Availableonlineat https://ejournal.unisayogya.ac.id/ejournal/index.php/ijhst
International Journal of Health Science and Technology, 1 (2), 2019, 12-20

Soy milk and avocado juice: what is the best to reduce cholesterol among obesity children?

Rizki Agustin Purwaningtyas[1], Kustiningsih[2]

[1,2] Faculty of Health Science, Universitas 'Aisyiyah Yogyakarta, Indonesia

purwaningtyas.ra@gmail.com, kustiningsih_ning@yahoo.com

Submission date: 18 Juli 2018, Receipt date: 1 Oktober 2019, Publication date: 1 November 2019

Abstract

Children with obesity have high risk to have abnormal cholesterol rate. Obesity and high cholesterol rate can cause cardiovascular disease at a later time. Children have normal rate of cholesterol if the cholesterol rate in the blood is <170 mg/dL, the threshold category between 170-199 mg/dL, and high category is >200 mg/dL. Soy Milk and avocado juice are the ways of non pharmacological care that can be applied to reduce cholesterol rate. This study aims to compare Soy Milk and avocado juice giving toward cholesterol rate in children with obesity in State Elementary School 1 and 2 of Katerban, Central Java Province, Indonesia. The study used quasi experiment design with non-equivalent control group framework. Samples of the study were 30 children taken by use purposive sampling. Soy Milk and avocado juice effective to reduce cholesterol level in obesity children (p value=0,000, p<0,05), but neither soy milk and avocado juice there're no one that more effective to decrease cholesterol level (p value=0,902, p>0,05). 60% of respondent were male student age 11 years (36,7%). Father education were high. Soya milk and avocado juice are able to reduce cholesterol rate. Parents must give attention to children's dietary intake to reduce cholesterol and obesity, also motivate them to do physical activity.

Keywords*: cholesterol, besity, soy milk, avocado juice*

INTRODUCTION

Abnormal concentrations of total cholesterol, low-density and high-density lipoproteins bound cholesterol (LDL-C and HDL-C respectively) and triglyceride in blood is a risk factor for thrombosis on atherosclerotic lesions, leading to athero-thrombotic diseases (myocardial infarction, stroke or lower limb occlusive disease) (Gracia,2014). Total cholesterol (TC) directly correlates with overweight/obesity. Epidemiologic data on serum lipids and the obesity epidemic have also identified a direct correlation between high total cholesterol and excessive body weight. The link between blood lipids and body weight has been seen in adults and children in both clinical and population based studies. Understanding the correlation between total cholesterol, adiposity, and body weight is essential in exploring the biomarkers of overweight / obesity among children (Holmes et al., 2016).

Doi: https://doi.org/ 10.31101/ijhst.v1i2.1098

The prevalence of obesity and associated co-morbidities (e.g. insulin resistance) is increasing in children and adolescents, leading to a heightened concern for atherosclerosis development in youth and subsequent progression to cardiovascular disease (CVD) in adulthood (Higgins et al., 2018). The relationship between changes in body fat and changes in serum lipids was reported in the 5-year longitudinal Bogalusa Heart Study of black and white children. The Minneapolis Children's Blood Pressure Study, a population-wide longitudinal cohort study, indicated that reducing the rate of excess weight gain during childhood could reduce subsequent cardiovascular risk in adulthood. Further, the Mater-University Study of Pregnancy, a large scale birth cohort study in Brisbane, reported that children who had a normal body mass index (BMI) at the age of 5 years but who were overweight at 14 years had elevated blood pressure; in contrast, children who were overweight at 5 years but had normal BMI at 14 years had normal blood pressure (Kouda et al., 2011). In pediatric studies, BMI percentiles are commonly used to examine childhood overweight/obesity (Holmes et al., 2016).

Childhood obesity rates have dramatically increased over the past two decades, with approximately 17% of children (between 2 and 18 years) in the USA (Ogden et al., 2010) and between 5 and 31% of European children (between 6 and 9 years), estimated to be obese (Wijnhoven et al., 2014). Moreover, based on a 2016 World Health Organization report, around 170 million children worldwide below the age of 18 were suffering from the physical and psychological consequences of overweight or obesity (Commission on Ending Childhood Obesity, 2016). The National Baseline Health Research 2013 by Ministry of Health of Indonesia reported prevalence of obesity in Indonesia increased to 8,8% in 2013.

The new guidelines recommend ways to prevent the development of cardiovascular risk factors and optimize cardiovascular health starting with breast feeding and emphasizing a diet low in saturated fat starting at age 1 year. The guidelines also encourage protection from tobacco smoke as well as regular physical activity. A significant change from previous guidelines is the new recommendation that all children be screened for high cholesterol at least once between the ages of 9 and 11 years, and again between ages 17 and 21 years. The NCEP Expert Panel on Blood Cholesterol Levels in Children and Adolescents, issued in 1992, instead called for screening only children with a family history of heart disease or high cholesterol. Physicians now will be able to use a non-HDL cholesterol test that does not require children to fast; children with abnormal results should be followed up with a fasting lipid profile (American Academy of Pediatrics, 2011).

The Government through the Regulation of Health Minister No. 41 in 2014 had issued a regulation concerning Balanced Nutrition Guidelines which aims to provide guidelines for daily food consumption and healthy behavior based on the principle of consumption of food diversity, hygienic behavior, physical activity, and regular weight control in order to maintain normal weight. One of the non-pharmacological treatment efforts that can be done by nurses to reduce cholesterol levels is by encouraging hypercholesterolemia patients to consume foods that can lower cholesterol levels such as tomatoes, pomegranates, avocados, grapes, garlic, various processed soybeans (tofu, tempeh , soy milk), and nuts (Anies, 2005).

The consumption of 25 grams of soy protein per day is effective in reducing total cholesterol levels in the blood due to changes in LDL cholesterol levels and

ISSN 2685-8673 (online)

inhibits oxidation of LDL. Lecithin and isoflavones in soy milk can dispel LDL. Lecithin also functions to dissolve cholesterol in the blood, so there is no narrowing and blockage of blood vessels. Isoflavones have important function to be antioxidants and to increase HDL, to become estrogenic and anti-atherosclerosis (Muchtadi, 2010). For toddlers two glasses of soy milk can already meet 30% of protein needs a day. Children's needs for essential amino acids per day can be fulfilled by consuming 200 ml of soy milk (Kanetro & Hastuti, 2006).

The latest study, published in the Journal of Clinical Lipidology, also states that consuming one avocado or half regularly per day shows a significant decrease in cholesterol levels. Avocados are chosen because they can be included in special fruits, containing 20-30 times more fat than other fruits. Avocados have a total fat content of 15,41 grams / 100 grams of fruit (National Nutrient Database for Standard Reference Release, 2012; California Avocado Commission, 2015). Avocados are rich in protein, riboflavin (vitamin B2), niacin (vitamin B3), potassium (potassium), vitamin C, and omega-3 fatty acids that are useful for maintaining heart health, lowering cholesterol and providing food for the brain. MUFA (Monounsaturated Fatty Acid) in avocados acts to reduce LDL cholesterol (bad cholesterol). Avocados also contain niacin which can increase the amount of HDL cholesterol (good cholesterol). A decrease in LDL and an increase in HDL will cause blood to become smooth and prevent atherosclerosis (Helen, 2014). Researchers from the Hass Avocado Board California stated that besides lowering bad cholesterol, eating avocados can also reduce weight and the risk of heart disease (Maharani, 2016).

Based on preliminary studies conducted by researchers on 6-8 October 2015 at Primary School of 1 and 2 Katerban, the following data obtained that there were 212 students in Primary School of 1 Katerban, and 176 students in Primary School of 2 Katerban. The data obtained that there were 17 obese students at Primary School of 1 Katerban and 13 obese students at Primary School of 2 Katerban. Cholesterol levels were examined randomly in 6 obese students in both schools; 3 of whom had high cholesterol levels of 174 mg/dL, 175 mg/dL, and 177 mg/dL. The results of interviews in both schools obtained information that both schools and the local health center had never done cholesterol screening in students, but weighing was carried out routinely every 6 months. This study aimed to determine the differences between the provision of soy milk and avocado juice to cholesterol levels in obese children in Primary School of 1 and 2 Katerban Kutoarjo Purworejo Central Java.

RESEARCH METHODS

This research applied Quasi Experiment design with Non-Equivalent Control Group design. The population was 30 obese students in Primary Schools of 1 and 2 Katerban, the samples obtained 30 children using purposive sampling technique, namely sampling based on certain considerations made by the researcher itself, based on the characteristics of an existing population (Notoatmodjo, 2012). Test data analysis used Paired T-Test and Independent T-Test.

ISSN 2685-8673 (online)

RESULTS AND DISCUSSION

General Description of Research Location

Primary Schools of 1 and 2 Katerban, Kutoarjo District, Purworejo Regency, Central Java Province, and the schools are in the area of Kutoarjo Primary Health Center work area. Primary School of 1 Katerban is ± 1 km to Primary School of 2 Katerban. Primary School of 1 Katerban is located in the Katerban Village area and is next to the local residential area. Primary School of 2 Katerban is also located in the Katerban Village area and is located in the administrative area of the village. It is directly adjacent to Katerban Sub-district Office and Village Polyclinic. In the north, the border is with PMB 1 Kutoarjo Junior High School. In the south, it is bordered with Junior High School-Senior High School of Indonesian Institute and Indriyasana Kutoarjo Kindergarten, and the east border is the regency road, namely Kemiri-Kutoarjo main road.

There were 212 students in Primary School of 1 Katerban, consisting of classes I to VI, while Primary School of Katerban 2 had 176 students. There were 10 teachers at Primary School of 1 Katerban, and there was one school guard. Primary School of 2 Katerban had 11 educators and 1 school guard.

Characteristics of Respondents

The study was conducted on 17-31 March 2016 at Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo Central Java. Characteristics of the subjects showed that among 30 student respondents in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo Central Java, there were obese students; 18 of them (60%) were male, and 12 (40%) were female. Characteristics of respondents based on the age covered that most of the respondents were 11 years as many as 11 people (36,7%) and the least age coverage was 6 years, 8 years, 12 years and > 13 years respectively 1 person (3,3%) . The characteristics of respondents based on class were mostly in class IV as many as 10 people (33,3%), and the least were in class II and VI, namely 1 person (3,3%).

Characteristics of respondents based on the level of education of the father showed that 30 obese respondents in Primary School of 1 and 2 Katerban Kutoarjo Purworejo, Central Java had fathers with high school education, namely 25 people (83,3%) and the least had University education namely 1 person (3,3%). There were no fathers who did not go to school or had elementary school education, while most of mother's education was high school, namely 22 people (73,3%); elementary school graduate was 1 person (3,3%), and university graduate was 1 person (3,3%) and no mother did not attend school. Based on the job characteristics of the father, the most respondent's father worked as employees, namely 13 people (43,4%) and the least were civil servants, namely 3 people (10%). In addition, according to the work of the mother, most were housewives namely 15 people (50%) and the least were civil servants and entrepreneurs, each of which consisted of 4 people (13,3%). Characteristics of respondents based on parental income indicated that most parents of obese children

ISSN 2685-8673 (online)

earned more than 2 million/month consisting of 21 people (70%) and 9 people (30%) earn 1-2 million.

Characteristics of respondents according to physical activity patterns showed that among 30 obese student respondents in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo, Central Java, most of them had no activity, i.e. 10 people (33,3%), and a few of them were playing dolls, cooking, playing badminton, kites, running, swimming, playing marbles; each of the activity consisted of one person (3,3%). Characteristics of respondents according to the intensity of exercise in a week obtained that most of them did 3x and 4x sports in a week consisting of 11 people (36,7%) and the least was 2x, namely 8 people (26,7%).

Characteristics of respondents based on diet showed that among 30 obese student respondents in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo, Central Java, mostly had a diet of 3 times a day, namely 27 people (90%) and 3 (10%) respondents had a pattern eat 4x a day. Characteristics of respondents according to consumption of snacks a day showed that mostly consumed 4x snacks a day as many as 13 people (43,3%) and the least consumed 2x / day snacks consisting of 5 people (16,7%).

The normality test in this study used Shapiro-wilk and showed normal distributed data (Asym.Sig.=0,148 for pretest and Asym.Sig. Cholesterol levels=0,099 for posttest cholesterol levels). The results of paired t-test on soy milk obtained p value 0,000 (p <0,05), meaning that there was an effect of soybean milk on cholesterol levels in obese children. The results of paired t-test on avocado juice obtained p value of 0,000 (p <0,05), meaning that there was an effect of the provision of soy milk and avocado juice on cholesterol levels in obese children. The results of independent t-test on soy milk and avocado juice on cholesterol levels of obese children obtained p value of 0,902, thus Ho was accepted because the p value was > 0,05, which meant that there was no difference in the effectiveness of giving soy milk with avocado juice to cholesterol levels in Obese children in Primary Schools of 1 and 2 Katerban, Kutoarjo, Central Java.

The Effect of Soy Milk on Cholesterol Levels

The results showed that there was an effect of soybean milk on cholesterol levels in obese children in Primary Schools of 1 and 2 Katerban, Kutoarjo, Purworejo, Central Java. This was in line with research conducted by Lieskayanti (2011) entitled The Effect of Soy Milk on Cholesterol Levels on Type II Diabetes Mellitus Patients in Piyungan Bantul Yogyakarta Health Center, with the results of research showed that soy milk was effective in reducing cholesterol levels in Type II DM patients. Soy milk contains fats, carbohydrates, calcium, phosphorus, iron, provitamin A, vitamin B complex (except vitamin B12) and water. Consumption of 25 grams of soy protein per day is effective in reducing total cholesterol levels in the blood due to changes in LDL cholesterol levels, and inhibits oxidation of LDL. Lecithin and isoflavones in soy milk can dispel LDL. Lecithin also functions to dissolve cholesterol in the blood, so there is no narrowing and blockage of blood vessels. Isoflavones function as antioxidants and increase HDL, estrogenic and anti-atherosclerosis (Muchtadi, 2010). For toddlers, two glasses of soy milk can already meet 30% of protein needs a day. Children's needs for essential amino

ISSN 2685-8673 (online)

acids per day can be fulfilled by consuming 200 ml of soy milk (Kanetro & Hastuti, 2006).

Effect of Avocado Juice on Cholesterol Levels

The results showed that there was an effect of avocado juice on cholesterol levels in obese children in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo, Central Java. This was consistent with a previous study conducted by Usman (2014) entitled The Effect of Avocado (Persea americana Mill) Fruit Consumption on Total Cholesterol Levels of Hyper-cholesterol patients in Padang Pasir Primary Health Center in 2013, with the results of research showed that consumption of avocado could reduce cholesterol levels. The latest study, published in the Journal of Clinical Lipidology, also states that consuming one avocado or half regularly per day, shows a significant decrease in cholesterol levels. Avocados are chosen because they are included as special fruits, containing 20-30 times more fat than other fruits. Avocados have a total fat content of 15,41 grams / 100 grams of fruit (National Nutrient Database for Standard Reference Release, 2012 in California Avocado Commission, 2015). Avocados are rich in protein, riboflavin (vitamin B2), niacin (vitamin B3), potassium (potassium), vitamin C, and omega-3 fatty acids that are useful for maintaining heart health, lowering cholesterol and providing food for the brain. MUFA (Monounsaturated Fatty Acid) in avocados acts to reduce LDL cholesterol (bad cholesterol). Avocados also contain niacin which can increase the amount of HDL cholesterol (good cholesterol). A decrease in LDL and an increase in HDL will cause blood to become smooth and prevent atherosclerosis (Helen, 2014). Researchers from the Hass Avocado Board, California states that to lower bad cholesterol eating avocados can also reduce weight and the risk of heart disease (Maharani, 2016).

Comparison of Soy Milk with Avocado Juice to Cholesterol Levels

The results showed that the provision of soy milk and avocado juice were equally influential in lowering cholesterol levels in obese children in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo, Central Java, but based on statistical tests both soy milk and avocado juice had no difference in effectiveness to reduce cholesterol levels (*p value*=0,902>0,05). Based on the data, the average value of cholesterol reduction in both groups showed that the soybean milk group had an average reduction in cholesterol levels greater than the avocado juice group. The average decrease in cholesterol levels in the group of soy milk in this study was 9,27 mg/dL and in the group giving avocado juice was 9,07 mg/dL. The highest decrease in cholesterol levels was in the group of giving avocado juice which was 19 mg/dL while in the group giving soy milk was 18 mg/dL. It could be concluded that the average reduction in cholesterol levels was greater in the group of soy milk, but the highest difference in the pre and posttest cholesterol levels was found in the avocado juice group. This happened because at the time of research the researcher had not controlled other factors that could affect cholesterol levels in obese children, one of which was a factor of food consumed daily by children since it played an important role in increasing and decreasing cholesterol levels.

Cholesterol or blood fat levels generally come from the food menu consumed. The more consumption of fatty foods, the greater the chance to increase cholesterol levels (Information Center for LIPI Technology, Food & Health, 2009). A cholesterol

ISSN 2685-8673 (online)

diet is recommended when cholesterol levels rise. Diet is the first step in overcoming high cholesterol; drugs can be given if a strict diet for 6 months cholesterol levels do not decrease. If poeple are overweight, losing weight can also reduce cholesterol levels (Anwar, 2014). Consumption of saturated fats derived from animals such as meat, butter, cheese, animal milk, ice cream, pastries, cakes, coconut oil, coconut milk and all other oils that get high heating and heated repeatedly can increase LDL cholesterol levels so that it increases the risk occurrence of coronary heart disease (Mumpuni & Wulandari, 2011).

The repeated use of cooking oil is commonly found in stalls or street vendors to fry their food. Oil used for frying repeatedly can increase cholesterol levels (Melania, 2012), whereas there are many fried food sellers selling around Primary Schools of 1 and 2 Katerban that sold various types of fried foods with blackish oil because it had been used to fry many times. Most children buy food at those sellers. There were only a few students that carried snacks from home. Most snacks sold by sellers in the school environment were also not healthy ones such as *cilok*, *ciki*, drinks/ice that contained coloring and artificial food sweeteners and preservatives.

Research conducted by Septianggi, Mulyati, and Sulistya (2013) entitled The Relationship between Fat Intake and Cholesterol Intake with Total Cholesterol Levels in Coronary Heart Outpatient Patients at Tugurejo Hospital Semarang showed results that there was a positive relationship between fat intake and cholesterol levels in coronary heart patients in outpatient care at Tugurejo Hospital Semarang. A similar study was also carried out by Muryati (2008) on the Relationship between Fat Intake and Total Cholesterol Levels in Patients with Coronary Heart Disease showing a relationship between fat intake and total cholesterol levels. According to Laker (2006), high cholesterol consumption will increase cholesterol levels, and the safe limit for consumption of food with cholesterol should not be more than 300 mg/day.

The theory could be attributed to this study showing that although respondents had been given soy milk and avocado juice regularly for 2 weeks, but if the respondent still consumed foods that contained saturated fat, it would affect the difference in effectiveness between the provision of soy milk and avocado juice to levels of cholesterol in obese children. Less extensive respondent coverage might also be an effect of no difference in effectiveness between soy milk and avocado juice on cholesterol levels. Even though there was an average decrease in cholesterol levels between groups given soy milk with avocado juice at 0,2 mg/dL, the results of statistical tests did not show significant differences.

CONCLUSION

The average value of cholesterol levels in obese children in Pimary Schools of 1 and 2 Katerban Kutoarjo Purworejo Central Java before being given soy milk was 169 mg/dL, and after the treatment it decreased to 159,73 mg/dL. The average value of cholesterol levels in obese children in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo Central Java before administration of avocado juice was 171 mg/dL, and after the treatment it dropped to 162,80 mg/dL.

There was an effect of giving soy milk to cholesterol levels in obese children in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo Central Java. There was an

ISSN 2685-8673 (online)

effect of giving avocado juice to cholesterol levels in obese children in Primary Schools of 1 and 2 Katerban Kutoarjo Purworejo Central Java. There was no difference in the effectiveness of giving soy milk and avocado juice to cholesterol levels in obese children in Primary Schools of 1 and 2 Katerban Kutoarjo, Central Java. It means that both soy milk and avocado juice are equally effective in reducing cholesterol levels in obese children.

REFERENCES

American Academy of Pediatrics. (2011). Physicians Recommend all Children, Ages 9-11, Be Screened for Cholesterol. Available from https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/Physicians-Recommend-all-Children,-Ages-9-11,-Be-Screened-for-Cholesterol.aspx.

Anies. (2015). *Kolesterol & Penyakit Jantung Koroner.* Yogyakarta: Ar-Ruz Media.

California Avocado Comission. (2015). Nutriens in Avocado dalam http://www.avocadocentral.com, diakses pada 10 Desember 2015.

Commission on Ending Childhood Obesity. (2016). Report of the Commission on Ending Childhood Obesity; World Health Organization: Geneva, Switzerland.

Gracia, M. (2014). Hypolipidemic potential of plants used in Cuba. Pharmacologyonline Volume 1, 2014, Pages 73-80. ISSN: 1827-8620.

Helen.(2014). Ketahui Aneka Manfaat Buah Alpukat dalam http://www.gizi.depkes.go.id.

Higgins et al. (2018). Pediatric reference intervals for calculated LDL cholesterol, non-HDL cholesterol, and remnant cholesterol in the healthy CALIPER cohort. Clinica Chimica Acta 486 (2018) 129–134. DOI: 10.1016/j.cca.2018.07.028.

Holmes, L. et al. (2016). Racial and Ethnic Heterogeneity in the Association Between Total Cholesterol and Pediatric Obesity. International Journal of Environmental Research and Public Health; Basel Vol. 13, Iss. 1. DOI: 10.3390/ijerph13010019.

Kanetro, B. dan Hastuti, S. (2006). *Ragram Produk Olahan Kacang-Kacangan*. Yogyakarta: Unwama Press.

Kouda, K. et al. (2011). Effect of Recovery From Obesity on Cardiovascular Risk Factors Among Japanese Schoolchildren: The Iwata Population-Based Follow-Up Study. Journal Epidemiologi 2011;21(5):370-375. DOI: 10.2188/jea.JE20100140.

Laker, M. (2006). *Memahami Kolesterol*. Jakarta: PT Grafika Multi Warna.

Lembaga Ilmu Pengetahuan Indonesia (LIPI). (2009). *Kolesterol.* Jakarta: Balai Informasi & Teknologi LIPI Pangan & Kesehatan.

Lieskayanti, D. T. (2011). *Pengaruh Pemberian Susu Kedelai Terhadap Kadar Kolesterol pada Penderita Diabetes Mellitus Tipe II di Puskesmas Piyungan Bantul Yogyakarta*. Skripsi tidak dipublikasikan: Program Studi Ilmu Keperawatan STIKES ‘Aisyiyah Yogyakarta.

ISSN 2685-8673 (online)

Maharani, D. (2016). Alpukat Terbukti Bisa Turunkan Kolesterol dalam http://health.kompas.com, diakses pada 8 Oktober 2015.

Melania. (2012). Mewaspadai Kolesterol Tinggi! dalam https://plus.google.com, diakses pada 12 Mei 2016.

Ministry of Health of Indonesia. (2013). National Baseline Health Research (RISKESDAS). Jakarta: Badan Litbang Kesehatan.

Muchtadi, D. (2010). *Kedelai Komponen Utama untuk Kesehatan*. Bandung: AlfaBeta.

Mumpuni, Y. dan Wulandari, A. (2011). *Cara Jitu Mengatasi Kolesterol*. Yogyakarta: Penerbit ANDI.

Ogden, C. L. et al. (2010). Prevalence of high body mass index in US children and adolescents. The Journal of the American Medical Association, 303(3), 242e249. DOI: 10.1001/jama.2009.2012.

Septianggi, F. N., Mulyati, T. dan Sulistya, H. (2013). Hubungan Asupan lemak dan Asupan Kolesterol dengan Kadar Kolesterol Total pada Penderita Jantung Koroner Rawat Jalan di RSUD Tugurejo Semarang. *Jurnal Gizi Universitas Muhammadiyah Semarang, Volume 2, No. 2, November 2013*.

Syahrul et al. (2016). Prevalence of underweight and overweight among school-aged children and it's association with children's sociodemographic and lifestyle in Indonesia. International Journal of Nursing Sciences. Volume 3, Issue 2, June 2016, Pages 169-177. DOI: 10.1016/j.ijnss.2016.04.004.

Usman, M. (2014). *Pengaruh Konsumsi Buah Alpukat (Persea americana Mill) Terhadap Kadar Kolesterol Total Pada Pasien Hiperkolesterol di Puskesmas Padang Pasir Kota Padang*. Skripsi dipublikasikan: Fakultas Kedokteran & Ilmu Keperawatan Universitas Andalas.

Wijnhoven, T. et al. (2014). WHO european childhood obesity surveillance Initiative: School nutrition environment and body mass index in primary schools. International Journal of Environmental Research and Public Health, 11(11), 11261e11285. DOI: 10.3390/ijerph111111261.

ISSN 2685-8673 (online)