FACTORS ASSOCIATED WITH DYSLIPIDEMIA AMONG YOUNG WORKERS UNDERGOING PERIODIC HEALTH EXAMINATIONS: THE ROLE OF OBESITY, HEALTH KNOWLEDGE AND HEALTH BEHAVIORS

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ABSTRACT

Introduction: Recent studies have shown a growing trend of dyslipidemia among younger populations. This phenomenon is closely linked to unhealthy lifestyle habits commonly observed in young adults today, including physical inactivity, consumption of fast food, chronic stress, smoking, and alcohol use. However, studies focusing on young adults - under 40 years old - remain limited, especially those exploring their knowledge and health behaviors in relation to dyslipidemia. **Objective:** Analyzing the association between dyslipidemia and obesity status, knowledge and health behaviors among young workers undergoing periodic health check-ups at the University Medical Center Ho Chi Minh City. **Methods:** This was a descriptive cross-sectional study with analytical components, conducted on 358 individuals who underwent routine health examinations at the University Medical Center Ho Chi Minh City. **Results:** Our findings indicate an association between dyslipidemia and overweight/obesity based on BMI (OR = 2.553, 95% CI: 1.157–2.629, p = 0.017). Furthermore, there was a statistically significant difference in the prevalence of dyslipidemia associated with abdominal obesity, as determined by waist circumference (OR = 2.654, 95% CI: 1.316–4.994, p = 0.005). **Conclusions:** Obesity, knowledge and health behaviors influence the occurrence of dyslipidemia. Among these, obesity is a closely associated risk factor for dyslipidemia.

Keywords: *dyslipidemia, risk factors, obesity, knowledge, health behaviors.*

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I. INTRODUCTION

Dyslipidemia is a condition characterized by an imbalance of one or more lipid components in the blood, most commonly elevated total cholesterol, elevated triglycerides, elevated LDL-C, and/or reduced HDL-C. This condition often progresses silently, without noticeable symptoms for a long time and is typically only detected after causing serious complications. One of the most common outcomes is atherosclerosis due to the accumulation of LDL-C in the vascular endothelium, which increases the risk of myocardial infarction, stroke and other cardiovascular diseases.(1)

Recent studies have highlighted a downward shift in the age of onset of dyslipidemia.(2) This trend is strongly associated with unhealthy lifestyle practices among young adults, such as low physical activity, high intake of fast food, frequent psychological stress, smoking, and alcohol consumption.(3)

From February 2019 to January 2020, Nurshad Ali conducted a study among university faculty and students in Bangladesh, reporting an overall dyslipidemia prevalence of 81.5%. Regression analysis showed significant

associations between dyslipidemia and older age, obesity, diabetes and insufficient physical activity.(4)

Another cross-sectional descriptive study by Ngo Thanh Thao et al. conducted in two communes of Phu Vang District, Thua Thien Hue Province, involving residents aged 25 years and above, reported a dyslipidemia prevalence of 61.1%. The study identified several associated factors, including age, history of hypertension, smoking habits, alcohol consumption, fruit and vegetable intake, physical activity intensity and overweight/obesity status.(5)

Another study by Phan Kim My, targeting individuals undergoing general health check-ups at Pham Ngoc Thach University Medical Clinic from December 2022 to March 2023, reported a dyslipidemia prevalence of 77.1%. The study found associations with male gender, hypertension, waist circumference, waist-to-hip ratio and dietary habits. Notably, this study also investigated the relationship between dyslipidemia and physical activity levels, revealing that physical activity was significantly related to specific lipid parameters including total cholesterol, LDL-C and non-HDL-C (p-values of 0.001; 0.001; <0.001, respectively).(6)

Currently, most studies in Vietnam have focused primarily on middle-aged or elderly populations, in whom metabolic and endocrine changes increase the likelihood of lipid abnormalities.(7) In contrast, research on younger adults-under 40 years old-remains limited, especially in exploring their knowledge and health behaviors related to dyslipidemia. Early identification and timely intervention of risk factors for dyslipidemia in this population not only protect individual health but also contribute to reducing the long-term burden of disease on society. Therefore, this study was conducted to analyze the association between dyslipidemia, obesity status, knowledge, and health behaviors among young workers undergoing periodic health check-ups at the University Medical Center Ho Chi Minh City.

II. METHODS

Study settings

This study was conducted from December 2024 to April 2025 at the University Medical Center Ho Chi Minh City.

Study design and participants

This was a descriptive cross-sectional study with analytical components, carried out among individuals undergoing routine health check-ups at the University Medical Center Ho Chi Minh City.

All individuals undergoing periodic health examinations were routinely prescribed a lipid panel, regardless of whether they exhibited any clinical symptoms, as lipid profiling is a standard test included in periodic health check-ups. Additionally, all study participants underwent health examinations under institutional contracts arranged by their employers, independent of their individual health conditions or socioeconomic status.

Sample size and sampling

The sample size was calculated using the formula for estimating a population proportion:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

n is the minimum required sample size,

$\alpha = 0.05$ is the Type I error probability,

$Z(1-\alpha/2)$ is the Z-score corresponding to a 95% confidence interval ($Z = 1.96$),

d is the desired margin of error (chosen as 0.05),

p is the expected prevalence of dyslipidemia in the population, based on previous studies.

The value of p = 0.341 was selected based on the study by Zhang H. et al.[8]

During sampling, we collected 358 samples that met the criteria.

Data collection

Blood lipid panel test results are collected and compiled daily based on Labconn software connected to the AU480 - Beckman Coulter automatic biochemical analyser system at the Laboratory Department of University Medical Center 2. Quality control process is carried out with at least 2 levels in accordance with current regulations.

We combined the corresponding survey questionnaire with each patient's blood lipid panel test result to divide into survey groups. Survey groups related to gender (male/female), age, BMI (overweight, obesity / no overweight, obesity), and factors including Abdominal Obesity, Knowledge about Dyslipidemia, Health Behaviors: Alcohol Consumption, Smoking Status, Exposure to Secondhand Smoke, Frequent Consumption of Fried/Fatty Foods, Frequent Consumption of Instant/Processed Foods, Fruit and Vegetable Intake, and Physical Activity.

Dyslipidemia was defined according to the NCEP ATP III 2001 criteria [9], as the presence of an abnormality in at least one of the following lipid components: total cholesterol ≥200 mg/dl, triglycerides ≥150 mg/dl, LDL-C ≥130 mg/dl, or HDL-C <40 mg/dl.

Data analysis

The collected data were entered into Microsoft Excel and analyzed using SPSS version 27. Qualitative variables were described using frequencies and percentages. Associations were tested using the Chi-square test or Fisher's exact test, as appropriate. The odds ratio (OR) was utilized to assess the association between variables.

Ethical considerations

This study was approved by the Biomedical Research Ethics Committee of the University of Medicine and Pharmacy at Ho Chi Minh City (approval number: 2076/HĐĐĐ-ĐHYD, August 23th, 2024).

III. RESULTS

Prevalence of dyslipidemia among participants aged ≤ 40 years

This research, among 358 participants aged 18 to 40 years, dyslipidemia was identified in 306 individuals, accounting for 85.5%.

The association between dyslipidemia and some factors

Table 1. ***Association between Overweight/Obesity and Dyslipidemia***

Overweight/Obesity Status	Total n (%)	Dyslipidemia		p-value	OR (95% CI)
		Yes n (%)	No n (%)		
Body Mass Index (BMI)					
Overweight/Obese	105 (29.0)	97 (92.4)	8 (7.6)	0.017	2.553 (1.157–5.629)
Not Overweight/Obese	253 (71.0)	209 (82.6)	44 (17.4)		1
Abdominal Obesity					
Yes	154 (43.0)	141 (91.6)	13 (8.4)	0.005	2.654 (1.316–4.994)
No	204 (57.0)	165 (80.9)	39 (19.1)		1

Table 1 indicates a significant association between dyslipidemia and overweight/obesity status, as determined by BMI (OR = 2.553, 95% CI: 1.157–2.629, p = 0.017). Furthermore, a statistically significant association was observed between the prevalence of dyslipidemia and abdominal obesity, as defined by waist circumference (OR = 2.654, 95% CI: 1.316–4.994, p = 0.005).

Table 2. ***Association between Knowledge of Dyslipidemia and Dyslipidemia***

Knowledge about Dyslipidemia	Total n (%)	Dyslipidemia		p-value	OR (95% CI)
		Yes n (%)	No n (%)		
Awareness of Risk Factors					
Yes	210 (59.0)	183 (87.1)	27 (12.9)	0.286	1.378 (0.764–2.485)
No	148 (41.0)	123 (83.1)	25 (16.9)		1
Awareness of Consequences					
Yes	190 (53.0)	164 (86.3)	26 (13.7)	0.631	1.155 (0.641–2.080)
No	168 (47.0)	142 (84.5)	26 (15.5)		1
Blood Test as Early Detection Method					
Yes	326 (91.0)	278 (85.3)	48 (14.7)	1.000	1
No	4 (1.0)	4 (100.0)	0 (0.0)		NA
Do not know	28 (8.0)	24 (85.7)	4 (14.3)		1.036 (0,344-3,118)
Awareness of Preventive Measures					
Yes	238 (66.0)	200 (84.0)	38 (16.0)	0.276	0.695 (0.361–1.340)
No	120 (34.0)	106 (88.3)	14 (11.7)		1

NA: Not applicable

As shown in Table 2, participants who reported knowing about preventive measures for dyslipidemia or methods for early detection had a lower prevalence of dyslipidemia compared to those who did not. However, these differences were not statistically significant (p > 0.05).

Table 3. ***Association between Health Behaviors and Dyslipidemia***

Health Behaviors	Total n (%)	Dyslipidemia		p-value	OR (95% CI)
		Yes n (%)	No n (%)		
Alcohol Consumption					
Never or rarely	185 (52.0)	155 (83.8)	30 (16.2)	0.690	1
Monthly	120 (33.0)	106 (88.3)	14 (11.7)		1.465 (0.742-2.895)
Weekly	43 (12.0)	37 (86.0)	6 (14.0)		1.194 (0.463-3.077)
Almost daily	10 (3.0)	8 (80.0)	2 (20.0)		0.774 (0.157-3.827)
Smoking Status					

Health Behaviors	Total n (%)	Dyslipidemia		p-value	OR (95% CI)
		Yes n (%)	No n (%)		
Ever smoked	15 (4.0)	13 (86.7)	2 (13.3)	0.974	1
Currently smoking	79 (22.0)	68 (86.1)	11 (13.9)		0.951 (0.188-4.802)
Never smoked	264 (74.0)	225 (85.2)	39 (14.8)		0.888 (0.193-4.087)
Exposure to Secondhand Smoke					
Yes	224 (63.0)	195 (87.1)	29 (12.9)	0.273	1.393 (0.769–2.526)
No	134 (37.0)	111 (82.8)	23 (17.2)		1
Frequent Consumption of Fried/Fatty Foods					
Yes	264 (74.0)	229 (86.7)	35 (13.3)	0.254	1.445 (0.766–2.724)
No	94 (26.0)	77 (81.9)	17 (18.1)		1
Frequent Consumption of Instant/Processed Foods					
Yes	136 (40.0)	117 (86.0)	19 (14.0)	0.816	1.075 (0.584–1.978)
No	222 (60.0)	189 (85.1)	33 (14.9)		1
Fruit and Vegetable Intake					
Inadequate	197 (55.0)	166 (84.3)	31 (15.7)	0.472	0.803 (0.442–1.460)
Adequate	161 (45.0)	140 (87.0)	21 (13.0)		1
Physical Activity					
Yes	201 (56.0)	170 (84.6)	31 (15.4)	0.585	0.847 (0.466–1.540)
No	157 (44.0)	136 (86.8)	21 (13.4)		1

Table 3 shows that participants who consumed alcohol on a monthly or weekly basis had a higher prevalence of dyslipidemia than those who never or rarely drank. A similar trend was observed among those who smoked or were regularly exposed to secondhand smoke. Regarding dietary habits, participants who frequently consumed oily or processed foods had higher rates of dyslipidemia compared to those without these dietary patterns (OR = 1.445 and 1.075, respectively). Moreover, those who engaged in physical exercise or sports had a lower prevalence of dyslipidemia than non-exercisers (OR = 0.847). Nevertheless, none of these differences reached statistical significance ($p > 0.05$).

IV. DISCUSSION

This study found that the prevalence of dyslipidemia among overweight and obese participants - based on BMI - was 92.4%, significantly higher than that in individuals without overweight or obesity ($p < 0.05$). Several other studies have reported similar findings. Ngo Thanh Thao's study, for instance, also categorized participants based on BMI into overweight/obese and non-overweight/non-obese groups. The dyslipidemia prevalence in the overweight/obese group was 79.6%, significantly higher than in the other group, and the author concluded that there was a statistically significant association between dyslipidemia and overweight/obesity ($p < 0.05$) (5). A descriptive cross-sectional study conducted in Hanoi with a sample size of 103 overweight or obese adults aged 40–60 reported that 71.8% of participants had at least one lipid abnormality. The most common disorders observed were reduced HDL-C and elevated LDL-C.[10]

Beyond BMI, our study also used waist circumference to identify abdominal obesity. Males with a waist circumference ≥90 cm and females ≥80 cm were classified as having abdominal obesity. This study found a statistically significant difference ($p < 0.05$) in dyslipidemia prevalence between individuals with and without abdominal obesity. The association between dyslipidemia and waist circumference has been highlighted in both national and international studies. For instance, Ahmad Delbari et al. conducted a study in Iran from January 2020 to January 2022 among more than 5,000 participants aged 50 and older, identifying waist circumference as one of the key factors related to dyslipidemia.[11] Another cross-sectional study by Pham Thi Dung et al was conducted on 1,910 adults aged 30 and above in rural Thai Binh, Vietnam.[12] The study also confirmed waist circumference as a significant risk factor for dyslipidemia (OR > 1, $p < 0.05$). Similarly, a study by author Phan My Kim involving individuals undergoing general health check-ups at Pham Ngoc Thach University Clinic from December 2022 to March 2023 also found an association between dyslipidemia and waist circumference.[6]

Regarding knowledge, differences in dyslipidemia prevalence were observed between groups. However, these differences were not statistically significant ($p > 0.05$). This may be influenced by socioeconomic factors. Although some participants knew which foods should be avoided to reduce dyslipidemia risk, limited economic resources may have prevented them from accessing healthier alternatives. Consequently, they continued to consume potentially harmful foods if consumed frequently. This phenomenon has been documented in numerous studies worldwide. A cross-sectional study conducted from July to September 2019 on 321 adults in Mekelle City, Northern Ethiopia, showed that individuals with moderate socioeconomic status were twice as likely to develop dyslipidemia compared to those with lower socioeconomic status (aOR: 2.017, 95% CI: 1.044–3.899). The authors identified moderate socioeconomic status as a risk factor for dyslipidemia.[13]

In the present study, no statistically significant associations were found between dyslipidemia and participants' health behaviors, including alcohol consumption, smoking, frequent intake of oily or processed foods, fruit consumption and physical activity. However, these factors have been

shown to affect dyslipidemia in previous research. This discrepancy may be due to the age range of our study population. The present study focused on adults aged 18 to 40, a group in which metabolic processes have not yet significantly deteriorated and exposure time to risk factors remains relatively short. Therefore, the associations with dyslipidemia may not have been fully manifested.

This study targeted early screening of dyslipidemia in young working individuals aged 18–40 who were largely asymptomatic. This approach enables early detection of potential risk factors for dyslipidemia, including obesity, knowledge, and health behaviors. The results demonstrated a strong association between dyslipidemia and obesity among participants. Furthermore, obesity is a known risk factor for various non-communicable diseases, such as type 2 diabetes and cardiovascular conditions. These findings underscore the importance of health education programs that promote lifestyle behavior change to reduce community obesity rates and prevent the development of serious chronic diseases. This is particularly crucial for the young working population, as they represent the core workforce and play a vital role in the country's future socioeconomic development.

Despite its strengths, this study has several limitations. The study population consisted of individuals undergoing routine health check-ups at the University Medical Center Ho Chi Minh City, making the sample subject to the demographics of specific organizations or institutions, and thereby limiting the generalizability to the broader young working population. Additionally, some information was obtained via structured questionnaires, which relied on participants' recall and subjective experiences. This may have introduced recall bias and affected data accuracy.

In conclusion, obesity, knowledge and health behaviors influence the occurrence of dyslipidemia. Among these, obesity is a closely associated risk factor for dyslipidemia. Enhancing lipid profile screening and promoting health education initiatives among young workers is essential.

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CONFLICTS OF INTEREST

The authors do not have any conflicts of interest.

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