Lipid Profile of the Coronary Heart Disease (CHD) Patients Admitted in a Hospital in Malaysia

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INTRODUCTION

Coronary heart disease (CHD) is a leading cause of morbidity and mortality in many countries world-wide and is estimated that it will be the single largest cause of disease burden (WHO, 2015). CHD can develop at any age. It refers to a group of closely related syndromes caused by an imbalance between the myocardial oxygen demand and the blood supply. Depending on the rate severity of coronary artery narrowing and the myocardial response, one of four syndromes may develop: angina pectoris (chest pain), acute myocardial infarction, sudden cardiac death and chronic ischemic heart disease with congestive heart failure (Kumar et al., 2015). The most common cause of CHD is narrowing of the lamina of the coronary arteries by atherosclerosis. Initially, an area of atheromatous plaque forms in the coronary artery. The mechanism for plaque formation is unclear, although the predominant view is that lipid accumulates under the lining of the coronary artery. Because the lipid infiltrate is a foreign matter, white blood cells called macrophages engulf it, and create foam cells. Smooth muscle cells then invade the area, which enlarges the plaque and obstructs more than 50% of the lumen of the coronary artery that the flow of blood to the heart muscle, the myocardium, is reduced (Kumar et al., 2015; Burke et al., 1997); while resting, or undertaking a minimal activity, the blood supply to the heart is adequate. However, when the heart requires a greater supply of oxygen, as occurs during exercise or emotional episodes, the blood supply cannot increase sufficiently and the person will experience chest discomfort. This is referred to as angina pectoris. Once plaque has formed, the wall of the coronary artery is damaged and irregular in shape and platelets cluster around the obstruction. This reduces the size of the lumen still further and consequently the blood supply is also reduced (Kumar et al., 2015). A number of factors are thought to increase the likelihood of developing CHD. It can be divided into two, which are controllable and uncontrollable risk factors.

ABSTRACT

Coronary Heart Disease refers to a group of closely related syndrome caused by imbalance between the myocardial oxygen demand and the blood supply. It is the single most common cause of death in economically developed countries, including the United States and Europe. Hypercholesterolemia is considered as one of the most common modifiable risk factors of CHD. Men are more commonly affected than women until the fifth decade, after which time the frequency of CHD is similar in both sexes. Other risk factors are hypertension, diabetes mellitus, and smoking. This was a cross-sectional study in demonstrating the pattern of the lipid profile (Total Cholesterol (TC); Low Density Lipoprotein (LDL-C); High Density Lipoprotein (HDL-C) and Triglyceride levels (TG) among the CHD patients admitted in the hospital. Most of the CHD patients had the total cholesterol level high, and among them 25.6% were Malay. Malays were the highest in the optimal range (<3.0mmol/L) with 20.9% and HDL level within the normal range (1.2-1.8mmol/L) by 22.2% (34). Most of the CHD patients had the TG level within normal range (<1.5mmol/L) but among them 19.9% were Malays. This study had demonstrated that Malays were mostly affected by heart disease (HD) followed by Chinese and Indians, and the incidence was twice as high as in men compared to women.
Controllable risk factors are hypertension, hypercholesterolemia, smoking, obesity, sedentary lifestyle, diabetes, stress, hyperhomocysteinemia, depression and anxiety. However, uncontrollable risk factors are gender, heredity and age (Milinov, 1990; Bostom et al., 1999; Kuulasmaa et al., 2000; Lee et al., 2001; D’Agostino et al., 2000; ESCHDCRG, 1998; Karim et al., 2000; O’Malley et al., 2000). Despite a lot of investigation for novel risk factor, established risk factors still play a major role for CVD (Kuulasmaa et al., 2000). These are the dyslipidemias including high, low density lipoprotein cholesterol (LDL-C), low, high density lipoprotein cholesterol (HDL-C) and high fasting triglyceride (TG), hypertension, cigarette smoking, diabetes, obesity and physical inactivity (Lee et al., 2001; D’Agostino et al., 2000; ESCHDCRG, 1998). The objective of this study was to assess the lipid profiles of the CHD patients admitted in Hospital Raja Permaisuri Bainun (HRPB) Ipoh, Malaysia.

MATERIALS AND METHODS

This was a cross-sectional descriptive study done during the period of 01-10-2013 to 31-12-2013. All the demographic and risk factors related information were collected from the patient’s record available in the hospital. A data collection sheet was designed to gather all the necessary information of the patients. The written official permission was taken from the Hospital Director through the Elective coordinator. The data was then analyzed by using standard statistical program, SPSS version 16. Blood lipids were categorized into total cholesterol, LDL-C, HDL-C and TG levels. Total cholesterol was further categorized into desirable (<4 mmol/L), borderline high (4 - 4.8 mmol/L) and high (>4.8 mmol/L). LDL-C was further classified into optimal (<3 mmol/L), near optimal (3 - 3.9 mmol/L), borderline high (4 - 4.8 mmol/L) and high (>4.8 mmol/L). For HDL-C, it was divided into 3 groups which were heart disease risk factor (<1.2 mmol/L), normal range (1.2 - 1.8 mmol/L) and lower risk of heart disease (>1.8 mmol/L) whereas for TG level, it was divided into normal (<1.5 mmol/L), borderline high (1.5 - 2 mmol/L) and high (>2 mmol/L) (Figure 5). Smoking status was grouped into the smoker, ex-smoker and non-smoker. History of diabetes was classified into diabetic and non-diabetic. Diabetics were people who previously diagnosed and on treatment or with plasma glucose ≥11.1 mmol/L after oral glucose tolerance test. A family history of CHD was defined as close (first) relatives who suffered from CHD. All of the 160 CHD patients admitted in the hospital during the period of October 01 to December 31, 2013 were included.

RESULTS

160 patients aged between 30 to 79 years were included in this study (Figure 1). Out of 160 patients with CHD, 69% were male and 31% female (Figure 2). The ethnic distribution of the patients were 48% Malay, 32% Indians, 19% Chinese and 1% others respectively (Figure 3). 50% of the patients had a high total cholesterol level (>4.8 mmol/L) and 29% had borderline total cholesterol levels (4.0 - 4.8 mmol/L) (Figure 4). Only 20% of the patients had a desirable total cholesterol level (<4.0 mmol/L). Among the study patients, 48% had optimal (<3.0 mmol/L), 34% had nearly optimal (3.0 - 3.9 mmol/L), 7% had borderline (4.0 - 4.8 mmol/L) and 9% had high (>4.8 mmol/L) level of LDL-C respectively. 48% had normal (1.2 - 1.8 mmol/L), 41% had lower (<1.2 mmol/L) and 8% had higher (>1.8 mmol/L) level of HDL-C respectively. 41% had normal (<1.5 mmol/L), 31% had high (>2.0 mmol/L) and 28% had borderline high (1.5 - 2.0 mmol/L) TG level respectively.

54%, of the patients had high (>140 mm Hg), 44% had normal (100 - 140 mm Hg) and 2% had low (<100 mm Hg) systolic blood pressure respectively. On the other hand, 68% had normal (60 - 90 mm Hg), 29% had high (>90 mm Hg), and 3% had low (<60 mm Hg) diastolic blood pressure respectively. Surprisingly 46% of the study population were smoker, 31% non-smoker and 23% were ex-smoker respectively, and 57% were diabetic and 43% were non-diabetic. Only 61% of the patients had a family history and 31% had no family history of CHD (Figure 6). Among the study population, 51% had high total cholesterol level; 50% had the LDL-C level within the optimal range (<3.0mmol/L); and 41% had the TG level within normal range (<1.5mmol/L). Among the 51% patients with high total cholesterol level, male were 33% and female were 18%; and 26% of them were Malay population.
Fig. 4: Level of Total Cholesterol, LDL, HDL And TG among CHD Patients.

Distribution of total cholesterol among CHD patients

Distribution of LDL level among CHD patients

Distribution of HDL level among CHD patients

Distribution of triglyceride level among CHD patients

Distribution of systolic blood pressure among CHD patients

Distribution of diastolic blood pressure among CHD patients

Distribution of smoking status among CHD patients

Distribution of history of diabetic among CHD patients

Distribution of family history of CHD

Fig. 5: Distribution of risk factor among the CHD patients.

Fig. 6: Distribution of Family History of CHD patients
DISCUSSION

In this study, 35% of the patients were from the age group of 60-69 years and the lowest number was from 30-39 years group. Age is a dominant feature, and death rates from the CHD rise with decade, even into advanced age (Institute of Medicine, 2010; Gaziano et al., 2006). Atherosclerosis is not clinically evident until middle age or later, when the arterial lesions precipitate the organ injury (Alarabawy et al., 2015). The incidence of myocardial infarction increase fivefold between the age ranging from 40-60 (Bui et al., 2011; Ganesh et al., 2013). Our study found that the highest percentage was represented by the Malay population. 47.5% patients were Malay; followed by 14.74% (Chinese), 18.8% (Indians) and the remaining 1.9% were from other ethnicities. This finding differed from another Malaysian study where it was found that Indians had the highest CHD mortality (51.8 per 100 000) followed by Chinese (26.5) and Malays (14.4) (Geok, 1994). Thus, Indians have a CHD mortality risk which twice that for Chinese and 3.6 times higher than that for Malays. This difference could be due to the smaller sample size in this study. The prevalence of male CHD patient was twice as high as women, 110 and 50 respectively in the current study. This finding is comparable with another Malaysian research study that reported the rate was 27.2 per 100 000 for men and 13.6 for women (Khor, 1994). In addition, men are much prone to develop atherosclerosis and its consequences than women (Institute of Medicine, 2010; Maas and Appelman, 2010).

When comparing the prevalence of atherosclerosis for men and women, according to two age categories, 30-39 and 60-69 respectively, women in 60-69 age group showed eight times higher and men 16 times higher than 30-39 age group. Myocardial infarction and other complication of atherosclerosis are uncommon in premenopausal women. However, the incidence of atherosclerosis-related disease increases, probably owing to a decrease in natural estrogen levels (LaRosa, 1992; Tanna et al., 2013). Indeed, the frequency of myocardial infarction in both sexes equalizes by the seventh to eighth decade of life (Kumar et al., 2010). This study findings regarding the frequency of men and women in two age groups were not equalized perhaps due to small sample size, and perhaps women have higher awareness for health and medical care especially when it was seen that all of them were non-smoker. Dyslipidemia is the major risk factor in the development of coronary heart disease (Institute of Medicine, 2010). The current study, we found that 50% of the samples have high total cholesterol level. However, the majority of the patients (48%) of them had the optimal LDL level (<3.0 mmol/L), 40.6% had normal triglyceride levels (<1.5 mmol/L) and 48.12% had a normal range of HDL level (1.2-1.8 mmol/L). Importantly, this result may not have been of sufficient duration and period to show the full effect of high LDL, TG and low HDL as the risk factors because this is a retrospective cross-sectional study. The patient has been hospitalized to the Ipoh GH may had control their diet program. These findings were similar with one study from Singapore with almost same ethnic background (Lee et al., 2001). This study found that 54% of the patients had hypertension (SBP>140 mmHg). The prevalence of hypertension in Malaysia is between 14 - 24% (Ministry of Health, 2013). It contributes to more than one third of premature mortality due to CHD and a greater proportion due to stroke (Yunus et al., 2004). Most of the patients (43%) who had CHD were smokers which is comparable with a study that showed cigarette smoking as the single most prevalent risk factor of CHD patients in Malaysia (Khor, 1994; Yunus et al., 2004; Quek et al., 1989).

Majority (57%) of the patients in this study were diabetic which is comparable with another study done in Malaysia and found that people with diabetes had a two to eight-fold more risk of developing heart disease (Khor, 1994; Martín-Timón et al., 2014). 61% of the patients had a family history of CHD whereas the other 31% had no family history of CHD. A strong family history of heart disease can increase an individual’s risk for coronary heart disease fourfold, and even a moderate family history can lead to a two-fold increase in risk, a population-based study had shown (Collins, 2006; Buttar et al., 2005). The family history is considered to be significant when a male relative's first CHD event occurred before the age of 55, or a female relative's first CHD event occurred before 65 (Scheuner et al., 2008; Roncaglioni et al., 1992; Nasir et al., 2004). Some other studies had shown that death from CHD was largely influenced by genetic factors with a positive family history being associated with a 75% increase in risk in men, and an 84% increase in women (Kashani et al., 2013; Zdavkovic et al., 2002).

The National Cholesterol education program (NCEP) of The National Heart, Lung, and Blood Institute (NHLBI) has established guidelines for the prevention and treatment of lipid disorders. According to the NCEP guidelines, all patients at least 20 years of age should have an initial cholesterol measurement. It is recommended that the initial laboratory test measure both the total and HDL cholesterol. The American Diabetes Association (ADA) recommends that diabetic patients should receive a complete lipid profile annually (Eldor and Raz, 2009; ADA, 2003; Jellinger et al., 2013). The most (51%) of CHD patient have high total cholesterol and high prevalence in male (34%) than female (17%). High total cholesterol levels common in the age group between 60-69 years, and among them, TC was higher (26%) among Malays rather than Chinese, Indian and other ethnic groups. Total cholesterol level was also high among the Malays who suffer diabetic dyslipidemia than other races. This also shows the correlation since diabetes mellitus is one of the major risk factors for CHD. Similar observations were also found in a number of studies (Al-Harbi, 2004; Shestov et al., 1993; Castelli et al., 1977).

LDL-C level for the CHD patient are mostly (49%) within optimal range. The highest came from age group between 70-79 years old (18%), among them 31% were male and 26% were Malays. Other studies among the CHD patient found that most of the patient has an LDL-C level near the optimal range and came from age group between 51-74 years old which nearly similar to our study (Bambauer et al., 2012). The cardiovascular cohort
studies in Singapore, all the Chinese, Malay, and Asian Indian male that suffer from CHD have an LDL-C level ≥ 4.14 mmol/L (Lee et al., 2001). This is also same as our results, but we are more specific in aspect of gender and ethnicity.

This study also found that most of the CHD patients have HDL-C level within normal range and the highest percentage came from patient in age group between 60-69 years old (16%), among them 35% were male and 22% were Malays. Another study reported that CHD patient had high levels of HDL-C from the age group below 25 years and the patient within the age group above 60 years usually had low levels of HDL-C (Miller and Miller, 1975). This is different from the current study that may be due to dyslipidaemia which occasionally causes the development of CHD than other risk factor for example hypertension. Multiple Malaysian research revealed that HDL values were significantly higher in females than males and much lower among the Indian males, rather than Chinese and Malay (Ng et al., 1997; Tan et al., 2011; Blebil et al., 2011). In this study, male accounts for most of the samples that might have affected the result. However, the low prevalence of CHD among the Indians may be due to the difference in their ethnic origin (Chaturvedi, 2003). The TG level among the CHD patients was in the normal range. Most of them from age group between 60-69 years (16%), among them 32% were male and 20% were Malays. High TG level was also demonstrated in a study among the American survivors of Myocardial Infarction (MI) (Miller et al., 2011; Jeppesen et al., 1998; Weitz et al., 2010) and most of them were female around 40-49 years old. These findings are totally different from the current study result perhaps because they just had focused on MI only. According to the study among the Malaysians who suffered coronary artery disease (CAD), the evaluation also been made on TG level, but within the patient and control group, however, no difference in TG level that could be attributed to the ethnicity (Ng et al., 1997).

CONCLUSION

The findings of this study indicated high serum cholesterol as an important single risk factor for CHD and an increase in the levels of LDL-Cholesterol and a decrease in HDL-Cholesterol especially among the males and in Malays. There were some similarities and dissimilarities with other studies have also been shown. Therefore, there is a need to extend the study on a larger population and an urgent need for appropriate interventions to maintain the serum total cholesterol and LDL-C levels within the expected range.

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Kashani M, Eliasson A, Vernalis M, Costa L, Terhaar M. Improving Assessment of Cardiovascular Disease Risk by Using Family History an Integrative Literature Review. Journal of Cardiovascular Nursing, 2013; 00 (0): 00-00.


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