Knowledge of coronary heart disease risk factors and associated dietary fat intake among medical students

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Abstract

Background: Coronary heart disease (CHD) prevalence has increased among young adults. The most common CHD risk factor among young adults was high daily fat intake. Knowledge regarding CHD risk factors was a crucial element in determining health behaviour, including healthy dietary patterns. However, the level of CHD knowledge and its association with dietary fat intake among medical students is still unclear.
Methods: The study was performed among preclinical medical students at the Pelita Harapan University, Indonesia. The CHD risk factor knowledge was assessed using the validated Heart Disease Fact Questionnaire (HDFQ), comprising of 25 items. The dietary fat intake was evaluated using the validated Block Dietary Fat Screener (BDFS) questionnaire.
Results: A total of 98 participants were included in this study. The median age of the participants was 19 years (IQR 18-20). Of the 98 participants, 71 (72%) participants had adequate knowledge of CHD risk factors. Older age, being female, and being in the third year of medical study were related to higher HDFQ scores. The daily fat intake was classified as high in 33 (34%) of participants and very high in 33 (34%) of participants. No significant difference in dietary fat intake level was observed between participants with and without adequate knowledge of CHD risk factors.
Conclusion: This study reveals that most medical students had adequate knowledge of CHD risk factors. However, the knowledge factor did not lead to healthy dietary pattern adoption among medical students, suggesting that the implementation of an education and training program to motivate lifestyle modification was required.

Introduction

Coronary heart disease (CHD) has emerged as a significant global health concern, increasingly affecting younger populations amid shifting lifestyle patterns.[1,2] The prevalence of CHD in young people ranges from 1% to 16% and is higher in South Asian population.[3-9] CHD in young adults was associated with high rates of major adverse cardiac event recurrences, worse long-term prognosis, and premature death.[10,11] Additionally, CHD in working-age individuals causes a reduction in workplace productivity.[12,13] Indonesia has been reported to have the second-worst disability-adjusted life years (DALYs) rates due to CHD.[12]

The CHD risk factors among young adults were commonly related to behavioural risk factors, such as smoking, unhealthy diet, and physical inactivity.[1,2] Knowledge regarding health risks was the

crucial element for individuals to adopt healthy behaviours.[14] Previous meta-analysis studies have demonstrated the low knowledge of CHD risk factors among young adults, resulting in poor attitudes towards CHD prevention.[15] The most prevalent CHD risk factors among young adults were high intake of dietary fat.[15,16] In young adults, due to the socio-cultural and environmental factors, the dietary pattern was generally shifted towards high consumption of fast foods, resulting in the increased serum saturated fatty acids (SFA), trans fats that eventually promote plaque formation in vascular.[17-19]

Given that adequate knowledge of CHD is an essential factor for fostering healthy behaviors, and it remains a persistent challenge among young individuals and underreported among medical students, in this study, we assess the level of CHD risk factor knowledge among medical students. In addition, we evaluate the dietary fat intake pattern among medical students and its relationship with the level of CHD knowledge to better understand the importance of the knowledge factor for motivating behavioral changes among medical students.

Material And Methods

Study design and participants

This cross-sectional study was conducted from March to June 2025 at the Medical Faculty of Pelita Harapan University, Banten, Indonesia. Participants were preclinical medical students enrolled through non-probability convenience sampling. Written informed consent was obtained from the participants. This study received ethical approval from the Pelita Harapan University research ethics committee (No: 181/K-LKJ/ETIK/IV/2025).

Data collection

Data was collected using the questionnaire disseminated through Google Forms or social media platforms, such as Line and WhatsApp. The socio-demographic variables, including age, gender, academic year, history of cardiovascular disease, and family history of cardiovascular disease, were collected. The knowledge of risk factors for the development of CHD was evaluated using a validated Heart Disease Fact Questionnaire (HDFQ) comprising 25 items.[20] The HDFQ demonstrated adequate internal consistency, with a Kuder-Richardson-20 reliability of 0.77, the corrected item-total correlations ranging from 0.18 to 0.41, and the test-retest reliability of 0.89.[20] Participants were asked to respond to each question with possible answers of true, false, or I do not know. The HDFQ scoring system consists of 1 point for each correct response and 0 for incorrect and “I do not know” responses. The final score was calculated by summing the points for all the items,

and a total score >20 indicated the good or optimal knowledge of participants, as described in a previous study.[21] Further, the different domains of cardiovascular disease knowledge were assessed through 25 items of HDFQ : (a) the role age, gender, genetics and family history was evaluated in items 1, 2, 3, and 25, (b) the CHD risk factors were measured in items 4, 6, 8, 12, 16, and 18, (c) the importance of exercise in cardiovascular disease prevention was assessed in items 13, 14, and 15, (d) the contribution of diet and cholesterol level in CHD was determined in items 9, 10, 11, 17, 20, and 22, and (e) the role of lifestyle intervention in CHD was assessed in item 5, 7, 19, 21, 23, 24.

The habitual fat intake was measured using the validated Block Dietary Fat Screener (BDFS) questionnaire.[22] This instrument consists of 17 items that evaluate the consumption frequency of 41 high-fat foods. The frequency of fat consumption was categorized as follows scales: 0 points = one time a month or less, 1 point = two to three times a month, 2 points = one to two times a week, 3 points = three to four times a week, and 4 points = from five to more times a week. The total score of 0 to 7 indicates very low-fat intake, 8 to 14 suggests the average fat intake, 15 to 22 equals high-fat intake, and ≥23 represents very high-fat intake individuals.

Statistical analysis

The numeric variables were described as median (interquartile range, IQR), and the nominal variables were shown as counts and percentages. JASP (version 0.19.3) was used for statistical analysis and graph drawing. In all analyses, a two-tailed p-value of less than 0.05 was considered statistically significant.

Result

Participants characteristics

A total of 98 participants were included in the present study. The median (IQR) age of participants was 19 (18-20) years, of which 38 (39%) were male and 60 (61%) were female. More than half of the participants (63%) were in their first year of preclinical medical studies. About 24 (25%) participants had a family history of cardiovascular disease. The general characteristics of participants are demonstrated in **Table 1**.

Table 1. The sociodemographic characteristics of participants

Variables	n = 98
Age, median (IQR)	19 (18-20)
Gender, n (%)	
Male	38 (39)
Female	60 (61)
Year of study, n (%)	
First year	63 (63)
Second year	19 (19)
Third year	16 (16)
Personal medical history of cardiovascular diseases, n (%)	
Yes	0 (0)
No	100 (100)

Family history of cardiovascular diseases, n (%)	
Yes	24 (25)
No	74 (75)

Assessment of CHD risk factor knowledge among participants

In this study, we observed that 27 (28%) participants had inadequate knowledge (HDFQ total score ≤20), whereas 71 (72%) participants showed adequate knowledge of CHD risk factors (HDFQ total score >20) (**Figure 1A**). The HDFQ total score was positively correlated with the age variable (p: 0.004, **Figure 1B**). A higher HDFQ score was found in females compared to males (mean: 22 vs. 21, p: 0.026, **Figure 1C**). In addition, the third-year medical students had greater HDFQ scores than the first-year medical students (mean: 23 vs. 21, p: 0.013, **Figure 1D**). There is no significant difference in the HDFQ score between participants with and without a family history of cardiovascular disease (**Figure 1E**).

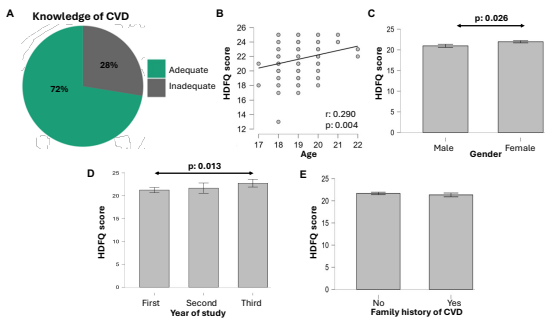

Figure 1. Knowledge about the risk factors for the development of cardiovascular disease among medical students

(A) A pie chart illustrates the percentage of participants with adequate and inadequate knowledge of cardiovascular disease. The level of knowledge was also evaluated based on the participant's age (B), gender (C), year of study in medical school (D), and family history (E). Statistical analysis was performed using the Spearman rank correlation test to evaluate correlations, the Mann-Whitney U test to compare two independent groups, and the Kruskal-Wallis test followed by Dunn's multiple comparison to compare more than two independent groups. Data was presented as mean ± standard error of the mean (SEM). Abbreviations in figure: CVD, cardiovascular disease; HDFQ, Heart Disease Fact Questionnaire.

From the HDFQ items analysis as shown in **Table 2**, we found that most participants recognized smoking, high blood pressure, high cholesterol, being overweight, diabetes, family history, and older age are risk factors for cardiovascular disease. However, only 43 (44%) participants knew the effect of gender on the risk of cardiovascular disease. In addition, we observed that most participants understand the cardiovascular disease prevention measures, for example, smoking cessation, regular physical activity, maintaining a healthy weight, and controlling high blood pressure, high blood sugar, and high cholesterol levels. Although a greater number of participants correctly answered the questions related to the role of diet and cholesterol in the risk of developing cardiovascular disease, we figured out that only 63 (64%) participants were aware of the tendency of low good cholesterol (high-density lipoprotein/HDL) in diabetes conditions.

Table 2. Response of Heart Disease Fact Questionnaire (HDFQ) among participants

No	Questions	Correct response	Frequency n (%)
1	A person always knows when they have heart disease	False	84 (86)
2	If someone has a family history of heart disease, the greater their risk of heart disease	True	91 (93)
3	The older a person is, the greater their risk of heart disease	True	91 (93)
4	Smoking is a risk factor for heart disease	True	94 (96)
5	A person who stops smoking will lower their risk of heart disease	True	83 (85)
6	High blood pressure is a risk factor for heart disease	True	96 (98)
7	Keeping blood pressure under control will reduce a person's risk for developing heart disease	True	94 (96)
8	High cholesterol is a risk factor for developing heart disease	True	96 (98)
9	Eating fatty foods does not affect blood cholesterol	False	80 (82)
10	If someone's good cholesterol (HDL) is high, he/she is at risk for heart disease	False	72 (73)
11	If someone's bad cholesterol (LDL) is high, he/she is at risk for heart disease	True	94 (96)
12	Being overweight increases a person's risk for heart disease	True	97 (99)
13	Regular physical activity will lower a person's chance of getting heart disease	True	93 (95)
14	Only exercising at a gym or in an exercise class will lower a person's chance of developing heart disease	False	69 (70)
15	Walking and gardening are considered exercise that will help lower a person's chance of developing heart disease	True	93 (95)
16	Diabetes is a risk factor for developing heart disease	True	91 (93)
17	High blood sugar puts strain on the heart	True	91 (93)
18	If someone's blood sugar is high over several months it can cause his/her cholesterol level to go up and increase his/her risk of heart disease	True	89 (91)
19	A person who has diabetes can reduce their risk of developing heart disease if they keep their blood sugar levels under control	True	82 (84)
20	People with diabetes rarely have high cholesterol	False	75 (77)
21	If a person has diabetes keeping their cholesterol under control will help to lower their chance of developing heart disease	True	85 (87)
22	People with diabetes tend to have low HDL cholesterol	True	63 (64)
23	Person who has diabetes can reduce their risk of developing heart disease if they keep their blood pressure under control	True	81 (83)
24	Person who has diabetes can reduce their risk of developing heart disease if they keep their weight under control	True	88 (90)
25	Men with diabetes have higher risk of heart disease than women with diabetes	False	43 (44)

Factors associated with the level of dietary fat consumption among participants

As shown in **Figure 2A**, most participants had dietary fat consumption in high (34%) to very high (34%) levels. There was no significant relationship between fat intake with age variable (**Figure 2B**), level of study of participants in medical school (**Figure 2D**), family history of cardiovascular disease (**Figure 2E**), and knowledge of cardiovascular disease (**Figure 2F**). A significantly higher BDFS score, indicating increased dietary fat consumption, was found in females than in males (mean: 21 vs. 17, p: 0.026, **Figure 2C**).

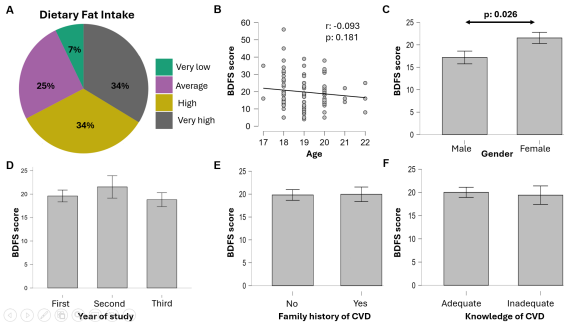

Figure 2. Level of dietary fat consumption among medical students

(A) A pie chart illustrates the percentage of participants with very low, average, high, and very high intake of fat. The level of dietary fat intake was also evaluated based on the participant's age (B), gender (C), year of study in medical school (D), family history (E), and knowledge of cardiovascular disease (F). Statistical analysis was performed using the Spearman rank correlation test to evaluate correlations, the Mann-Whitney U test to compare two independent groups, and the Kruskal-Wallis test followed by Dunn's multiple comparison to compare more than two independent groups. Data was presented as mean ± standard error of the mean (SEM). Abbreviations in figure: CVD, cardiovascular disease; BDFS, Block Dietary Fat Screener.

Discussion

Coronary heart disease (CHD) is the most common type of cardiovascular disease and the leading cause of mortality and morbidity globally, including in Indonesia.[12,23] Even though CHD is frequently found at older ages, several reports have shown an increase in CHD in young individuals, particularly in the Asian population.[4-9] The young CHD term is defined as CHD that occurred before the age of 45 years.[24] The consequence of young CHD is devastating, with a negative impact on productivity and an enhanced risk of cardiovascular event recurrence.[10,12]

The modifiable risk factors of CHD, such as smoking, sedentary lifestyle, hypertension, hyperlipidaemia, diabetes mellitus, obesity, and unhealthy dietary intake, were increased in prevalence among young adults.[1] The extent of atherosclerotic lesions in CHD was related to the CHD risk factors.[2,25,26] The most important primary prevention to prevent the cardiovascular events of CHD was promoting healthy lifestyle behaviour.[1,27] To achieve healthy lifestyle behaviours among individuals, adequate knowledge regarding CHD risk factors was a crucial factor.[28,29] Individual knowledge will influence the adoption and engagement towards healthy behaviour.

Medical students will eventually become professional healthcare workers involved in health promotion by encouraging people to adopt healthy lifestyles. Thus, they must have optimal knowledge of disease risk factors to prevent the development and progression of non-communicable diseases, such as CHD. In this study, we observed that 72% of participants demonstrated sufficient knowledge of CHD. This result is similar to previous studies in Saudi Arabia and Nigeria, showing the optimal CHD knowledge in healthcare students.[21,30] In terms of CHD risk factors, CHD management, and the role of physical activity in CHD risk reduction, more than 70% of respondents answered correctly

items in the HDFQ questionnaire, indicating good CHD knowledge in this area.[21,31] While respondents in this study recognised that high cholesterol was a risk factor for developing CHD and were able to identify the role of good cholesterol (HDL) and bad cholesterol (LDL) in CHD risk, they did not recognise that individuals with diabetes tend to have lower HDL cholesterol. In addition, the knowledge deficit regarding gender factors as CHD risk factors was observed in this study. Overall, these findings may suggest the lack of a comprehensive understanding of the role of diabetes, cholesterol, and hormones in CVD pathogenesis.

In the present study, significantly higher HDFQ scores were observed in females than in males. Previous studies have shown the differences in health literacy and the engagement activity of health-seeking information between females and males.[32-34] The differences are possibly related to the traditional role of females as family caregivers and children, and the greater concern about appearance and aesthetics in females. Moreover, we observed that third-year medical students had greater HDFQ scores than first-year students. This result may be due to more exposure to health information, clinical training, and critical thinking skills in third-year medical students than in first-year medical students. Furthermore, a positive correlation was found between HDFQ scores and age, which may be explained by the fact that the age of participants is associated with their study level.

The daily intake of a high-fat diet was reported as the most common CHD risk factor among young adults.[2,16,35] The impact of dietary fat on artery disease was related to the types of fatty acids and cholesterol.[36] High levels of saturated fatty acids (SFA), trans fats, and cholesterol, particularly LDL cholesterol, can build up the lipids in the artery wall, leading to plaque formation and blood vessel narrowing. In the present study, the frequency of participants with high and very high daily fat consumption was 34% and 34%, respectively. This result is in line with existing findings that demonstrate unhealthy eating behaviours among medical students.[37,38] Previous studies have shown that stress levels among medical students may induce the release of the cortisol hormone to control stress, resulting in high fat intake.[39] In addition, the increased workload demands and study duration among medical students determine their food preferences, in which they tend to consume fast food, high in SFA and trans fats, for convenience reasons.[40,41] Further, gender differences in dietary patterns have been shown in prior studies.[42,43] Our study showed that females had higher daily fat consumption than males, which is similar to previous

studies.[44,45] This result is likely explained by the predominant disordered or impulsive eating behaviour and higher stress levels among females.[42,46-48]

Although in this study, we observed a large proportion of participants with adequate CHD knowledge, the high dietary fat intake, as one of the CHD risks, was prevalent among respondents. Besides the optimal CHD knowledge, the individual's perception towards CHD risk is also an important determinant in adherence and implementation of healthy lifestyle behaviours according to the Health Belief Model.[14] Our study consists of preclinical medical students who still lack experience and exposure to clinical settings, which may negatively impact their perception of CHD susceptibility, severity and threat, resulting in difficulty in translating the knowledge into healthy behaviour practices.

Several limitations in this study should be acknowledged. First, the study was conducted among undergraduate medical students from a single institution, restricting the generalizability of the results. Second, this study uses a non-probability convenience sampling that may cause an imbalance proportion of participants' characteristics and affect the statistical analysis result. Third, the self-reported questionnaire used to evaluate the knowledge of CHD risk and dietary fat intake may be subject to recall and social desirability bias.

Conclusion

This study highlighted the adequate knowledge of CHD risks among preclinical medical students. Levels of education, age, and gender were factors that related to knowledge of CHD risk factors. Considering the optimal knowledge of CHD risk factors was not aligned with the actual health lifestyle behaviour, in which we observed the overconsumption of fat in the majority of respondents, indicating that the implementation of education and training programs to enhance awareness and assist medical students in adopting positive lifestyle behaviour is needed.

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