is 6-8 weeks, using an organic liquid fertilizer bioactivator (in-vessel processing). Reversal and watering stacks once every 7 days, in order to maintain optimum conditions for microorganisms, ie 40-60% water humidity and 40-60°C temperatures. Mature compost is marked with a blackish brown color, odorless, the material does not clot if held and the temperature of the compost is equal to the ambient temperature.	The decomposition process takes place as long as the raw material is fed into the composter. During that time, the crude fluid formed at the base of the composter is ready to be collected in a separate container for use or enrichment of nutrients to match the quality of organic liquid fertilizer. While solid compost is mature marked with the color to be blackish brown, soft material and ambient temperature dried by the sun.
STAGES	**OPEN WINDROW COMPOSTING**	**IN-VESSEL COMPOSTING**
Drying	Drying is done with the help of sunlight to reduce the water content in the compost product that aims to avoid the	Solid compost has high moisture content and needs to be dried in the sun to avoid fungus. Another alternative is to make this

	fungus. After this is done sieving so that the size of compost granules uniform and packing.	compost solid as a bio-activator during decomposition and prioritize liquid compost products.
Tools	Organic chopping machine, sieving machine, filter, shovel, 2 x 2.25 m2 plastic sheet, non-chlorine water spraying installation, personal protective equipment such as boots, gloves, masks	Tong composter capacity of 120 liters, water sprayer, plastic jirigen, chopping knife, shovel and self-protection tool.

Sources : Damanhuri 2010; Sucipto, 2012; Prasojo 2012; Bapelkes Cikarang (2015)

Liquid Fertilizer Testing

The sample of liquid fertilizer is stored in a 100 mL-covered glass bottle which is inserted in an ice flask and brought to the accredited Laboratory of Sucofindo in Cibitung for examination of the parameter content in the sample. The test results are compared with the standard Regulation of the Minister of Agriculture Number 70/2011.

RESULTS AND DISCUSSION

Waste Generation

The waste generation is calculated by equation 1 and can be seen in table 2 below.

Table 2. Waste Generation in Bapelkes Cikarang

Sampling day	Name of days	Weigh of Waste (kg)	Number of Persons	Waste Generation (kg/person.day)
1	Sunday	214.98	140	1.5
2	Monday	166.12	230	0.7
3	Tuesday	158.77	230	0.7
4	Wednesday	154.69	230	0.7
5	Thursday	115.38	230	0.5
6	Friday	159.27	230	0.6
7	Saturday	144.57	140	1.0
8	Sunday	176.35	140	1.2
Average		161.27		0.89

Source: Bapelkes Cikarang, 2015

The average weight of the whole waste is 161.27 kg/day, the maximum value occurring on the first day of 214.98 kg/day and the minimum value occurring on the 5th day of 115.38 kg/day. This is in line to the waste generation. The average of waste generation of Bapelkes Cikarang is 0.89 kg/person/day. Maximum waste generation occurs on the first day of 1.54 kg/person/day and the minimum one occurs on the 5th day of 0.5 k/person/day. The first day shown maximum generation of waste due to the simultaneous environmental clean-up activities that always done once a month and also because of the less employee who worked on Sunday. Whereas the opposite happened on the 5th day, the waste generation decreased due to some training participants had done the outdoor study so the kitchen's activities reduced their service capacity in that day.

The weigh fluctuation of waste by source can be seen in Figure 3 below.

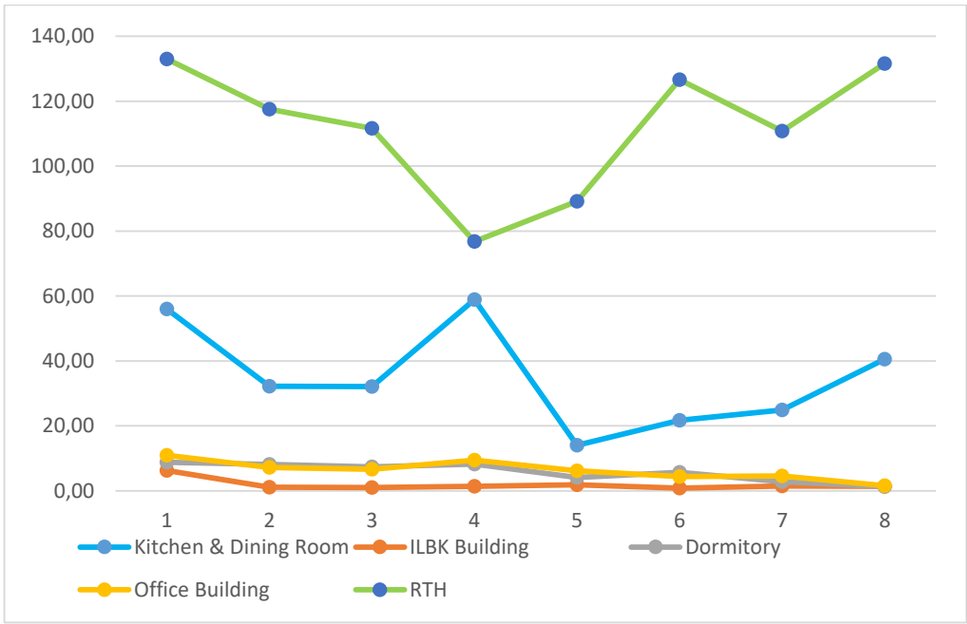

Figure 1. Weigh Fluctuation of Waste based on Source

Source : Bapelkes Cikarang, 2015

The garbage from the RTH shows the greatest weight among the 4 other types of waste in each sampling day. This is due to the number of dried leaves or grass that fell in the that areas. It appears that the left-over food waste remained the second after the dried leaves waste. The maximum left-over food waste generation occurs on the 4th day of 58.9 kg. The number of participants and employees present on the day of sampling is fixed but the fluctuation of the leftover remains. This is possible because they provides a different diet service every day and a variety of cuisine menu can result in the amount of waste generated from the Kitchen and Dining Room. The ingredients that cause high wastes are carrots, corn, melons, bananas and watermelons. The minimum left-food food waste generation condition decreased at 5th day of 14.03 kg due to the decrease of consumption services with the existence of outdoor study for the training participants.

Garbage generated from the office building and Laboratory and Workshop Building (ILBK Building) is 6.37% and 1.9% respectively. Activities that take place in the office building and ILBK building is a type of place where most of the office employees during the day. The waste generation generated in the Office Building is higher than the ILBK Building, due to the high number of employees in the Office Building rather than in the ILBK Building. Specific waste originating from ILBK Building such as wood, iron, rubber and PVCs plastic are directly managed separately by collection and reuse.

Composition

For the discussion of the waste composition can be seen in Table 3 below.

Table 3. Waste Composition in Bapelkes Cikarang

No	Type of Waste	Waste Average (kg)					Waste Generation (kg)	Waste Composition (%)
		Kitchen & DR	ILBK Building	Dormitory	Office Building	RTH		
1	Dried leaves	0.55	0.20	1.02	0.82	111.26	112.96	70.21
2	Leftovers Food	30.96	0.24	1.03	1.79	0.11	34.12	21.04
3	paper	1.56	0.32	2.01	2.39	0.16	6.44	3.97
4	Plastic	1.35	0.58	1.17	0.94	0.31	4.34	2.68
5	Glass cup	0.41	0.26	0.09	0.14	0.24	1.14	0.70
No	Type of Waste	Waste Average (kg)					Waste Generation (kg)	Waste Composition (%)
		Kitchen & DR	ILBK Building	Dormitory	Office Building	RTH		
6	Wood	0.08	0.04	0.10	0.14	0.68	1.04	0.64
7	Cans / Metal	0.09	0.09	0.12	0.02	0.16	0.48	0.30
8	Rubber / Fabrics	0.00	0.18	0.17	0.00	0.10	0.44	0.27
9	Styrofoam	0.05	0.01	0.09	0.13	0.01	0.29	0.18
10	Etc	0.00	0.00	0.01	0.00	0.00	0.01	0.01
	TOTAL	35.05	1.90	5.82	6.37	113.01	162.14	100.00

Source : Bapelkes Cikarang, 2015

DR = Dining Room

The composition of organic waste treated by composting is 91.20% by weight from 70.21% dried leaves and 21.04% of left-over food waste. This amount is higher than the composition of organic waste in an office and dormitory area in Bali, named Werdhapura Village Center (WVC) at 10.93% (Wardiha, 2013). The value is also higher than the Office of Agency for the Assessment and Application of Technology (BPPT) of 35.47% (Silalahi, 2003). This shows that the composition of waste is not comparable with the similarity of activity as an office, because it depends on the activities and the presence of green open space. The organic waste of Bapelkes Cikarang is calculated from the leftover food and dried leaves dominated by trees while in the office of BPPT is calculated from the canteen, food residue of employees and garbage park dominated by parking lot. The organic waste in WVC Bali is also far below Bapelkes Cikarang, due to organic waste WVC is dominated by left-over food and a less green area.

Left-over food waste in Bapelkes Cikarang is higher than WVC Bali that is 26.43% (Wardiha, 2013). Although the number of occupancy in WVC is greater than Bapelkes Cikarang, the number of consumption service in Bapelkes Cikarang is more that 3 times of food services and 3 times snack services, causing the composition of food waste in Bapelkes Cikarang higher than in WVC.

Dry leaves waste (70.02%) derived from RTH is the most widely in organic composition, followed by the left-over food waste (21.26%) from kitchen and dining room activities. This is in line with findings in the field that garbage collectors carry more than 3 carts (capacity 0.44 m^3/cart) in a day. The most left-over food are found in the Kitchen & Dining Room, which is a place of dining services for training participants. The second most lef-tover food waste was found in the office building, indicating that employees were having lunch activities.

Paper waste as much as 3.96%, is a very low value compared to the composition of HVS paper waste at BPPT office building which is worth 38.07% for the capacity of 4635 employees (Silalahi, 2003). In addition to the proportion of fewer employees in Bapelkes Cikarang, this is also due to the internal policy of Bapelkes Cikarang for using e-paper internal communication by e-mail or chat group.

The composition of waste that does not reach 1% is seen in glass, wood, can/metal, rubber/cloth. Glass (0.70%) comes from broken cutlery, the cans/metals (0.30%) derived from scrap cans that not picked up by scavengers, the wood (0.63%) comes from tree branches that are not transported to organic waste processing. It is almost as big as the same kind of waste in BPPT office building, that is glass (0.92%), the cans (0.69%), and the wood (1.78%).

Styrofoam waste has a composition of 0.18%, which is 10 times lower than 1.85% in BPPT Office building (Silalahi, 2003). This is possible because of internal policies prohibiting the food presentation by styrofoam for both buffet, snack meetings. Some purchasing groceries must be done by special recyclable containers such as cardboard or shopping cart.

Table 4. Reduction of Waste Weight through Open Windrow Composting

Day of Testing Process *)	Weight before Treatment (kg)	Weight after Treatment (kg)	% Depreciation of Organic Waste (Dry Leaf)
Day 1	130	62	52.31
Day 2	117	56	52.14
Day 3	110	61	44.55
Day 4	76	35	53.95
Day 5	86	43	50.00
Day 6	125	62	50.40
Day 7	110	54	50.91
Day 8	129	65	49.61
Average			50.40

Source : Bapelkes Cikarang, 2015 **) 1 cycle finished in 2 months*

From Table 4, it was found that the percentage of organic waste shrinkage of dried leaves processed by open windrow was 50.40%, where the maturity of compost was marked by 40-60% of raw material depreciation (Isroi, 2008). From the testing, the value of organic waste decreased from 44.55% to 52.31%, it shows the difference of condition in the compost material, such as the difference of humidity and temperature which become the indicator of microorganism life. Watering and reversaling the garbage mound has been done regularly every 7 days by the garbage officer, but the watering dosage is not appropriate so that the humidity conditions and mound temperatures are not uniform. It will result in different percentage compilation.

Tabel 5. Reduction of Waste Weight through In-Vessel Composting

Composter *)	Weigh before Treatment (kg)	Weigh after Treatment (kg)	Volume Liquid Fertilizer (L)	% Depreciation of Organic Waste (Left-over food)
1	246	8.6	7.7	96.86
2	418	6.5	9.9	97.63
3	186	3.0	7.7	95.88
Total	849	18.1	25.3	96.79

Sumber : Bapelkes Cikarang, 2015 **) 1 cyles finished in 1 months*

Fluid characteristics generated in the in-vessel composting process is similar to the liquid fertilizer that is yellowish brown and distinctive smell of sting (Sucipto, 2012). With this process, obtained fluid volume as much as 25.3 Liters used as organic liquid fertilizer for the trees around. The liquid must be fermentated in about a month for increasing the number of effective microorganisme inside by giving aeration. The total residue of 18.1 kg is separated for reuse in the next testing processes as bioactivators. The percentage of shrinkage of left-over food waste is quite high, i.e. 96.79% because all the solid compost formed in the composter can be reused entirely. Even the liquids compost can be bioactovators for the next process as shown in Table 4.

Table 6. Organic Liquid Fertilizer Composition

No.	PARAMETER	Content of Parameter (%)	Standard *)	Testing Standard
	Hara Makro		-	ISO 2803-
1	(NPK)	0.56		2012
2	C-Organik	0.30	min. 6%	
			3-6%	ISO 2803-
3	Nitrogen Total	0.18		2012
			3-6%	ISO 2803-
4	P_2O_3	0.07		2012
			3-6%	ISO 2803-
5	K_2O	0.31		2012
6	Bahan ikutan	0	max. 2%	

Source : Bapelkes Cikarang, 2015 **)* Permentan 70/2011

The quality of organic liquid fertilizer produced from the in-vessel composting process is far below the standard of Regulation of the Minister of Agriculture (Permentan) No. 70/2011. This is possible because the anaerobic process in the composter has not been good enough. To insert the left-overs, the composter lid is opened and causes air into the composter room. The use of organic liquid fertilizer as a natural bioactivator also has not been able to increase the nutritional content in the product. The macro nutrient value of organic liquid fertilizer from vegetable market waste for 14 days was still lace, ie N = 0.16% (medium), P = 0.014% (very low), and K = 0.25% (very low) (Latifah et.al., 2012). However, these fertilizers have been tried to fertilize plants with different concentrations and have no significant effect on the growth of red spinach plants (*Alternanthera ficoides*).

In general, the comparison of conditions before and after the application of organic waste treatment in Bapelkes Cikarang can be seen in Table 5 below.

Table 7. Comparison of Conditions Before and After Waste Treatment Implementation

No	Parameter	Before Treatment Application	After Treatment Application
1	Generation	All waste is brought to the landfill	Approximately 8.8% of the waste generation is brought to the landfill
2	Composting Technique	Composting technique into learning theory	Composting techniques into learning simulations and waste processing trials
3	Institution	The institution has no application of environmental health technology	Organic waste processing is the application of environmental health technology and solutions to waste generation problems
4	Product	There is no product	Compost fertilizer products become - quality indicator of composting (as per standard) - nutrients for the surrounding plants - souvenirs
5	Office Environment	Many den of disease vectors	The environment is clean and the disease vector's nest is reduced
6	HR	HR does not care about environmental sanitation	Skilled human resources in managing waste

Source : Bapelkes Cikarang, 2015

CONCLUSION

The Open window composting can reduce 96.29% weight of initial dried leaves. This process can produces 49.6% weight of fertilizer and 3.71% weight of residue taken to the landfill. In-Vessel composting can reduce 96.79% weight of left-over food and can produce 2.98% liquid fertilizer, 97.87% weight of solid fertilizer and 2.13% of residue taken to the landfill.

For the next experiment, it is advisable to use the comparator variables to determine the risk factors of organic waste reduction experiments

The waste management at Bapelkes Cikarang is a prototype that can be implemented in different places and organizations but needs to be readily related to social and economic factors and the fulfillment of standard fertilizer products in adopting this system elsewhere.

In the case of retesting, it is advisable to use the comparator variables to determine the factors that affect the reduction of organic waste by these two composting methods. For in-vessel composting, it is advisable to enrich the leachate from the composter to obtain good quality liquid fertilizer according to the standard.

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MOST PROBABLY NUMBER OF ESCHERICHIA COLI AND COLIFORM IN SNACK FOOD SOLD IN ELEMENTARY SCHOOL CANTEEN AND STREET VENDORS

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ABSTRACT

Background : Food is one of the causes of health problems that can cause illness. Based on Health Profile year 2015 an outbreak due to food poisoning happen in Surabaya city, with 35 cases of food poisoning. The highest cases were found in Rungkut sub-district with a total of three cases. The type and location of snack food sold were the important cause of food contamination.

Objectives : This study was to analyze the differences of most probable number (*MPN*) of *E.coli* and *Coliform* in snacks food sold in school canteens and street vendors.

Method : This was an observational analytic study on 25 vendors and 25 food items as samples.

Results : Result showed mostly 40% of snack foods are contaminated by *Coliform* (>10counts/gram) and 12% contaminated by *E.coli* (>3counts/gram). The highest contamination of *Coliform* (>1100counts/gram) was found in the typical one dish snack (n=4) found in the School Canteen (n=4). The highest contamination of *E.coli* (>240counts/gram) was found in the typical wet snack (n=1) such as meatball was found in the school canteen.

Conclusion : Based on statistical analysis using *Mann-Whitney U test* showed that there was a significant difference of *MPN* of *Coliform* between typical of snack food sold and location of snack food sales (p=0,001 and p=0,004 respectively). Whereas no significant difference of *MPN E.coli* between type of snack food sold and location of snack food sales (p=0,311 and p=0,280 respectively). Mostly, snack food in the canteen has contaminated by *E.coli* and *Coliform,* so there's need a controlling of snack food and food handlers by school.

Keywords: *Food Safety, Most Probably Number of Bacteria, Escherichia Coli, Coliform, Snack Food*

INTRODUCTION

Food can be one of the causes of health problems that can cause illness [1]. Good food production should notice to the security aspect.[2] Food becomes unsafe if one of them caused by contamination.[1] The food are contaminated can caused foodborne diseases, moreover can caused the other diseases.[3]

Based on reported departemen of drug and food control of republic Indonesia on year 2016 January until June in Indonesia from 60 cases of food poisoning, 16,7% caused by contamination of food snack with the number of victims 266 people and 1 victim died.[4],[5] The outbreaks of food poisoning in East Java Province as many as 60 cases, with the number of victims 1106 people and 3 people died.[6] The outbreaks of food poisoning in Surabaya 35 cases in 28 villages.[7] The outbreaks due to the highest food poisoning in Surabaya occurred at Rungkut sub-district, which were three cases, all cases occurred in the working area of Kalirungkut Public Health Center. According to food outbreaks data showed that 19% of cases of poisoning occur in schools and 78.57% happened of primary school children.[8] The most influencing aspects of food safety are the quality of food, the implementation of personal hygiene and the environmental sanitation of poor food production.[9]

Based on Setyorini's study (2013) it was found that 69.2% of *Escherichia Coli* contaminated food caused by poor personal hygiene of food handlers, didn't wash hands before and after handle the food, didn't wash hands with flowing water, didn't wash hands with soap.[10] The other research also proves that 71.83% food handlers who don't meet the requirements of personal hygiene can increase 7,4 times the food becomes contaminated *Escherichia coli* when compared with food handlers who maintain their hygiene.[11] Sanitation facilities of stand vendors that doesn't fill up criteria , not using a covered bin, waste that is not immediately thrown away, doesn't have the proper of washing dishes, the unavailability

of clean wiper can increase the risk of 9.2 times food serving equipment contaminated by *Esecherichia Coli*, if compared with stand vendors that provide eligible sanitation facilities.

METHODS

This was an observational analytic uses cross sectional design study on 25 vendors and 25 item food as a sample which are randomly selected with use simple random sampling method. The study it's already done on July 17, 2017 until August 6, 2017 at five schools in Kalirungkut sub-district. The dependent variable in this research is the type of food snack and the location of snack food sales, while the independent variables that is MPN of *Coliform*, and MPN of *Escherichia Coli*. This study has been tested in the health research ethics committee of faculty of public health airlangga university with number ethical approval 326-KEPK.

Microbiological tests have been done in Sanitation laboratory, Central Health Laboratory Surabaya. Samples were analyzed from July 31 to August 9, 2017. Food samples were then examined for contamination levels using the most probable number method. The MPN method test uses Lactose Broth media, brilliant green bile broth (BGLB), eosin methylen blue (EMB), mac conkey agar (MCA), and IMViC all of the media used Merck's production. The reagents used include alfa naphtol 6%, KOH 40%, methyl red, kovacs, and aquadest. MPN test is a type of quantitative microbiological examination. Microbiological test data was continued with statistical analysis using *Mann-Whitney U test* to test the difference between dependent variable group and independent variable with 95% confidence interval.

Tabel 1. Charactestic of Vendors and food Snack

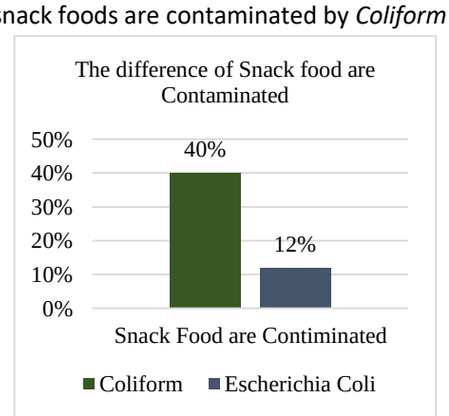
Characteristic	n=25	%
Gender		
Male	16	64
Female	9	36
Age		
>34 year	19	76
28-34 year	4	16
<28 year	2	8
Education		
Unschool	2	8
Not Graduated From Elementary School	3	12
Elementary School	10	40
Junior High School	7	28
Senior High School	3	12

Characteristic	n=25	%
Training Participation		
Ever	9	36
Never	16	64
Type of Snack Food		
One Dish Snack	6	24
Wet Snack	19	76
Selling Facilities		
Small tradeswomen	5	20
Cart	12	48
Kiosk/Stand	8	32
Status of Selling Facilities		
Owner	14	56
Hirer	9	36
Borrower	2	8

RESULTS

Based on Table 1. mostly the street vendors is male (64%). Majority the age category of street vendors is > 34 years (76%). The average age of street vendors is 40 years old, with the age of the oldest street vendors 55 years old and the youngest 19 years. Mostly educations of vendors is primary school education (40%). Majority of the vendors never received training about food safety from public health center (64%). The most selling facility of vendors uses cart(48%).

Figure 1. Result of snack foods are contaminated by *Coliform and Escherichia Coli*



Most traders are the owners (56%). Wet snack most dominated of the type of snack food are sold by the vendors (76%).

The result of microbiological analysis of snack food are contaminated by *Coliform* and *Escherichia Coli*, in figure 1. Result showed mostly 40% of snack foods are contaminated by *Coliform* (> 10 counts/gram) and 12% contaminated by *Escherichia .coli* (>3 counts/gram). The highest contamination of *Coliform* (> 1100 counts/gram) was found in the typical one dish snack (n=4) found in the School Canteen (n=4). The highest contamination of *Eschercoli* (> 240 counts/gram) was found in the typical wet snack (n=1) such as meatball was found in the school canteen.

Data analysis used *Mann-Whitney U test* with α = 0,05. Based on statistical analysis on Table 2 showed that there was a significant difference between *MPN* of *Coliform* with location of snack food sales (*p=0,004*). But no significant difference of MPN *Escherichia Coli (p=0,280).*

Tabel 2. Difference of Microbiological Contamination by Location of Snack Food Sales

Contamination	Canteen ($\bar{x}$ + SD)	Street Vendors ($\bar{x}$ + SD)	*p-value*
Coliform	582 + 560,84	112,64 + 297,61	0,004
Escherichia Coli	28,5 + 74,57	2,81 + 0,05	0,280

Based on Table 3 showed that there was a significant difference between *MPN* of *Coliform* with type of snack food are sold (*p=0,001*). No significant difference of *MPN Escherichia Coli* between type of snack food are sold (p=0,311).

DISCUSSION

The number of food has been contaminated by *Coliform* more than *Escherichia Coli* contaminated food, indicating there is contamination of other pathogenic organisms besides *Escherichia Coli* in these snacks. The statement was supported by the Government Health Institution in America, Benton Franklin Health District (2012) that the presence of *Coliform* bacteria in drinking water or food suggests the possibility of dangerous disease-causing organisms.[12] The significant difference between MPN *Coliform* and *Escherichia Coli* contamination based on the sales location indicates that the sales location is one of the factors affecting the MPN *Coliform* value. Observations in several schools whose snack foods are contaminated by *Coliform* and *Escherichia Coli* show that the canteen is located nearly to the toilet. Canteens located close to the source of contaminants have a high risk of contamination of pathogenic bacteria. According to Riana's study (2017), factors that may affect the increase in the amount of contamination of *Coliform* bacteria are the location of sellers near the pollution source, 44% of sellers <100 meters away from pollution sources (p = 0.05), selling in a place close to pollution can increase the contaminated of pathogenic microbes to food through hands, flies, or insects.[13]

Tabel 3. Difference of Microbiological Contamination by Typical of Snack Food

Contamination	One Dish Snack ($\bar{x}$ + SD)	Wet Snack ($\bar{x}$ + SD)	*p-value*
Coliform	781,53 + 514,06	148,45 + 353,07	0,001
Escherichia Coli	Has been omitted	16,35 + 54,35	0,311

The observation of food handlers behavior showed most food handlers wash cooking ware or cutlery used water in containers in a bucket, only 32% of food handler have washing a hands and washing the cooking ware with flowing water. Based on Riana's study (2017) showed that food handler who have hand-washed places and equipment with running water are significantly related to food safety (*p* = 0,000, *rho* = 0.665 *).[13] More food handler who wash their hands and wash cooking ware and cutlery with flowing water can increase the food safety. In addition, other factors that affect significant differences in microbial MPN contamination in canteen and street vendors are vendor attitudes in combating food and vendor practices in food processing. According to Sugiyatmi's study (2006) showed that traditional snack-

eating attitudes are significantly related to the use of borax and dyestuffs with the practice of making food snacks (p = 0,000).[14] Food handlers in the canteen are usually tenants. Based on observations many tenant kiosks or booths that clean the place only use water, without cleaning fluid (for example cleaning the table using only a wet cloth). lack of sense of belonging is thought to be a factor causing differences in the value of MPN *Coliform* and *Escherichia Coli* based on the location of snack sold.

The discovery of significant differences between MPN *Coliform* and *Escherichia Coli* contamination based on the type of snack, indicating that the type of snack is a factor that can affect the value of MPN *Coliform*, it is related to the method of food processing snacks. Based on observation, wet snacks are grilled meatball, crispy tofu, satay of intestine. The critical point of snack food safety is overcome by using the frying method, so that *Escherichia Coli* bacteria in wet snack has been reduced before reaching the consumer. In contrast to one dish snack that tend to be wetter (such as vegetable with peanuts sauce, meatballs with dressing, fried rice, yellow rice), foods that tend to be wet and not hot can increase the risk of contamination. In addition, the type of food that contains high water or high glucose that is not cooked properly and the right temperature can also trigger bacterial growth. For example in vegetable with peanuts sauce, when the vegetables are washed using water that is unconsciously contaminated with pathogenic microbes, then food handlers who don't keep attention to personal hygiene, as well as the process of boiling vegetables that don't reach 60^{o}c for 15 minutes can be one risk of contaminated by *coliform* and *Escherichia Coli* on the vegetable with peanuts sauce-.[15]

CONCLUSION

Most of the food snack in the canteen was contaminated with *Coliform* and *Esherichia Coli*, so there's a need some control of snack food and food handlers, specifically checking of food safety routine and food handler training about good of food processing by the school collaborate with public health center.

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SYSTEMATIC REVIEW : "EARLY INTRODUCTION OF SOLID FOODS AND THE RISK OF ALLERGY IN CHILDREN"

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ABSTRACT

Background: Preventive strategies applied to decrease the incidence of allergies in children is with reducing or eliminating exposure to potential allergens. But it is now known that early introduction of solid foods that often cause allergy can reduce the incidence of allergies in children who have the risk of allergies.

Methods: Systematyc Review of 1142 research articles through 3 scopus databases, springer links and google scholar was conducted to analyze related research from journals from 2012 to 2017 with the keyword "Early Food Introduction and Allergy" and Makanan Pendamping ASI Dini dan Alergi.

Result: Six studies were analyzed, consisting of two randomized trials, one experimental, and three observational studies. Four studies found that the introduction of solid foods before the age of six months reduces the frequency of allergy. Two studies assessed that early introduction of allergenic foods such as peanut and egg in 4 month-old infants with eczema may modulated immune responses to peanuts and eggs with elevated specific IgG4 antibodies. Two studies assessed the risk of allergic sensitization in early introduction of allergenic food . Three obesrvational studies found that the introduction of food diversity in the first year of life may reduced the risk of allergy, especially in children with atopic history.

Conclusion: The introduction of early solid foods may reduce the risk of allergies in children with history of allergies. Introducing diverse foods in the first year of life may decrease the risk of allergies.

Keyword : *Allergy, Early Introduction of Solid Foods, Immune Response, Sensitization, Foods Diversity*

BACKGROUND

Children are the most common group that often suffer from allergies. The prevalence of allergic diseases in children are increasing worldwide with unprecedented complexity and severity. Allergy that often occur in children are caused by food (World Allergy Organization, 2013). Globally the prevalence of food allergy in children ranges between 3 to 7% (Meyer *et al.*, 2017). Research from 2009 to 2010 in 38.480 children (infants up to 18 years old) showed about 6% of children aged 0-2 years have food allergy, children aged 3-5 years who suffered from food allergy are 9%, aged 6-10 years are 8%, age 11-13 years are 8% and children aged 14-18 are 8.5%. 38.7% of food allergy in children have a bad effect (StatisticAllergy 2017). In Indonesia, the prevalence of food allergy in children younger than 3 years in Jakarta based on online surveys in 2013 are 10.5% (Meida Tanukusumah 2013). According to Candra et al. (2011), 208 people who visited the Poly Allergy Immunology RSCM during the year 2007 there were 102 people (49%) are sensitive to food allergy, which 29.4% of them are children.

Foods that often cause allergy in infants are eggs, milk, wheat, beans, and fish (Urisu et al 2014). Preliminary strategies for food allergy prevention is to avoid foods that caused allergy during pregnancy and in baby food. In 2000, the American Academy of Paediatrics recommended that infants with high risk of food allergy should delay the introduction of dairy products up to 1 year; Eggs up to 2 years; beans and fish until the age of 3 years. Breastfeeding mothers also should avoid nuts. But food allergy cases continue to rise and evidence from observational studies suggests that delaying the introduction of allergenic foods in infants will increase the risk of developing food allergy (Peters et al., 2017).

Several studies shown that delaying the introduction of solid foods and preventing the introduction of certain specific foods may increased the risk of allergy. Specifically, prior to 2008 several cohort studies documented an increased risk of eczema, asthma, allergic rhinitis and allergic sensitization in infants introduced to specific foods (cow's milk, fish, wheat and eggs) more than 6 months (Palmer & Prescott 2012). Here we would like to present the results of a systematic review aimed at answering the question of whether early introduction of solid foods (before 6 months of age) can affect the development of allergy in children with a history of allergy.

METHODS

We searched for primary research studies from 2012 to 2017 through 2 databases : scopus and springer link with the keyword "introduction of early food and allergy" and google schoolar with the keyword “Makanan Pendamping ASI Dini dan Alergi”. Studies with only an abstract published were excluded. The collected literatures were screened and assessed for possible duplication and relevance. These relevant articles were then being organized and stored electronically. Citation of each article is stored using software for the management of citation for future use.

RESULT

Nearly 1142 were identified in the literature search. Screening for duplication and eligibility greatly reduced the number of articles to be critically analyzed to 6. The number of studies screened, assessed, and reported in this review are listed in figure 1. A total of 6 studies were 2 randomized trial with 147 dan 640 subjects; 1 experimental in rat pups; 2 cohort study with 1133 dan 3781 subjects; and 1 case control study with 451 subjects and 451 controls

Figure 1. Study Overview

No	Reference	Participant	Age	Intervension	Result and Conclusion
1	Two-step egg introduction for prevention of egg allergy in high-risk infants with eczema (PETIT): Natsume et all, 2017 randomised, double-blind, placebo-controlled trial(sept 2012-feb 2015)	n= 147	4–5 months of age with eczema	73 [50%] to the egg group and 74 [50%] to the placebo group	Result - 4 [9%] of 47 participants had an egg allergy in the egg group vs 18 [38%] of 47 in the placebo group; risk ratio 0·222 [95% CI 0·081–0·607]; p=0·0012). - In the primary analysis population, five (8%) of 60 participants had an egg allergy in the egg group compared with 23 (38%) of 61 in the placebo group (risk ratio 0·221 [0·090–0·543]; p=0·0001). -The only difference in adverse events between groups was admissions to hospital6 [10%] of 60 in the egg group vs none in the placebo group; p=0·022). - 19 acute events occurred in 9(15%) participants in the egg group versus 14 events in 11 (18%) participants in the placebo group after intake of the trial powder. Conclusion - Introduction of heated egg in a stepwise manner along with aggressive eczema treatment is a safe and efficacious way to prevent hen's egg allergy in high-risk infants. In this study, we developed a practical approach to overcome the second wave of the allergic epidemic caused by food allergy.

2	Randomized Trial of Peanut Consumption in Infants at Risk for Peanut Allergy Du toit et all, 2015 Randomized trial	n=640	4-11 months infants with severe eczema, egg allergy, or both	to consume or avoid peanuts until 60 months of age than assigned to separate study cohorts on the basis of preexisting sensitivity to peanut extract, which was determined with the use of a skin-prick test — one consisting of participants with no measurable wheal after testing and the other consisting of those with a wheal mea- suring 1 to 4 mm in diameter. The primary outcome, which was assessed indepen- dently in each cohort, was the proportion of participants with peanut allergy at 60	Result Among the 530 infants in the intention-to-treat population who initially had nega- tive results on the skin-prick test, the prevalence of peanut allergy at 60 months of age was 13.7% in the avoidance group and 1.9% in the consumption group (P<0.001). Among the 98 participants in the intention-to-treat population who initially had positive test results, the prevalence of peanut allergy was 35.3% in the avoidance group and 10.6% in the consumption group (P = 0.004) Increases in levels of peanut-specific IgG4 antibody occurred predominantly in the consumption group; a greater percentage of participants in the avoidance group had elevated titers of peanut-specific IgE antibody. A larger wheal on the skin-prick test and a lower ratio of peanut-specific IgG4:IgE were associated with peanut allergy. Conclusions The early introduction of peanuts significantly decreased the frequency of the development of peanut allergy among children at high risk for this allergy and modulated immune responses to peanuts
3	Early Oral Ovalbumin Exposure during Maternal Milk Feeding Prevents Spontaneous Allergic Sensitization in	rat		investigated immune response development after early oral egg antigen (Ovalbumin; OVA) exposure in a rat pup model	Results. Feeding OVA daily to DR pups maintained systemic and local gut antibody and immunoregulatory marker mRNA responses. Systemic TGF-β1 was lower in DR + OVAi pups compared to DR and DR + OVAc pups. Feeding OVA to FF pups resulted in significantly greater OVA-specific IgE and IgG1, and lower IgA and TGF-β1 and Smad expression compared to DR pups. Conclusions. Early daily OVA exposure in the presence of maternal milk

	Allergy-Prone Rat Pups El merhibi et all, 2012 experimenta				maintains immune markers associated with a regulated immune response, preventing early allergic sensitization.
4	Development of atopic dermatitis according to age of onset and association with early-life exposures Roduit et all, 2012 prospective birth cohort study	n=1133 third trimester of pregnancy women	infants - 4 years	PASTURE is a prospective birth cohort study involving children from rural areas in 5 European countries (Austria, Finland, France, Germany, and Switzerland) designed to evaluate risk factors and preventive factors for atopic diseases. Briefly, pregnant women were recruited during the third trimester of pregnancy and divided into 2 groups. Women who lived or worked on family-run farms on which any kind of livestock was kept were assigned to the farm group. The reference group was composed of women from the same rural areas not living on a farm.	ResultsThe diversity of introduction of complementary food in the first year of life was associated with a reduction in the risk of having atopic dermatitis with onset after the first year of life (adjusted odds ratio for atopic dermatitis with each additional major food item introduced, 0.76; 95% CI, 0.65-0.88). The introduction of yogurt in the first year of life also reduced the risk for atopic dermatitis (adjusted odds ratio, 0.41; 95% CI, 0.23-0.73). ConclusionAs early-life exposure, the introduction of yogurt and the diversity of food introduced in the first year of life might have a protective effect against atopic dermatitis.

5	Early weaning is beneficial to prevent atopic dermatitis occurrence in young children Turati et all, 2016 case control	cases : 451 outpatient with AD controls : 451 outpatients attending for a pediatric/dermatological visit, with no history of AD.	3–24 months	a matched case–control study on incident physician-diagnosed AD in early childhood including 451 cases and 451 controls. Data on several factors, including feeding practices, were collected through an interviewer-administered questionnaire. Odds ratios (OR) and the corresponding 95% confidence intervals (CIs) were estimated through logistic regression models, conditioned on study center, age, sex, and period of interview, and adjusted for potential confounders.	Results Early weaning, defined as the introduction of solid foods at 4 or 5 months of age, was inversely related to the risk of AD, with children weaned at 4 months having lower AD risk (OR = 0.41, 95% CI, 0.20-0.87) compared to those exclusively breastfed. Similar results were observed for weaning started at 5 months of age (OR = 0.39, 95% CI, 0.18-0.83). This association persisted when children with and without family history of allergy were considered separately. Prolonged partial breastfeeding (breastmilk plus milk formulas) was not associated with AD. Consistently, the introduction of a high number of different solid foods reduced the risk of AD (P trend = 0.02 at 4 months of age and P trend = 0.04 at 5 months). Conclusion Our data provide evidence against the preventing role of prolonged exclusive (but not partial) breastfeeding in AD occurrence and confirm recent results indicating a beneficial role of early weaning in AD.
6	Introduction of complementary foods in infancy and atopic sensitization at the age of 5 years: timing and food diversity in a Finnish birth cohort (FINNISH	N=3781	Infants 3, 6 and 12 months	data on the timing of infant feeding were collected up to the age of 2 years and serum IgE antibodies toward four food and four inhalant allergens measured at the age of 5 years. Logistic regression was used for the analyses.	Result introduction of oats <5.1 months and barley <5.5 months decreased the risk of sensitization to wheat and egg allergens, and oats additionally associated with milk, timothy grass, and birch allergens. Introduction of rye <7.0 months decreased the risk of sensitization to birch allergen. Introduction of fish <6 months and egg ≤11 months decreased the risk of sensitization to all the specific allergens studied. The introduction of <3 food items at 3 months was associated with sensitization to wheat, timothy grass, and birch allergens; the introduction of 1–2 food items at 4 months and ≤4 food items at 6 months was associated with all endpoints,

	DIPP) Nwaru et all, 2013				but house dust mite. These results were particularly evident among high-risk children when the results were stratified by atopic history, indicating the potential for reverse causality. Conclusions The introduction of complementary foods was consecutively done, and with respect to the timing of each food, early introduction of complementary foods may protect against atopic sensitization in childhood, particularly among high-risk children. Less food diversity as already at 3 months of age may increase the risk of atopic sensitization.

Timing of Solid Food Introduction

2 randomized trials, 1 cohort study and 1 case control study reported children who were introducing solid foods before 6 months had a lower risk of allergic events (BI Nwaru et al., 2013; Du Toit et al., 2015; Turati et al., 2016). Two randomized trials showed introducing solid foods at 4 months effectively prevent and decrease the incidence of allergy in children with high risk of allergy. (Du Toit et al., 2015; Natsume et al, 2017a). The prospective cohort study showed early introduction of cereals, fish, and eggs and food diversity at 3 to 6 months is very protective against subsequent allergic sensitization (B. I. Nwaru Et al. 2013). In the case control study by Turati et al. 2016, children with atopic dermatitis who were introducing solid foods at 4 months had lower risk of atopic dermatitis compared to those who were exclusively breastfeed.

Allergic Sensitization

Four studies reported that early introducing allergenic solid foods may reduced the risk of allergic sensitization. Both randomized trials showed that introducing peanuts and eggs to 4 months old infants with eczema may modulated the immune response by increasing specific IgG4 antibodies. Concentrations of IgG1, IgG4, and IgA were higher in the consuming group than in the placebo group (Du Toit et al 2015, Natsume et al., 2017) .1 An experimental study on rats showed that early egg antigen exposure in breast milk maintain immune markers associated with immune response regulation to prevent early allergic sensitization (El-Merhibi et al., 2012). One prospective cohort study also showed a reduced risk of sensitization when children were introduced to 4 or more supplemental foods at the age of 4 and 6 months in children with eczema or history of atopy in the elderly.The initial introduction of cereals, fish, and eggs and food diversity introduced between 3 and 6 months was very protective against subsequent allergic sensitization (Bright I. Nwaru et al., 2013).

Introduction to Food Diversity

Two prospective cohort studies and one case control study reported that the introduction of food diversity in the first year of life was associated with reduced risk of allergic events, especially in children with a history of atopy (Roduit, Frei, Loss, Büchele, et al., 2012; Bright I. Nwaru et al., 2013; Turati et al., 2016). One prospective cohort study showed the introduction of complementary food diversity in the first year of life was associated with a decreased risk of atopic dermatitis with onset after the first year of life (Roduit, Frei, Loss, Büchele, et al., 2012). Other prospective cohort studies show results that early introduction of oats (<5.5 months), wheat (<6.5 months), rye (<7 months), barley (<7.5 months), fish (<9 months) , and eggs (<11 months) reduced the risk of sensitization of food allergens (Bright I. Nwaru et al., 2013). The case control study by Turati et al., 2016 in 4-month-old children with atopic dermatitis reported that children who were introduced to high number of different solid foods at 4 months had a lower risk of atopic dermatitis than those exclusively breastfeed. The same results were observed for weaning starting at 5 months of age.

Type of solid food.

The types of foods introduced were solid foods that commonly cause allergy in children such as hen's eggs, peanuts, yogurt, oats, wheat, rye, barley, and fish (El-Merhibi *et al.*, 2012; Roduit *et al.*, 2012; Nwaru *et al.*, 2013; Du Toit *et al.*, 2015; Natsume *et al.*, 2017).

DISCUSSION

The main finding of this review is the introduction of alergenic solid foods to children before 6 months may reduce the risk of allergic events, especially in children with a history of allergy and reduce the risk of allergic sensitization. Allergens to food proteins are influenced by food processing. The effect of food processing on allergy depends on the methode used, the nature of the protein and the sensitivity of a person (Andreae eta Nowak-Weegrzyn, 2016, or 139). In his study Natsume et al. 2017 conducted the introduction of hen's eggs in infants with eczema using a two-step approach that is to provide 50 mg of heated egg powder for infants aged 6 to 9 months and after 9 months to 12 months the amount increased to 250 mg. This approach does not cause an immediate allergic

reaction, even in infants who have IgE sensitization to hen's eggs before starting the intervention. It may be caused by the allergenicity of the heated eggs being lower than the raw eggs. A low initial dose (50 mg) may also contribute to the safety of the approach. The process of introduction of extensively heated eggs has therapeutic potential (Kattan, 2016). Leonard et al. 2012 in his study showed that group who added baked eggs into their regular diet were 14.6 times more likely to develop tolerance to eggs than in the group that avoided eggs strictly. Continuous consumption of roasted eggs is associated with a decrease in SPT diameter, ovomucoid IgE and ovalbumin IgE levels, and elevated levels of specific IgG4 ovalbumin and ovomucoid.

Complex modern environmental changes (including changes in microbes, lifestyle, food intake, and environmental pollution), in addition to family history of allergy also contribute to allergic events (Palmer, 2016). Environmental and genetic interactions have an effect on oral tolerance, which can cause IgE-mediated food allergy and intestinal immune disorders (Lee, Thalayasingam eta Lee, 2013). Early environmental exposure (through the skin) to allergens may cause initial sensitization, while early oral exposure may lead to immune tolerance (Du Toit et al., 2015). The regulation of immune response during the introduction of food antigens is influenced by the environment in the gut (El-Merhibi et al., 2012). Feeding at 6 months of age (weaning age) can program the immune response to sensitization and not tolerance (Zutavem A et al. 2004, Agostoni C et al. 2008 in El-Merhibi et al., 2012). Early exposure to food antigens routinely in early life maintain the immune-regulating mechanism preventing allergic sensitization (El-Merhibi et al., 2012). The introduction of early solid foods, especially eggs and beans before the 6 month old (starting age 4 months) effectively prevent allergy. Early introduction of a wide range of foods is also recommended to reduce the risk of allergic diseases (Huang et al., 2016; Ierodiakonou et al., 2016; Abrams et al., 2017). Delay introduction of certain foods such as nuts, fish or eggs does not prevent even increase the risk of food allergy. Introducing new food regularly (several times a week) are important to maintain tolerance (Chan et al., 2014). Exposure to a wide variety of microbes provides a protective effect against asthma. The variety of bacteria in the intestine shows a relation with atopic diseases (Ege MJ et al. 2011, Bisgaard H et al., 2011 in Roduit, et al., 2012). Food is a major environmental factor, especially for infants who encounter large amounts of new food components in their first years of life. Food diversity appears to be protective of atopic dermatitis development. This supports the hypothesis that exposure to various antigens, such as food proteins, over a period of time in early life may be important for developing immune tolerance (Roduit, et al., 2012).

Early introduction (age 3 months) of food allergens to prevent allergies are not addressed to the general population. For the general population, supplementary feeding can begin at 4-5 months of age with a variety of different foods, including mature eggs around the age of 6-7 months (avoiding risk of FPIES) for allergic prevention and all types of foods important to be introduced in infants within a first year of life (Ricci eta Cipriani, 2016). The introduction of early solid foods has no significant effect on the frequency of breastfeeding or the duration of breastfeeding. The duration of breastfeeding decreased slowly, and the frequency of breastfeeding did not change during the first month of solid food introduction. In contrast, formula feeding is associated with decreased frequency of breastfeeding and breastfeeding duration (Abrams et al., 2017). Longer duration of breastfeeding significantly protects allergies in children without a history of allergy to their families (Huang et al., 2016).

CONCLUSION

Based on limited research evidence it can be concluded that the introduction of solid foods before 6 months of age has a lower risk of allergic events. Early introduction of allergenic foods is known to reduce the risk of allergic sensitization and modulate the immune system with elevated specific IgG4 antibodies. The likelihood of children becoming tolerant to food allergens may vary for different foods, so introducing diverse foods in the first year of life may reduce the risk of allergic events, especially in children with a history of atopic.

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BACTERIA IDENTIFICATION ON LEUKOCYTE POSITIVE URINE SAMPLES

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ABSTRACT

Background: Urinary tract infection (UTI) is one of the most infectious diseases found in developing countries such as in Indonesia. can occur in all ages both in children, teenagers, adults and in advanced age and also both in women and men. Most UTI occur because of the entry of microorganisms through the urethra. **Objectives:** This research purpose is to identify bacteria from the leukocyte positive urine sample was carried out.
Methods: The total number of bacteria was counted using PCA media. Then bacteria were isolated on MC media and for identification purpose we use serial of biochemistry media.
Results: From the results, the total number of bacteria on samples were ranged from 2-6000. From 32 urine samples we found *Escherichia coli* bacteria (43.8%), *Klebsiela pneumonia* (21.9%), *Shigella dysenteriae* (15.6%), *Pseudomonas aeruginosa* (6.3%) and *Serratia marcescens* (3.1%).

Keywords: *UTI, identification, bacteria*

INTRODUCTION

Urinary tract infection (UTI) is one of the most infectious diseases found in developing countries such as in Indonesia. It is the second after respiratory tract infections (Sari et al., 2015). According to its incidence rates, UTI can occur in all ages both in children, teenagers, adults and in advanced age and also both in women and men. However, of both sexes, women more frequently infected than men and estimated 50-60% of adult women have experienced UTI in her life (Imaniah, 2015). UTI is a general term indicating the presence of microorganisms in the urine. Most UTI occur because of the entry of microorganisms through the urethra. These microorganisms include *Escherichia coli, Klebsiella* spp*., Proteus mirabilis, Enterobacter* sp*., Pseudomonas aeurginosa, Staphylococcus saprophyticus,* and *Staphylococcus aureus*. *Escherichia* coli is the most common bacteria isolated from patients with the symptomatic or asymptomatic infection (Sari et al., 2015).

Generally it is agreed that UTI defined as the existance of minimal 10^5 colonies of bacteria/mL urine. However white blood cells that may found in the urine gives the high impression but not specific to the direction of the upper UTI. So it is necessary to do other tests as support and reinforcement. The key to UTI diagnosis is urine culture and microscopic examination to count the number of leukocyte in urine (Aina, 2016). However the other diagnosis for UTI diagnosis are available including sedimentation test to know the presence of bacteria and leukocyte in the urine sediment and dipstick test to test the presence of leukocyte esterase and nitrite in the urine sample (Septiari, 2012). The discovery of bacteriuria is the most meaningful of UTI diagnosis although it is not certainly always accompanied by clinical symptoms (Sumolang, et al., 2013). The purpose of this research is to know

MATERIALS AND METHOD

Urine samples came from hospital in area of Sleman Regency which has leukocyte positive from laboratory examination results. The sterile pots were used to minimize contamination of other microorganisms. Urine samples were taken every day to direct the inspection carried out in the laboratory. Urine in the pot put in closed containers which has been given with ice gels so that temperature conditions will still when taken to the laboratory.

At the isolation step urine samples were cultured on MacConkay (MC) agar media and incubate for 24 hours. Bacteria isolation results then identified using biochemical media including NA, sugar media, SC media, SIM and TSIA. All the media incubate for 24 hours for identification typing.

RESULTS AND DISCUSSION

A positive result on the NA can be seen with the growing positive colonies on the surface of the media. Some colonies grown with certain color like *Shigella dysenteriae* which is grown white. The other bacteria colonies produce another color pigment such as green in *Pseudomonas aeruginosa* and red in *Serratia marcescens*. For some other bacteria, like in *Escherichia coli* and *Klebsiela pneumonia*, the colonies grown colorless.

Identification results show that most of the bacteria found in urine samples were *Escherichia coli* (Table 1). *Eschericia coli* is the most bacteria that is found in various cases of UTI. This bacteria is most often found in the urine. This result is in accordance with the study result by Sumolang et al. (2013).

Tabel 1. Bacteria species found in urine samples

No.	Species identified	No. of samples	Percentage (%)
1	*Escherichia coli*	14	43.8
2	*Klebsiela pneumonia*	7	21.9
3	*Shigella dysenteriae*	5	15.6
4	*Pseudomonas aeruginosa*	2	6.3
5	*Serratia marcescens*	1	3.1
6	Unidentified	3	9.4
Total		32	100

E. coli bacteria is the main cause of UTI with percentage reaches 90% of cases compared to other bacteria, such as *Staphylococcus saprophyticus*, Enterococci, *Klebsiella* spp., *Proteus mirabilis*, and Pseudomonas (Ronald et al., 2001). It is a normal microorganisms found in human waste because it lives in intestine. This bacteria is generally carried in the feces and then reach the way into the urethra.

The second most one bacteria found was *Klebsiella pneumoniae* (Table 1). These results are in accordance with Haris et al. (2013) that found 21,43% *Klebsiella pneumoniae* from 34 urine samples. *Klebsiela pneumoniae* bacteria can get on the urinary tract could be due to the direct contact during urination (Elliott et al., 2013).

Some factors that can cause UTI i.e. shorter urethra in women, sexual intercourse, abnormalities of structures that impede the flow of urine (e.g. enlarged prostate and tumors), age and other factors such diabetes mellitus and instrumentation. UTI prevention can do with urination twice to make sure that the bladder empty, including before bedding time (Elliot et al., 2013).

CONCLUSION AND SUGESTIONS

Most of the bacteria found in urine with leukocyte positive is gram-negative bacteria with the most in percentage is *E. coli* species (43,8%). Further research is needed to find out the nature of bacterial sensitivity against various antibiotics.

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SUPPLEMENTARY FEEDING IN THE FORM OF BISCUITS IMPROVING STUDENT ACHIEVEMENT IN ELEMENTARY SCHOOL

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ABSTRACT

BACKGROUND: Academic achievement is a benchmark of the quality of human resources. Primary students is the initial capital and future assets. Consumption of food like PMT-AS have an influence on academic achievement.

OBJECTIVES: To determine the effect of supplementary feeding (PMT-AS) on academic achievement in elementary school.

METHODS: This study is a pre-experimental with one group pre-post test design, in primary school 4th and 5th grade students at SDN Dalangan 1,SDN Dalangan 2,SD Muhammadiyah Ngijon IV and SD Muhammadiyah Sragan. The inclusion are aged between 9-12 years old and willing to be a sample, while the exclusion are absent when the initial data collection and disability. Using proportional random sampling technique based class strata obtained 63 samples. Interventions were given of biscuits (PMT-AS) for 6 weeks was measured energy and protein from PMT with a food recode 4x24 hour, while academic achievement are categorized into three; exact sciences (mathematics,science); social (Indonesian,social) and average (fourth combined these subjects). Data were analyzed by Paired sample t-test, Chi-Square and stratification using Stata version 13.

RESULTS: Energy consumption is 16.98% and protein is 11.91% of the percent RDA. Exact sciences value increased by 0.85±5.220 points; social values increased by 3.14±7.156 points; and the average value increased 2.00±4.411 points. Energy and protein increases the exact sciences and average value but not significant (p=0.95; p=056) and (p=0.41; p=0.18) but social value significantly increased ie, p=0.03 and p=0.00.

Conclusion:PMT could increase all subjects value, but only increase the social value which was statistically significant.

Keywords *: PMT-AS, elementary school, academic achievement, energy, protein*

BACKGROUND

Academic achievement is an assessment of academic activities that can reflect the results achieved by each child within a certain period. Academic achievement can also be used as a benchmark in determining the quality of education and quality of human resources. According Siagian (2012), elementary school age children are the initial capital and valuable asset for nation building in the future. However, based on data from the Education Office of Sleman Regency (2015), there is a decrease in the mean score of the national standardized end-school examination (SDA) at Elementary School level of 23.49 in 2014 to 22.99 in 2015. And the average value of UASBN in the Mathematics subject down from 71.29 in 2015 to 66.09 in 2016 (Dikpora, 2015).

Academic achievement on the indvidu is influenced by external factors and internal factors. One of the external factors is the consumption of adequate energy and protein intake that can help children in improving academic performance because the brain can work optimally. Energy as glucose is the main source of fuel for the brain, nervous system, and red blood cells (Woodhouse, 2012). While the protein as a form of tissue in the body that serves to bring information from brain cells to other brain cells (Ross, 2010). But the consumption of protein in children in Indonesia is still relatively low ie 58.75% (Sudargo, 2016). Meanwhile, according Sunarti (2005), a person needs to consume the source of carbohydrates at certain intervals to obtain body glucose as energy needs, because the glycogen supply lasts only a few hours. According to Woodhouse (2012) if children lack of energy and protein can interfere with academic performance.

Therefore, the Government through the Sleman Health Office launched the School Supplementary Food Program (PMT-AS) in 50 elementary schools in 6 sub-districts in Sleman District. The activity will be conducted starting in October 2016 with supplementary feeding of school biscuits for three months or 12 weeks. The selected research location is Minggir sub-district because based on data from Education Office of Sleman Regency that the value of National Standardized School End Test (UASBN) Lesson Year 2014/2015 shows that from 501 primary schools in Sleman district, 4 schools that became research sites in Minggir sub-district are under the rank of 200 big that is 208, 292, 311, and 332. And based on sub-district rank as Sleman regency, Minggir subdistrict is ranked 16th out of 17 subdistricts with total value 220.78 (Disdikpora, 2015). Therefore, Minggir sub-district became the basis of selection in the study to see the effect of additional school feeding (PMT-AS) on the achievement of elementary school students.

SUBJECTS AND METHODS

This research is a pre-experimental study using pre-post test design. This study was designed to compare the effect of academic achievement before intervention and after intervention. The subjects of this study were elementary school students at SD Negeri Dalangan 1, SD Negeri Dalangan 2, SD Muhammadiyah Ngijon IV, SD Muhammadiyah Sragan with inclusion criteria that is aged between 9-12 years and willing to be a research sample with the consent of parent/guardian. While the exclusion criteria is not to go to school when the initial data collection and suffer from a defect or disability by looking at the physical condition. Using Lemeshow formula (1997), got sample as many as 63 people, while sampling technique using proportional random sampling with strata based on class.

The intake of PMT-AS seen is the energy and protein consumed by the child in a day from a PMT-AS biksuit containing 300 kcal of energy and 6 grams of protein. Given 5 times a week for 6 weeks. Measured using a food record 4x24 hours later compared with RDA and presented in percent form. Analysis of food intake data using Nutrisurvey software. Academic achievement that is seen is daily test score before midterm exam (pre) and after midterm exam (post). Categorized into three namely eksakta (Mathematics and natural science), social (Indonesian and social science), and average (combined four subjects). The academic achievement analyzed for PMT-AS intake is the difference in the three subjects.

Data is processed using computer program Microsoft Excel 2012 and Stata version 13. The analysis used is univariate to see frequency distribution table, while bivariate analysis using paired sample t-test and chi-square test. Meanwhile, to see other factors related to intake of PMT-AS and academic achievement is done stratification analysis. Factors analyzed were academic discipline, father and mother education, family income and large family. Data is processed using computer program Microsoft Excel 2012 and Stata version 13.

RESULTS

Table 1. Sample Characteristics

Sample Characteristic	n	%
School		
Public	35	55.6
Private	28	44.4
Grade		
Fourth	30	47.6
Fifth	33	52.4
Sex		
Male	29	46.0
Female	34	54.0
Age (year)		
10	24	38.1
11	31	49.2
12	8	12.7
Discipline of academic		
Discipline (>80%)	51	81.0
Less discipline (≤80%)	12	19.0
Father's Education		
High (≥SMA)	44	69.8
Low (<SMA)	19	30.2
Mother's Education		
High (≥SMA)	44	69.8
Low (<SMA)	19	30.2
Father's Occupation		
Farmer/Laborer/Entrepreneur	53	84.1
Civil servant/Army	10	15.9
Mother's Occupation		
Laborer/Entrepreneur/Entrepreneur/Civil Servant	20	31.7
No work	43	68.3

Table 2. Percentage of Food Intake

	Average ± SD	Min	Max
PMT-AS (%)			
Energy	16.98 ± 4.174	5.2	25
Protein	11.91 ± 2.843	3.5	17
Daily Intake (%)			
Energy	69.63 ± 27.352	26	194
Protein	90.06 ± 38.587	32.4	288
Total Intake (%)			
Energy	86.58 ± 29.466	37.2	218
Protein	102.01 ± 39.731	39.7	304

Table 3. Differences in Academic Achievement

	Average ± SD	Min	Max	*P-value*
Selisih Eksakta	0,85 ± 5,220	-13	11	0,197
Selisih Sosial	3,14 ± 7,156	-12	18	0,001
Selisih Rata-Rata	2,00 ± 4,411	-7	12	0,001

Table 4. Relationship of PMT-AS Intake to the Difference in Academic Achievement

PMT-AS Intake	Subjects				p	RR	CI95%
	Less		Good				
	n	%	n	%			
Eksakta Difference							
Energy							
Less (≤16.98)	11	44,00	14	56,00	0,95	0,98	0,55 - 1,73
Good(>16.98)	17	44,74	21	55,26			
Protein							
Less (≤11.91)	10	40,00	15	60,00			0,47 - 0,44
Good (>11.91)	18	47,37	20	52,63	0,56	0,84	
Social Difference							
Energy							
Less (≤16.98)	19	76,00	6	24,00	0,03	1,52	1,03 - 2,23
Good (>16.98)	19	50,00	19	50,00			
Protein							
Less (≤11.91)	20	80,00	5	20,00	0,00	1,68	1,14 - 2,49
Good (>11.91)	18	47,37	20	52,36			
Average Difference							
Energy							
Less (≤16.98)	17	68,00	8	32,00	0,41	1,17	0,80 - 1,72
Good (>16.98)	22	57,89	16	42,11			
Protein							
Less (≤11.91)	18	72,00	7	28,00	0,18	1,30	0,89 - 1,89
Good (>11.91)	21	55,26	17	44,74			

DISCUSSION

The results of this study are not in accordance with previous research which states that there is no difference in student achievement of Elementary School before and after PMT-AS (p = 0,09) (Lestari, 2010). Noviyani's research (2013) states that there is no increase in academic achievement in Indonesian subjects (p = 0.284), but significantly decreased in Mathematics (p = 0.013). Ruhana's research (2009), states that there is no statistically significant change in the difference in the average value of academic achievement (p = 0.334). Mulyono's research (1997), states that there is no influence of PMT-AS on Indonesian language academic achievement. Kim's research (2003) states that there is no relationship between energy intake and academic achievement.

But the results of this study in accordance with research in Kenya found that school feeding programs through breakfast can improve academic achievement of about 0.4 SD (Jukes, 2008). Kleinman's reearch (2002), school breakfast program for 6 months can increase the value of mathematics. Dotter's research (2013), shows that the breakfast program in the classroom can increase the value of language and mathematics by an average of 11% and 15% standard deviation.

This difference in outcomes can be due to the different types and content and ways of administering different PMT-AS. PMT-AS in the form of biscuit was first implemented in 2016 and has not done previous

research. Research of Noviyani (2013), giving PMT-AS in the form of snack food given 3 times a week for 2.5 months (10 weeks). In one feeding containing only 190 kcal of energy, but the protein is quite high at 9.25 gram. While in this study the given PMT-AS contains 300 kcal of energy and 6 grams of protein and given 5 times a week as much as 60 grams (10 pieces) for 10 weeks. But in this study only conducted for 6 weeks because the provision of PMT-AS suspended by the semester vacation. According to Health Office (2005), ideally PMT-AS is given at least 3 times a week during the effective academic day that is 9 months.

The energy and protein of PMT-AS biscuit contributed substantially to 16.98% for energy and 11.91% protein from AKG. When compared with the average daily intake of the sample (without PMT-AS), the percentage of energy sufficiency only reached 69.63% which included the category of less energy intake due to <80% of RDA compliance (Roedjito, 1989). Meanwhile, if the sample intake is included with the consumption of PMT-AS then the energy intake has categorized good ie 86.58%. According of Febriani (2013), the total energy intake sufficient energy needs can have a positive impact on the academic achievement of the sample. While protein intake remains good despite with or without the consumption of PMT-AS. This statement is also supported by Burkhalter's research (2011) which states that increased energy consumption and protein can improve academic achievement.

Research Woodhouse (2012), states that all cells in the body including neurons and glial cells, obtain energy from food in the form of macronutrients; carbohydrates, proteins, and fats. Before the cells can get energy, food should be converted into simple sugars, especially in the form of glucose, the simple sugar that is the main source of fuel for the brain, nervous system, and red blood cells. While the protein as a form of tissue in the body, including neurotransmitters that function to bring information from brain cells to other brain cells (Ross, 2010). Lack of protein or also known as lack of protein energy, can lead to poor school performance. This is because children become lethargic, less interested in a thing and become passive, so it affects their social and emotional development as well (Ross, 2010).

The growth and intelligence period of the child was first established and most optimal during the first 1000 days of life (1000 HPK) or commonly referred to as the golden period. This period starts from the pregnancy phase (270 days) until the child is 2 years old (730 days). There are 3 groups of interrelated developments: physical development, cognitive development and emotional development. This cognitive development that will affect the intelligence of children for the future (Julistio, 2013). Until a 2-year-old child will develop a neural network that is connected and faster in capturing information. Primary school-aged children aged between 7-12 years including late to repair brain development, but at this time still the development of brain neuronal tissue even though not as fast as at age less than 2 years. So the PMT-AS program is one solution to maintain or improve brain development. In addition, this additional consumption is important because adequate energy and protein consumption will benefit the brain in order to run optimally (Stuber, 2014).

Startification analysis results show that parent education (father and mother) has a relationship with intake of PMT-AS and social values and is statistically significant ($p < 0.05$). This is in accordance with the study of Sudargo (2016) which states the level of education parents have an important role in academic achievement, especially from maternal factors.

CONCLUSION AND SUGGESTION

Based on the results of this study, it was concluded that PMT-AS contributed 16.98% of energy and 11.91% protein. There has been a significant increase in academic achievement on social and average values but the effect size of exact scores has shown significant improvement. Supplementary feeding of schoolchildren (PMT-AS) signifies an effect on social value but on exact value and average value does not have a significant effect.

The researchers suggested that this PMT-AS program be continued because of the amount of energy and protein contribution from PMT-AS in fulfilling the daily requirement and the increase of academic achievement of elementary school students, so that it needs to be re-implemented this PMT-AS program with improvement in terms of type and variety taste. In addition, further research on the same theme is required using Pretest-Posttest Control Group Design research design and longer intervention of 12 weeks and examining other factors that influence academic achievement but not yet studied such as nutritional status, health status, academic facilities, intelligence, and teaching.

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BODY IMAGE AMONG OVERWEIGHT AND NON OVERWEIGHT ADOLESCENT GIRLS: *A CROSS SECTIONAL STUDY*

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ABSTRACT

Background: Adolescents are one of the vulnerable age groups who are overweight and obese. Physical changes influence psychological development, and will have an impact on body image. The lack of satisfaction on body image and the desire to be thinner are the factors related to the reason why adolescents do certain diets**.**

Objectives: The objective of the study was to analyze the differences of body image between overweight adolescent girls and non overweight adolescent girls.

Methods: This is an observational research using cross sectional design, conducted in Santa Agnes junior high school Surabaya. The sample size were 36 adolescent girls, and randomly selected from student's list. The observed variables were body image, body dissatisfaction and fear of fatness. Measurement of data using modification from Multidimensional Body Self Questionnaire-Appearance Scales (MBSRQ-AS). The data were analyzed by Chi-square test with α= 0,05.

Results: The result of the research showed that there was difference of perception about body shape and body weight between overweight and non overweight adolescent girls with value p = 0,044 (p < 0,05).

Conclusion: It was concluded that overweight girls tend to have negative body image, whereas non overweight girls tend to have positive body image.

Keywords: *body image, adolescent girls, overweight*

INTRODUCTION

Adolescents between the ages of 10 and 19 are the transition age group from childhood to early adolescence, middle adolescence, late adolescence to adulthood. Important conditions that affect nutritional needs among girls ages 10 to 19 are rapid growth in puberty, menstruation, snacking habits and attention to physical appearance of "body image". Adolescent girls should take into account the nutritional needs and pay attention to these conditions to prepare themselves before marriage. [1]

Adolescents are generally entering the stage of personal images that show concern for their body shape in accordance with the desired of the body image. Body image is a behavior or action that leads to the evaluation of the individual's judgment of his physical appearance, as well as the individual's experience of perception or thought to his form and body weight. [2] Concern for body image among adolescents is very strong, especially in early adolescents who are going through puberty rather than late adolescents groups. Adolescents who enter puberty will experience hormonal changes by showing signs of physical changes, sexual maturity and emotion. The thing most easily seen by the adolescents himself and others around him is the physical change, because the physical changes are visible. [3]

Adolescent girls who experience dissatisfaction with their body turn out more when compared with adolescent boys, because body fat in women will increase and make the body farther away from the ideal body shape at the time of entering into adolescence, while the adolescent boys mass his muscles increase and tend to be more satisfied with his body. [4] Results of research conducted in India in some adolescents show that 12.5% of adolescent boys and 40.8% of adolescent girls experience a negative body image. [5] Then, research conducted at a senior high school in Surabaya in 100 adolescent girls showed that 83% had dissatisfaction with her performance. [6] Other research shows that adolescent girls often give negative ratings and dissatisfaction with their own body, therefore adolescent girls tend to have a more negative body image than adolescent boys. [7] Dissatisfaction that happens in the end makes adolescents consider

his appearance as something scary, not in accordance with what is expected and eventually become not confident.

According to Riskesdas 2013 data, adolescents aged 13-15 years in East Java Province have a prevalence of overweight nutritional status of 8.9% and obesity nutrition status of 3.0%. Of these percentages is quite a problem for the occurrence of overweight and obesity. This data is higher when compared with the National Riskesdas data of 2013, the prevalence of obesity is 10.8% which consists of 8.3% overweight and 2.5% obesity. The prevalence of general obesity in women is higher than for men, which is 32.9% versus 19.7%. While the nutritional status of adolescents in Surabaya based on IMT/U is known, nutritional status of 7.8% thin, normal nutritional status of 76.3%, overweight 8.9% nutrition status and obesity nutrition status of 3.9%. [8]

Overweight is a weight that exceeds normal weight, while obesity is the excess fat accumulation in the body. But because body fat is difficult to measure, excessive body weight is considered fat accumulation. [9] Overweight and obesity can have a negative impact on the sufferer. According to the World Health Organizatation of overweight and obesity cause bad metabolic effects on blood pressure, triglycerides, insulin resistance and cholesterol. The risk of disease that will arise that type 2 diabetes mellitus, ishemic stroke and coronary heart can occur with increased Body Mass Index (BMI). A high Body Mass Index also increases the risk of breast cancer, prostate, endometrial, colon, kidney and gall bladder cancers. The mortality rate increases with increasing degrees of overweight and obesity cases. [10] Another impact that adolescents often overlook is the feeling that they feel different or differentiated from their family, friends and groups will make individuals overweight and obese are vulnerable to various psychological problems.

Researchers want to do research on adolescent respondents, especially adolescent girls remember those who are still vulnerable to nutritional problems. Therefore, this study was conducted with the aim to analyze the differences in body image between overweight adolescent girls and non overweight adolescent girls.

METHODS

This study was an observational analytic study and when viewed based on time using cross sectional design, because the dependent and independent variables in the study subjects were measured at the same time. [11] The total population obtained through weight and height measurements for screening was then assessed based on Body Mass Image (BMI) for age with standard WHO AnthroPlus standard in 2007. The study population was 140 girls consisting of all adolescent girls (ages 13-15 year) class VII and VIII at junior high school Santa Agnes Surabaya. This study began in April to August 2017.

After the measurement, there were two population groups, that is adolescents with overweight (BMI for age > 1 SD until 2 SD) and non overweight adolescents (BMI for age -2 SD until 1 SD). Then from both groups of population this is done withdrawal sample. Obtained 36 randomly selected samples from the student list. The sample was divided into 2 groups, ie 18 samples for overweight adolescent girls and 18 samples of non overweight adolescent girls. The observed variables are body image, body dissatisfaction and fear of fatness.

Primary data collection was measured by anthropometry (body weight, height, BMI/U) and interview using modified questionnaires that included 3 variables regarding body image, body dissatisfaction and fear of fatness in Multidimensional Body Self Questionnaire-Appearance Scales (MBSRQ-AS)). [12] Measurement of height and weight based on WHO anthropometric standard 2007 for children aged 5-18 years, nutritional status determined based on Zscore TB/U and IMT/U values. Secondary data obtained from the school in the form of general overview, derived from the profile of junior high school Santa Agnes Surabaya, a list of students of class VII and VIII and other secondary data obtained from various sources. This study uses instruments in the form of digital scales, microtoise and body image questionnaire. The data analysis used *Chi-square* test with $\alpha = 0,05$ to see the difference of body image between overweight and non overweight group. Prior to the data retrieval, the researcher has conducted an ethical test and has received approval from the research ethics committee of Health Faculty of Public Health University of Airlangga for the feasibility of ethics when taking data in the field.

RESULTS AND DISCUSSION

This research was conducted at junior high school Santa Agnes Surabaya, located at Mendut 7 Surabaya. Junior high school Santa Agnes has complete school facilities in the form of language laboratories, computer labs, biology laboratories, physics laboratories, counseling guides, chapels (small

rooms intended to replace the parent church's function), canteen, library and sport hall. In 2002, junior high school Santa Agnes Accredited A PLUS to date. Extracurricular activities in junior high school Santa Agnes are english club, science club, robotic club, extra information and communication technology, extra art like modern dance, karawitan, cheerleader, guitar, drum, piano and Santa Agnes Choir which is one of the pride of school for having won various kind of race.

Anthropometry of Respondents

The anthropometry of measured respondents included body weight, height and BMI/U of girls at junior high school Santa Agnes Surabaya. Based on Table 1 it was found that the mean weight of adolescent girls in the overweight group was (60,12 ± 5,27) kg and the mean body weight in the non overweight group was (49,18 ± 6,53) kg. While the average height of respondents in the overweight group was (157,42 ± 5,46) cm and the mean height in the non overweight group was (154,84 ± 5,99) cm. Furthermore, for the Body Mass Index by age (IMT/U), the average respondent in the overweight group was (1,40 ± 0,30) and the mean IMT/U in the non overweight group was (0,16 ± 0,78).

Body Image

Body image can undergo changes throughout the life span in response to changing feedback from others, the prevailing social and cultural environment. A healthy body image is characterized by a mental picture and an accurate attitude about the body and is one of the embodiments of positive self-esteem. If there is someone who has a positive body thinking, then automatically he will feel satisfied with the condition of the body and accept the condition of his body with what it is. But if a person has a negative body thought, then he will always compare his body with the ideal body of others who want and always feel dissatisfied with the condition of his body. [2] Negative thinking about the condition of the body is sometimes also very beneficial for overweight and obese adolescents, because they will have the awareness to lose weight. According to research Sunartio, et al who stated that the body of another woman is more interesting is the body shape most often used as a comparison by others or people who have overweight and obese. Because the comparative object is a more attractive body shape, this tendency will increase the dissatisfaction of body shape that will make the motivation to lose weight in people who are overweight and obese. [13]

Body image is categorized into two things: positive body image and negative body image. Based on Table 2 shows that 44,4% of respondents in the category of positive body image and 55,6% of respondents in the category of negative body image. When viewed in the group of overweight adolescent girls found 13 respondents (72,2%) in negative body image category and 7 respondents (38,9%) in non overweight adolescent girls group in negative body image category.

The result of difference test on body image between overweight and non overweight adolescent groups using *Chi-square* test obtained *p value* = 0,044 (p < 0,05) meaning that there is significant difference in body image between overweight and non overweight adolescent girls. The Odds Ratio in Table 2 shows the 4,08 result which means that the risk of negative body image in overweight adolescents is 4 times higher than non overweight adolescents.

The psychological development of adolescents is influenced by apparent physical changes in adolescents. Physical changes can also affect the concept of self in the adolescent in forming body image or how the individual perception to assess and evaluate the shape and size of the body. [14] Having a healthy, ideal and slim body is the desire and dream that must be obtained for every adolescents, especially adolescent girls. Many young women who are dissatisfied with body image or perception of their own body shape feel embarrassed, anxious and lack of self-confidence even thinking that others will find themselves less attractive.

The results of research conducted at Private High School in Surabaya showed that 61,5% of female adolescents had negative body image, 66,7% experienced dissatisfaction with the body and 64,1% took action. Adolescent girls who have negative body image are three times more at risk of experiencing body dissatisfaction or dissatisfaction with body shape than girls who have positive body image. [15]

Body Dissatisfaction

The most common body image problem is dissatisfaction with body shape (body dissatisfaction). Dissatisfaction occurs when a person does not like his body or certain parts of his body. Body dissatisfaction is part of the body image. Body dissatisfaction is the conceptualization of the difference between the ideal body perception they want and the individual's perception of his or her body size, or

just as a feeling of dissatisfaction with the desired size and shape. [16] Distribution of body dissatisfaction can be seen in Table 2.

Result of research in Table 2 about body image as much as 55,6% respondent in body image negative category causing body dissatisfaction at respondent equal to 41,7%. When viewed in the group of overweight adolescent girls found 3 respondents (16,7%) in body dissatisfaction category and 12 respondents (66,7%) in non overweight adolescent girls group in body dissatisfaction category. It can be concluded in Table 2 that body dissatisfaction in non-overweight adolescent girls tends to have dissatisfaction with the size and shape of the body. The result of difference test to body dissatisfaction between overweight and non overweight adolescent girls group by using *Chi-square* test obtained *p value* = 0,002 (p < 0,05) meaning that there is a significant difference in body dissatisfaction between overweight and non overweight adolescent girls group.

Adolescents who look dissatisfied with their body shape will do everything they can to improve their appearance to match what they want. Research conducted by Yuanita in adolescent girls who become members in the fitness center and do regular sports activities as many as 40% of adolescents. In addition to the efforts made by following the sport, adolescents also set the diet. Type of sports business followed by 37% doing other sports such as swimming, cycling, playing badminton and basketball. [17] Research conducted by Fernandez and Pritchard found some facts, namely the subject of research want to lose weight after watching the appearance of the artists on television and fashion show event. There is also the subject of research that was not satisfied with the image of his body because they like to read articles in the print media about the slim body shape. The role of media, community, family, friends and artist / model can influence and encourage the individual to care about the image and appearance of his body. [18] According to research conducted by Sunartio, the influence of peers as much as 30,9% and the influence of family 27,8% is the most motivating factor or increase the adolescents attention to body shape. [13]

The results of previous studies have shown that a person who experiences body dissatisfaction can lead to dietary behavior in the individual and an excessive diet will trigger eating disorders or commonly referred to as eating disorder and at risk also increase eating pathology such as anorexia nervosa and bulimia nervosa. Adolescents are sometimes less satisfied with the condition of the body despite having the ideal body shape, want to be thinner and continue to have the desire to stay lean and comparing with other people's body size is considered better. Body dissatisfaction is also a prominent factor in influencing a persons eating disorder. [19] Body dissatisfaction is also not always detrimental, sometimes also beneficial for adolescents who are overweight and obese so they have the motivation or awareness to lose weight, equating the normal weight he wants from other people, relatives, family and artists / models.

Fear of Fatness

Fear of fatness is a term to describe the rejection of overweight or obesity accompanied by weight loss efforts that have nothing to do with body size. [20] The result of research in Table 2 about body image of 55,6% of respondents in the negative body image category also caused fear of fatness on the respondents by 30,6%. When viewed in the group of overweight adolescent girls found 7 respondents (38,9%) in the category of fear of fatness and 4 respondents (22,2%) in the non overweight adolescents group in the category of fear of fatness. The result of difference test to the fear of fatness between overweight and non overweight adolescents by using *Chi-square* test obtained *p value* = 0.278 (p > 0,05) meaning that there is no significant difference in fear of fatness between overweight and non overweight adolescent girls.

Adolescent girls will tend to be more afraid of gaining weight and paying attention to their body shape than boys. [21] The form of fear of fatness has the characteristic that many people are affected by body dissatisfaction (perceiving themselves as fatter than actually), while others continue to maintain a thin body even though they admit that they are not overweight. This situation leads to improper body shape control in people who are of normal weight or even less. [22] Mistaken perceptions of seeing a adolescents self-change causes them to ignore the intake of nutritious food. Though nutritious food is essential to keep up with the rapid, physical, psychological and social changes in the adolescents growth spurt period. [23]

CONCLUSIONS

There is a difference of perception about body shape and body weight between the overweight and non overweight adolescent girls. Overweight girls tend to have a negative body image, while non

overweight adolescent girls tend to have a positive body image. Suggestions given so that adolescents still have a positive perception or thinking about the body image then it should adolescents, especially adolescent girls more apply the right diet, get enough breakfast, good physical activity by doing regular exercise three times a week for 30 minutes. In order for adolescents not to experience body dissatisfaction and fear of fatness should be more confident in the current body condition, do not care less about the negative judgments of others around and regularly monitor the weight and height to know the nutritional status.

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Table 1. Adolescent Girls Anthropometry in *Overweight* and *Non Overweight Groups*

Anthropometry of Respondents	*Overweight*	*Non Overweight*
Weight (kg)	60,12 ± 5,27 (51,50-68,70)	49,18 ± 6,53 (37,30-60,60)
Height (cm)	157,42 ± 5,46 (148,55-167,80)	154,84 ± 5,99 (145,50-163,20)
IMT/U	1,40 ± 0,30 (1,01-1,98)	0,16 ± 0,78 (-1,31-1,00)

Description: Data is presented in the mean ± standard deviation, with a minimum-maximum

Table 2. *Body Image* Distribution*, Body Dissatisfaction* dan *Fear of Fatness*

	Criteria	*Overweight*	*Non Overweight*	Total	OR	*P Value*
		n (%)	n (%)	n (%)		
Body Image	Positive	5 (27,8)	11 (61,1)	16 (44,4)	4,08	0,044
	Negative	13 (72,2)	7 (38,9)	20 (55,6)		
Body Dissatisfaction	Ada	3 (16,7)	12 (66,7)	15 (41,7)	0,10	0,002
	No	15 (83,3)	6 (33,3)	21 (58,3)		
Fear of Fatness	Yes	7 (38,9)	4 (22,2)	11 (30,6)	2,22	0,278
	No	11 (61,1)	14 (77,8)	25 (69,4)		

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PHYSICOCHEMICAL ANALYSIS OF INULIN OBTAINED FROM LESSER YAM (*Dioscorea esculenta*)

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ABSTRACT

Background: Lesser yam (Dioscoreaesculenta) is a local tuber that is widely available in Indonesia. However, the availability is not directly comparable to its utilization. Lesser yam contains inulin which is one of the most common food content used in medical and pharmaceuticals because it can reduce the risk of colon cancer, normalize blood sugar levels of diabetics, and lower the cholesterol and triglycerides. However, the inulin used for both research and industrial field are still imported from abroad. Therefore, it is important to produce inulin from local products.
Objective: Isolated inulin from the lesser yam and conducted physicochemical analysis of inulin products.
Method: This study was an exploratory research with the purpose of producing inulin from the lesser yam. The obtained inulin was then dried in the incubator and being tested for its solubility, water absorption, gel strength and moisture content. The study was conducted in the laboratory of Biochemistry, Biology Department, UniversitasNegeri Semarang on April-June 2017. The required materials were the lesser yam, chemical materials, and other necessary tools.
Results: The results showed the physicochemical values of inulin from lesser yam as follow: the solubility is 89.07 ± 1.3%; the water absorbency is 34.28 ± 0.8%; the gel strength is 0.027 ± 0.02 and the moisture content is 9.53 ± 0.15.
Conclusion: The inulin obtained from lesser yam has a high value of prebiotic activity which means that it has potential as a functional food

Keywords: *lesser yam, inulin, functional food*

INTRODUCTION

Inulin is a polymer of fructose with glucose as the terminal group. Fructose units in inulin are linked by β-(2α1)-glycosidic. As the soluble dietary fiber, inulin in useful for digestive system as well as the body health (Sardesai, 2003). Inulin is soluble in water, so that it could not be digested by enzymes in mammal digestive system. Inulin is widely used in food industry in EROPA, USA, Canada and Indonesia as the ingredient of various food.

Needs of insulin in Indonesia have increased year by year but all of those were fulfilled with the import inulin. The volume and import value of inulin in 2008 and 2010 reached 1.420.522 kg with the value of 4.664.245 US $ and 4.021.679 kg with the value of 13.190.242 US $. Kg respectively (Biro PusatStatistik, 2012).

Lesser yam (*Dioscoreaesculenta*)is one of the plants lived in various places in Indonesia. It grows wildly either in yards of residents of in the forests. The tuber of this species is usually used as an alternative carbohydrate. However, its utilization is still limited. Inulin isolation from the tuber of lesser yam is one effort and innovation to utilize the abundant local natural resources.

Inulins obtained from various plants have different characteristic, known from the different result of extraction and precipitation process. For example is inulin from *Agave tequilana*with the different degree of polymerization at different ages (Arrizondkk*.,* 2010). The way of drying process also affects the characteristic of inulin produced. Drying using a dryer cabinet produces inulin that has semi-crystalline properties (Park et al., 2006).

METHODS

Tools and Materials

The materials used in this study were lesser yam (*Dioscoreaesculenta*) that were obtained from GunungpatiFreshmarket, Semarang, Central Java, Indonesia. Standard inulin (C6H10O5)n for analysis using HPLC (*Hight Performance Liquid Chromatography*) obtained from MP.Biochemicals, Ohaio, with molecule weight of 990,8. Commercial inulin (Februline Instant, *native* chicory inulin) have the degree of polymerization (DP) about 10, obtained from the Biogenetic scientific, Indonesia. Additional materials used included dextrin, maltodextrin, egg white, and Na-CMC (*Sodium CarboxiMetilCelulose*). Bacteria used for the testing were *Bifidobacteriumbifidum* BRL-130*, Bifidobacteriumbreve* BRL-131*, Bifidobacteriumlongum* ATCC-15707, *Lactobacillus casei*FNCC-90*, Lactobacillus acidophilus* FNCC-0051, and *E.coli*NCC-195 obtained from Food and Nutrition Culture Colection, Center of Food and Nutrition Research UniversitasGadjahMada, Yogyakarta. Bacteria culture medium was liquid MRS (*Man RogosaSoyprotein*) and agar for the growth of *Bifidobacteria*and*Lactobacillus.*The MRS media formulation was by replacing glucose with inulin for the test medium. TSA (Trypticase Soy Agar) and TSB (Trypticase Soy Broth) for E. coli growth. Media M-9, was used for E. coli testing with a carbon source of glucose and inulin. Tools used in this study were HPLC with Aminex Column HPX-87C (250mmx4mm), 410 model water refraction detector and LCHE Waters model M-45 pump for inulin purity test, autoclave, cabinet dryer, centrifuge, water bath shaker, mixer, viscosimeter, Loyd penetrometer, incubator, colony counter and X-Ray diffractometer.

Inulin Isolation from the Lesser Yam

Isolation of inulis was conducted according to the procedure used by Park et al. (2006) and Toneli et al. (2008) with some modifications. The lesser yam was cleaned, washed, peeled and cut into small pieces, then blended with the addition of hot water in temperature of 80-90 ° C 1:10 (tuber: water). The next was diffusion in a waterbath shaker at 90 ° C for 1 hour. After being filtered and cooled, it was then frozen at -20 ° C for 24 hours. The frozen filtrate was thawed and then centrifuged at 1500 rpm for 15 minutes to obtain the white precipitate which was then separated. The white precipitate was then dried using a dryer cabinet at 60 ° C for 5 hours, mashed and sieved.

Inulin Solubility Test (YuwonodanSusanto, 2001)

Ten grams of sample was weighed, then put in water in temperature of 90 ° C and stirred for 15 minutes. The solubility time was calculated using the stopwatch until all inulin was dissolved. The solution was allowed to stand for a while then be filtered with a filter paper with a known weight. The solution left in the filter paper then were put in to the oven at 105 ° C for 3 hours and after that it was then weighed.

Water Absorption Test (Yuwono and Susanto, 2001)

The sample was weighed as much as 1.5 grams, then it was wrapped with filter paper and tied with yarn. The sample was hung in a jar that has been filled with water halfway of the volume. Samples should not be in contact with water and the jar was closed tightly. After 5 hours the sample was taken and weighed.

Gel strength measurement

The formulation of lesser yam inulin and 10% commercial inulin was made, then heated while stirring until the temperature reached 100 ° C. The inulin solution was cooled to 4 ° C for 24 hours. Gel strength was measured using Tensile Strength Zwick Type DO-FBO.5TS

Water Content Measurement (Gravimetri: AOAC, 1990)

Samples that have been mashed as much as 1-2 grams were put into the weighing bottle (aluminum foil) which has been dried in the oven at 105° C with a known weight (constant weight). They were then dried at 100-105° C for 3-5 hours, cooled in a desiccator, and then weighed. They were then heated again in oven for 30 minutes, then chiledl and weighed. This treatment was repeated until a constant weight was reached. This weight reduction was the amount of water in the calculated sample.

RESULTS

Inulin Solubility

The lesser yam inulin dried by using foam mat drying technique has 89.07% solubility. Commercial inulin as the standard has 100% solubility. Inulin solubility is caused by an inorganic hydroxyl (OH) groups which cause inulin to be polar, thus soluble in water. The solubility of the inulin of the drying lesser yam is

due to the air trapped at the time of foam formation resulted in a porous more dry inulin. The porous charateristic makes it more easily penetrated by water when dissolved. Kumalaningsih (2004), stated that the material dried by the method of foam mat drying has a characteristic that are crumb structure, easy to absorb water and soluble in water.

Water Absorption

Lesser yam inulin dried by using foam mat drying method can increase the water absorption of inulin up to 34.28%. Commercial inulin dried by spray drying method has 50.10% water absorption. The absorptive capacity of water in inulin is caused by an inulin-free hydroxyl (OH) group. The absorption capacity of the lesser yam inulin is due to the amount of air trapped in foam formation causing more free OH groups in the inulin molecule. That condition making the inulin is easier to bind the moisture from the surrounding. According to Kumalaningsih (2004), the dry powder produced from the foam mat drying method has a low density,so that it easily binds moisture from its surroundings.

Gel Strength

Lesser yam inulin dried by using foam mat drying method can decrease the strength of inulin gel to 0.027 N. Commercial inulin dried by spray drying method has a gel strength of 0.0025 N. The principle of hydrocoloid gel formation occurs due to the formation of a net or three-dimensional network by molecule by trapping a certain amount of water in it. Crosslinking occurs in polymers consisting of long chain molecules in sufficient quantities to form a continuous three-dimensional building and solvent molecules will be trapped therein. Then immobilization of solvent molecules then occurs and form a rigid and firm structures that are resistant to particular forces or pressures. Gelatinization is a phenomenon involving incorporation, or the occurrence of crosslinking between polymer chains (Ronkart et al., 2010).

Inulin Water Content

The formation of foam (foam) in the drying process can decrease the water content of lesser yam inulin. It is due to the air trapped in the inulin solution can decrease the surface tension (interface) between the molecules in the solution, so as to facilitate the evaporation of water in the drying process. The more water that can be evaporated, the moisture content in the dry matter gets smaller. This is consistent with Wilde and Clark (1996) who stated that gas bubbles trapped in a thin layer during the foaming process will facilitate the evaporation of water resulting in a low density dry powder.

CONCLUSION

Result of the study showed that the values of physicochemical analysis of lesser yam inulin are as follow: inulin solubility by 89,07±1,3%; water absorption by 34,28±0,8%; gel strength by 0,027±0,02% and water content by 0,027±0,02.

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