

The Role of Mollucas Traditional Food on the Improvement of Risk Factors of Coronary Heart Disease

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Received January 09, 2015; Revised February 10, 2015; Accepted February 13, 2015

Abstract Background: More than 60% of the global burden of coronary heart disease occurs in developing countries and approximately 75% of cardiovascular disease can be attributed to conventional risk factors, most of which is modifiable. The Indonesia Diabetes-Obesity-Cardiovascular disease (DOCAR) Prevent Study has started from 2005 focusing on finding ways with local wisdom in preventing DOCAR. **Purpose:** The purpose of this study is to examine the association between the Mollucas Traditional Food (MTF) diet and the risk factors of CHD. **Methods:** The design of the study is cross sectional. All participants were only men, pure mollucas ethnic, age ranging from 40 to 60 years old. The participants were divided into two groups; 73 were in Ambon city with Non-MTF diet and 73 in Taniwel Village, West Seram district with MTF diet. Data were collected through measurements of physical and laboratory parameters (Lipid profile, adiponectin, free fatty acid [FFA], oxLDL, hsCRP) and analysed using univariate, independent - sample T-test, linear regression and double linear regression methods. **Results:** The CHD risk factors in non-MTF compared to MTF diet group are: waist circumference are 93.35 ± 9.57 and 78.84 ± 7.8 cm respectively ($p=0.000$); adiponectin level are 5.53 ± 2.83 ng/mL and 12.06 ± 4.64 ng/mL respectively ($p=0.000$); hs-CRP level are 4.52 ± 9.69 mg/L and 3.61 ± 6.37 mg/L respectively ($p=0.507$); FFA level are 0.43 ± 0.24 mM and 0.37 ± 0.47 mM respectively ($p=0.379$); Ox-LDL level are 66.14 ± 31.11 ug/mL and 66.09 ± 27.55 ug/mL respectively ($p=0.991$). The correlation analysis revealed that food consumption i.e. non-MTF and MTF have significant impact on waist circumference ($r=0.642$, $p=0.000$) and adiponectin ($r=0.649$, $p=0.000$); but not with hsCRP ($r=0.003$; $p=0.97$), free fatty acids ($r=0.073$, $p=0.379$), as well as oxidized LDL ($r=0.001$, $p=0.991$). **Conclusion:** These results might indicate that Mollucas Traditional Food (MTF) provide better protective value than non-MTF through adiponectin level and body weight instead of inflammation (hsCRP) and lipid (FFA and oxLDL) mechanisms.

Keywords: mollucas traditional food, coronary heart disease risk factor, obesity, waist circumference, adiponectin, hs-CRP, free fatty acid, Ox-LDL

Cite This Article: Yusuf Huningkor, Suryani As'ad, Peter Kabo, and Gatot S. Lawrence., "The Role of Mollucas Traditional Food on the Improvement of Risk Factors of Coronary Heart Disease." *American Journal of Medical Sciences and Medicine*, vol. 3, no. 1 (2015): 4-7. doi: 10.12691/ajmsm-3-1-2.

1. Introduction

Coronary Heart Disease (CHD) is still a health problem in the World, including Indonesia. More than 60% of the global burden of coronary heart disease occurs in developing countries and approximately 75% of cardiovascular disease can be attributed to conventional risk factors, most of which is modifiable. The Indonesia Diabetes-Obesity-Cardiovascular disease (DOCAR) Prevent Study has started from 2005 focusing on finding ways with local wisdom in preventing DOCAR. The idea of clustering these cardiometabolic syndrome is based on

the imbalance of pro and anti-inflammation, pro and anti-oxidative stress in the molecular and micro-environments. [1,2] In this study we are exploring the impact of traditional food on the risk factors of CHD. The prevalence of CHD cases is low in Maluku Province. [3,4] Questions arise, whether lifestyle including eating habit of Maluku residents has been contributing to the different CHD profile from another population in Indonesia? Diet can reduce the risk of CHD, as proven by French paradox, Mediterranean and Inuit diets. [5,6] It is known that transmigration of residents from lower risk to higher risk of CHD area will result in comparable risks with the inhabitant of the new area. Several studies show that the results are modifiable impacts. [7] French paradox is a

phenomena known as an impact of diet in France, where the incidence of heart disease and obesity is lower than other European countries and only 7% of the French are obese. [8,9] Mediteranean traditional diet is similar to American Heart Association (AHA) recommended diet as it helps to prevent the incidence of CHD as well as impact on weight reduction. [10,11] Inuit Diet, is a traditional diet of Eskimos, some nutrients like Omega 3, contained in fish and seafood of Arctic, is able to prevent the incidence of CHD [6].

Mollucas Traditional Food (MTF) is primarily “Sagu” (sago, lapia, angkrik). Most of Mollucas ethnic population consumed sago as “staple food”. Sago itself is starch from the bark of Metroxylon spp. Sago were consumed traditionally in a form of “papeda” (glutinous like glue), which has a low glycemic index. Indonesian National Standard (Standart Nasional Indonesia/SNI) for sago starch was regulated in 1995, and updated in 2007 stated that every block of sago equal to 353 Calories, contains 1.2 gr proteins, 0.4 gr fats, 88.2 gr carbohydrates, 13 gr water and 0.5 gr soots. [12,13] Meanwhile, calorie demands of Indonesian adults is 2725 Cal/day for man and 2250 Cal/day for woman. [14] Standard daily intake are protein 10-20%, fat 20-25%, and carbohydrate 45-65% from total demand; beside that, fiber is required 25 gr daily and salt (NaCl) 7 gr daily. [15] It means that 7 blocks of sago can fulfill daily calorie demand.

It has been known that vascular endothelium has a role in modulating cardiovascular function of human body. Inflammation, oxidative stress and endothelial dysfunction become initial keys for atherosclerosis and CHD. [16] Studies has shown that sensitive biomarkers to predict CHD are adiponectin [17], high sensitive C-Reactive Protein (hs-CRP) [18], Free fatty acids (FFA) [19], dan Oxidized LDL (Ox-LDL). [20,21,22] The aim of this study was to examine the association between the consumption of MTF diet and the change of risk factors of CHD.

2. Materials and Method

A cross sectional design were performed in this study, conducted from May to December 2013. All participant were men of pure Mollucas ethnic, age ranging from 40 to 60 years old. Seventy three participants in Ambon city consumed Non-MTF diet and 73 in Taniwel village, a country side area in West Seram District, consumed MTF diet. Data were collected through physical measurements (Blood Pressure, waist circumference) and laboratory test (Lipid profile, adiponectin, hsCRP, FFA, oxLDL) results, and analysed using statistical software.

3. Results

3.1. The Comparison of CHD Risk Factors between Region Consuming MTF and non MTF

The average of Waist Circumference in non-MTF and MTF diet group are 93.35 ±9.57 and 78.84±7.8 cm respectively (p=0.000). The average adiponectin level non-MTF and MTF diet group are 5.53±2.83 ng/mL and

12.06 ± 4.64 ng/mL respectively (p=0.000). The average of hs-CRP level in non-MTF and MTF diet group are 4.52 ± 9.69 mg/L and 3.61 ± 6.37 mg/L respectively (p=0.507). The average of FFA level in non-MTF and MTF diet group are 0.43 ± 0.24 mM and 0.37 ±0.47 mM respectively (p=0.379). The average of Ox-LDL level in non-MTF and MTF diet group are 66.14 ± 31.11 ug/mL and 66.09 ± 27.55 ug/mL respectively (p=0.991).

Table 1. Characteristic of CHD risk factors between different Style i.e. Non Mollucas Traditional Food (Non-MTF) and Mollucas Traditional Food (MTF)

CHD Risk Factors	Food Style		P
	Non-MTF (n=73)	MTF (n=73)	
Waist Circ [cm]	93.36±9.57	78.85±7.80	0.000
Adiponectine [ng/mL]	5.53±2.83	12.06±4.65	0.000
hsCRP [mg/L]	4.53±9.69	4.58±7.18	0.97
Free Fatty Acids [mM]	0.43±0.25	0.37±0.47	0.38
oxidized LDL [U/L]	66.15±31.11	66.09±27.56	0.99

3.2. The Level of Adiponectin and Waist Circumference are more CHD Protective in Region Consuming MTF than in non-MTF Region

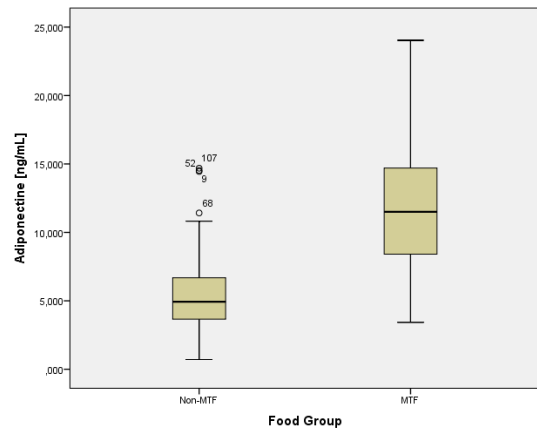


Figure 1. The level of Adiponectine in different food group (non-MTF and MTF)

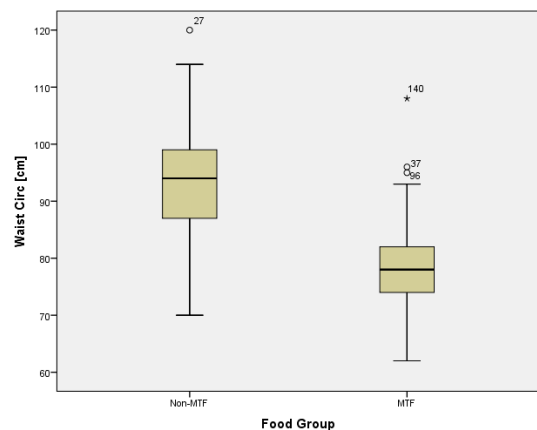


Figure 2. The waist circumference in different food group (non-MTF and MTF)

Correlation analysis revealed that food consumption i.e. non-MTF and MTF have significant impact on waist circumference (r=0,642, p=0.000) and adiponectin (r=0.649, p=0.000); however there is no significant correlation with hsCRP (r=0.003; p=0.97), free fatty acids

($r=0.073$, $p=0.379$), as well as oxidized LDL ($r=0.001$, $p=0.991$). The result might indicate that Mollucas Traditional Food (MTF) provide better protective value than non-MTF through different mechanism instead of inflammation (hsCRP) and lipid (FFA and oxLDL) mechanisms.

4. Discussion

Coronary Heart Disease (CHD) is a clinical phenotype as a result of prolonged interaction between genetic and environment exposure as indicated by Translating Pendulum Hypothesis. [2] High blood FFA level for a long time period has been shown to induce atherosclerosis. [23] The increase of FFA level in healthy people predict a future CHD incidence. [24] Obesity correlates with various clinical condition like cardiovascular diseases (CVD), diabetes mellitus, hypertension, dyslipidemia, and fatty liver. [25] Framingham study has proven that the increase of CVD incidence correlate with the increasing of body weight. Association between obesity and insulin resistance syndrome and cardiovascular risk is not only to the degree of obesity but also distribution of body fat. Abdominal obesity measured by waist circumference is a better indicator of the risk of insulin resistance and metabolic syndrome, particularly in non-obese individual. The main independent parameter for insulin resistance is waist circumference and blood triglyceride level [26].

In this study we have shown that obesity and waist circumference as indicator found in non-MTF group and not in MTF group. MTF group have lower average waist circumference that indicate low intra-abdominal fat that will result in atherogenic lipid profile improvement. Average of blood FFA level in non-MTF group is slightly higher (0.43 mM/L), although statistically not significant while in MTF group is in a normal range (0.37 mM/L). The level of FFA in healthy individu is between 300-400 $\mu\text{mol/L}$ or 0,3 – 0,4 mM/L. [20] It is most likely that MTF diet in Taniwel villagers has an impact on CHD risk factors, through the disappearance of intra-abdominal fat and higher level of adiponectin, but no significant impact on FFA level [27,28].

Adiponectin is believed to have an important role in glucose modulation and fat metabolism in insulin sensitive tissue, in human and animals. Adiponectin low level related to visceral adiposit, while its high level indicates lower body weight. [29] Plasma adiponectin in diabetes patient with CHD, is lower than in diabetes patient without CHD. This indicate that Adiponectin has a potential as anti-atherogenic agent. [30] Although adiponectin is secreted from "healthy" adipose tissue, its level is decreasing in obese individual. [23] This is a result of the increase of adipokine products like TNF- α and PAI-1, that is believed to down regulate the release of adiponectin production in obese individual. [31,32] High level of adiponectin also associated with lower risk of CHD. [20,33] This facts strengthen our suggestion that CHD incidence in villagers with MTF diet is possibly on account of high Adiponectin level, as a consequence of disappearance of intra-abdominal fat deposit in villagers group with MTF diet, resulting in undepressed Adiponectin level. Therefore, the result of our study indicate that protection against CHD in Taniwel villagers

group with MTF diet might be correlated with high adiponectin level.

High sensitivity C-Reactive Protein (hs-CRP) is a pentameric protein in a ring form, detectable in blood plasma, synthesised and secreted by liver as a response to cytokine, mainly IL-6. C-Reactive Protein bound to phosphocholin that is expressed in the surface of apoptotic/necrotic cells or bacteria. This binding will then activate complement system that consequently promote phagocytoses by macrophage that resulted in clearance of the apoptotic and necrotic cell or the bacteria. This is the acute phase response to the increasing level of IL-6 produced by macrophage and adipocyte tissue against infectious agents, immunologic stimulus. Tissue damage and acute inflammation. [34] C-reactive protein has longer half-life in plasma and is now recognised as a mediator (risk factor) also a marker of atherothrombotic diseases, that in the future will strongly predict cardiovascular incidence. [35,36] Specifically, individual with higher hs-CRP level, develop risks factors four times compare to individual with normal or lower level of hs-CRP. American Heart Association and US Centers for Disease Control and Prevention categorised risk group to CHD according to hs-CRP level as follows: Lower Risk (< 1.0 mg/L), Moderate Risk (1.0 – 3.0 mg/L), and High Risk (>3.0 mg/L). [37,38] This study reveals that average hs-CRP level of both groups are in high risk category for CHD (non-MTF diet group 4,52 mg/L and MTF diet group 3,61 mg/L). Higher hs-CRP level in non-MTF diet group is likely as a result of exposure to intestinal bacteria and various foods including red meat [39], while lower hs-CRP level in MTF diet group is possibly on account of only exposure to intestinal bacteria. Therefore, we suggests that MTF diet has no significant impact on hs-CRP level as a risk factor of CHD.

Hutter et al. [40] explain the association between Ox-LDL as pro-angiogenic agent and hyperlipidemia, inflammation and angiogenesis in atherosclerosis process. Ox-LDL is cytotoxic to endothelial cells because it increases neutrophil adhesion and causes endothelial injury. Ox-LDL has a main role in initiation and progression of atherosclerosis lesion although many other factors also required in promoting rupture of fibrous cap and thrombotic occlusion of arterial lumen. Therefore, this study suggests that MTF diet has no significant impact on Ox-LDL level as a risk factor of CHD.

Of all the findings and suggestions of this study, a limitation occurred where physical activity and respondents' genetic polymorphism were not measured.

5. Conclusion

We found a significant difference in average risk factors of CHD i.e. waist circumference and adiponectin level in residents who consumed MTF diet as compared to those on non-MTF diet. Taniwel villagers who consume MTF diet are not obese, and have higher level of Adiponectin. Therefore, we suggest that MTF diet may protect the incidence of CHD through modification to body weight and serum adiponectin level.

Acknowledge

Support for this study was received to a certain degree from the Maluku Province Government. The authors are indebted to Prof. Dr. dr. Puji A. Taslim, Prof. Dr. dr. Idrus Alwi, Dr. dr. Fachruddin Benyamin, Dr. dr. Burhanuddin Bahar, dr. Agussalim Bikhari, PhD, and Dr. Ir. Beni Setha, M.Si., for their constructive criticisms in the whole study.

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