based on the length of their carbon chain into short, medium, and long chain of fatty acid. (Akoh & Min, 2008; Mann & Truswell, 2012).

In accordance to unsaturated fatty acid, long chain unsaturated fatty acid which is known as polyunsaturated fatty acid has been recognized to have beneficial impact on health. The most notable polyunsaturated fatty acids are N3 (N3) fatty acid and N6 (N6) fatty acid. Both of N3 and N6 fatty acid have shown to have positive impact on children development and health, brain health, and especially on cardiovascular health (Mann & Truswell, 2012). Towards cardiovascular health, N3 and N6 give many impacts such as anti-inflammatory, lowered low density lipid cholesterol and inducing the production of high density lipid cholesterol that can protect the health of cardiovascular (Chowdury, et al., 2014).

Cardiovascular disease (CVD) is known as number one silent killer that cause death globally. In 2017, World Health Organization (WHO) reported that 31% out of all global death is caused by CVD with 85% of that is due to heart attack and stroke. The underlying mechanism of cardiovascular disease is atherosclerosis which can lead and manifest to coronary artery disease or cerebrovascular disease or peripheral disease depending on the type of artery itself. Atherosclerosis is occurring due to the lipid manifestation on the arteries that causing the plaque to occurs as well as hardens the arteries lining (Bergheanu, S. C., et al., 2017). Hypercholesterolaemia is reported to play a key role in lipid manifestation due to an increase of plasma cholesterol levels is affecting the arterial endothelial permeability to allow the migration of lipids to occur and resulting in the abundance of lipid attached to the endothelial cells wall and formed plaque (Bergheanu, S. C., et al., 2017). This condition has been linked with dietary pattern, dyslipidemia, diabetes, and lifestyle changes. The majority studies have shown that lifestyle behavior which attribute to the dietary pattern and fatty acid intake plays an important role in the developing of atherosclerosis. High intake of saturated fatty acid is commonly associated with the increase risk of atherosclerosis. In contrast to that, the

used of N3 fatty acid and N6 fatty acid on daily intake is reported to have positive impact towards the level of HDL which could lowered atherosclerosis risk (Bowen, 2016).

Japan as one of developed countries has been successfully reducing the rate of mortality caused by cardiovascular diseases since early 2000 by reducing the salt intake as well as cigarette consumption (Iso, H., 2011). However, in the following year, the prevalence of dyslipidemia and diabetes is increased which resulting in increased risk factor of CVD as well as high risk of development of atherosclerosis (Iso, H., 2011). This might occur due to the change in diet intake among Japanese people. Institute for Health Metrics and Evaluation (IHME) also reported that ischemic heart diseases and stroke were still on the top five diseases causing death with dietary risk and tobacco consumption were factors that drive the most deaths in Japan in 2017.

In the past recent years, Japanese traditional diet has been shifting from high N3 (N3) fatty acid and low N6 (N6) fatty acid intake to high N6 fatty acid intake and moderate amount of high N3 fatty acid. These changes among Japanese population occurred due to globalization that being influenced by western diet that consist of high N6 fatty acid intake from animal based than N3 fatty acid intake (Shimazu, et al., 2007). These dietary changes affected the overall health of population that used to have specific diet. In the study done by Simopoulus (2012), it showed that imbalance intake of N3 and N6 fatty acid as well as inadequate intake of N3 fatty acid might increase inflammation in cardiovascular diseases. In the underlying mechanism, eicosanoids that derived from N6 has been linked with pro-inflammatory that can induce the risk of cardiovascular disease and manifested into plague on the layer of the artery (Patterson, et al., 2012).

Toon City which located in Ehime prefecture is one of the model city that being established at 2004 by the merger of two towns of Shigenobu and Kawauchi. The demography of Toon City is consisting of 14.713 households with 33.540 population and with age range from 0 to 100 years old (Toon City, 2017). The Toon city is a city model that represent the overall population in the Ehime

prefecture. The same as the other city, the ratio of productive-age population and elderly population is small. This is because of the urbanization to the metro-city from urban city due to the lack of job availability and other resources. This change the overall lifestyle of the population where the elder populations tend to have low productivity as well as choose convenient way to eat. Therefore this change increased the occurrence of atherosclerosis by the change of their diet style from simple Japanese food towards more convenience foods that they can easily get through on the convenience market. Thus the balance of nutrient in the meal, especially the intake of N3 and N6 fatty acids, might affect the overall health of the population.

In order to find out the information about how N3 and N6 fatty acid intake impact towards atherosclerosis as one of the cardiovascular disease, it is important to understand association of imbalance and inadequate intake of N3 and N6 fatty acid towards atherosclerosis as one of cardiovascular risk. Thus the objective of this study was to assess the association of N3 and N6 fatty acid towards atherosclerosis risk based on their lipid serum and Carotid Intima-media thickness.

1.2 Objectives

The objective of this study was to investigate the association between N3 and N6 fatty acid intake in Toon City population towards intima media thickness.

1.3 Benefits of this Study

1.3.1   Core Knowledge Point of View

The finding of this study will give information about the association of N3 and N6 fatty acid intake in Japanese population towards atherosclerosis risk. This finding will also outline recent N3 and N6 fatty acid intake trend among the population as well as to give preventive measure to lowered atherosclerosis disease.

1.3.2   Research Point of View

The research about association of N3 and/or N6 fatty acid and their ratio towards cardiovascular risk has been widely discussed. However, the discussion about association of those fatty acid intake and their ratio towards atherosclerosis risk is rare to find. Thus the finding of this study might be used as supplementary or new perspective about the link of N3 and/or N6 fatty acid intake towards atherosclerosis risk. In addition to that, the result of this study might be used as a base for further research in cardiovascular disease.

1.3.3   Society Point of View

As the findings of this study will give the information on the importance of N3 and N6 fatty acid intake, thus it could be used as daily recommendation of dietary N3 and N6 fatty acid intake in order to prevent atherosclerosis to happen. It also encourages people to take N3 and N6 fatty acid daily as it gives beneficial aspect towards health.