BODY COMPOSITIONS AND ITS ASSOCIATION WITH DISLIPIDEMIA IN OVERWEIGHT/OBESE ADULTS AGED 40-60 IN HANOI

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ABSTRACT

To describe the body composition of overweight/obese adults and its association with some blood lipid index in overweight/obese adults in Hanoi. **Method:** A cross sectional study among 80 overweight/obese adults aged 40-60 in Hanoi, from August, 2020 to October, 2020. **Results:** Among overweight and obese people, the percentage of high cholesterol were 57,5%, the percentage of high LDL cholesterol were 65,0%, the percentage of high triglyceride were 58,8%. Linear regression showed that there were positive associations between LDL cholesterol with body fat mass, percent body mass and visceral fat ($p<0.05$) and negative association between HDL cholesterol with weight, BMI index, body fat mass, and visceral fat ($p<0.05$). **Conclusions:** The percentage of total cholesterol, high LDL cholesterol and triglyceride among overweight and obese people in Hanoi were high (57,5%, 65,0% and 58,8%, respectively). Some body composition indexes might have correlation with blood lipid indexes, but further studies need to be done to confirm these correlations.

Keywords: *overweight, obesity, hyperlipidemia, body composition, dyslipidemia*

I. INTRODUCTION

Overweight and obesity are becoming a worldwide health problem. The percentage of overweight and obese individuals is continuously climbing in Vietnam and many other nations throughout the world. Of great concern is that the prevalence of obesity has also markedly increased in children. As a result, the issues linked to overweight and obesity are anticipated to rise as well. Approximately 60-70% of patients with obesity are dyslipidemia while 50-60% of patients who are overweight are dyslipidemia. The lipid abnormalities seen in patients who are obese include elevated triglyceride, VLDL, Apo B, and non-HDL-C levels, which are all commonly observed [1].

The goal of this study was to describe dyslipidemia in overweight/ obese people aged 40 to 60 living in Hanoi.

II. MATERIALS AND METHODS

Study design: A cross sectional study

Study population: adults living in Hanoi aged 40-60

Inclusion criteria:

- BMI≥23
- Aged 40 to 60
- Agreed to participate in the study

Exclusion criteria

- People using drugs to lower blood lipid or in diet to lower body weight
- People with disabilities or with physical deformities (humpback, Scoliosis…)
- People with metal devices inside body (pacemaker, bone brace…)
- People using supplements to change body compositions (whey protein, BCAAs…)

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-People having strenuous training (athletes, body building…)

An online form was available for volunteers to register. Then, the volunteers were screened through anthropometry (height, weight, BMI). People with BMI≥23 (The WHO's BMI threshold for Asians) were subjected to further blood tests. In total, there were 80 participants in the study.

Sample size: Using the formula to estimate a population proportion with specified relative precision, the sample calculated was 80 people.

Time of study: from August 2020 to October 2020. Time of screening volunteers: August 2020 to September 2020.

Anthropometric measurement

The Inbody 370S machine was used to measure anthropometric indicators at baseline and. Bodyweight and height were measured to calculate body mass index (BMI). Body fat mass, percent body fat, and waist/hip ratio also were measured. Classification of obesity groups based on WHO's BMI threshold for Asians:

- Underweight: BMI<18.5
- Normal: 18.5≤BMI≤22.9
- Overweight: 23≤BMI≤24.9
- Obese class I 25≤BMI≤29.9
- Obese class II: 30≤BMI ≤ 39.9
- Obese class III: BMI≥40

Laboratory analysis: Fasting veinous blood (3ml) was collected and analysed at VIAM Clinical nutrition Laboratory using Biosystem A25 (Spain), Hanoi, Vietnam. Total cholesterol, LDL-C, HDL-C, and triglycerides concentration were determined. Classification of dyslipidemia according to the Vietnamese National Heart Association [2].

Ethical approval: The study was approved by the Ethics Council of Vietnam Institute of Applied Medicine.

III. RESULTS

Table 1. Characteristics of subjects

	N	%
Gender		
Male	27	33.8
Female	53	66.2
Age group		
40-50	37	46.2
50-55	13	16.3
55- 60	30	37.5
Mean of age	50.9±10.0	
BMI categorize		
Overweight (23≤BMI≤24.9)	41	51.2
Obesity class I	31	38.8

	N	%
(25≤BMI≤29.9)		
Obesity class II (BMI≥30)	8	10.0
Lipid profiles		
Higher TC (>5.2mmol/L)	46	57.5
Higher LDL-C (>3.3mmol/L)	52	65.0
Higher TG (>1.7mmol/L)	47	58.8

The majority of participant was women (66,2%). The mean age of them was 50,9 years old Most of the participants were overweight (51,2%) and most of them had higher LDL-C (65%). None of the subjects were in the class III obesity group (BMI>40)

Table 2. The body composition of participant according to nutritional status

Index	Overweight (n=41)	Obesity class I (n=31)	Obesity class II (n=8)	P
Weight (kg)	57,9±6,1	69,6±8,1	83,9±11,2	<0,05
BMI (kg/m^2)	23,7±0,4	27,2±1,3	31,8±1,4	<0,05
Muscle mass (kg)	22,3±3,8	25,3±5,1	29,5±5,6	<0,05
Body fat mass (kg)	16,9±2,6	23,6±3,8	30,8±3,3	<0,05
Percent body fat (%)	29,4±4,7	34,2±5,8	37,0±3,7	<0,05
Waist - Hip ratio	0,86±0,03	0,90±0,05	0,91±0,05	<0,05
Visceral fat	7,0±1,8	10,7±2,7	13,5±1,9	<0,05

** Krusal wallis test, Data expressed as mean+SD*

There were significant differences of the measured body composition between groups (p<0,05). In general, the overweight group had the lowest value of body composition indexes, and the obesity class II had the highest ones.

Table 3. The lipid profile of participants according to nutritional status

Index	Overweight (n=41)	Obesity class I (n=31)	Obesity class II (n=8)	P*
Total cholesterol (mmol/L)	5,5±1,1	5,2±1,0	5,7±0,8	0,272
LDL- C (mmol/L)	3,7±1,2	3,8±1,4	4,7±1,3	0,138
HDL- C (mmol/L)	1,2±0,5	1,1±0,3	0,8±0,4	0,071
Triglyceride (mmol/L)	2,6±2,3	2,5±1,9	2,4±1,3	0,739

** Krusal wallis test, Data expressed as mean+SD*

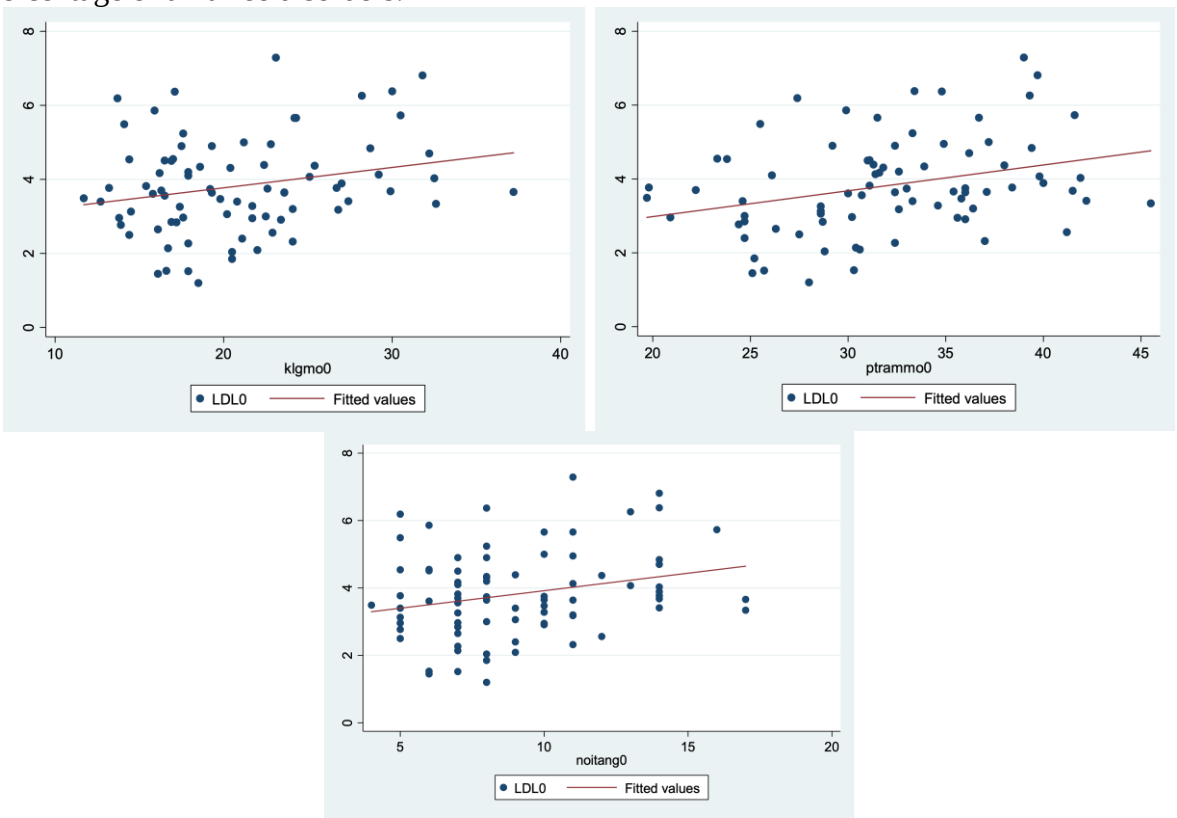
Obesity class II group had the highest total cholesterol and triglyceride, while overweight group had the highest triglyceride. There were not significant differences of lipid profile between groups (p>0,05)

Table 4. The percentage of high lipidemia among different nutritional status groups

Index	Overweight (n=41)	Obesity class I (n=31)	Obesity class II (n=8)	Total (N=80)	P
Higher TC (>5,2mmol/L)	27 (65,9)	13 (41,9)	6 (75,0)	46 (57,5)	0,073[a]
Higher LDL-C (>3,3mmol/L)	25 (61,0)	20 (64,5)	7 (87,5)	52 (65,0)	0,354[b]
Higher TG (>1.7mmol/L)	21 (51,2)	20 (64,5)	6 (75,0)	47 (57,5)	0,191[a]

[a]: Fisher exact test, [b]: Chi square test. Data expressed as n (%) by group obesity group

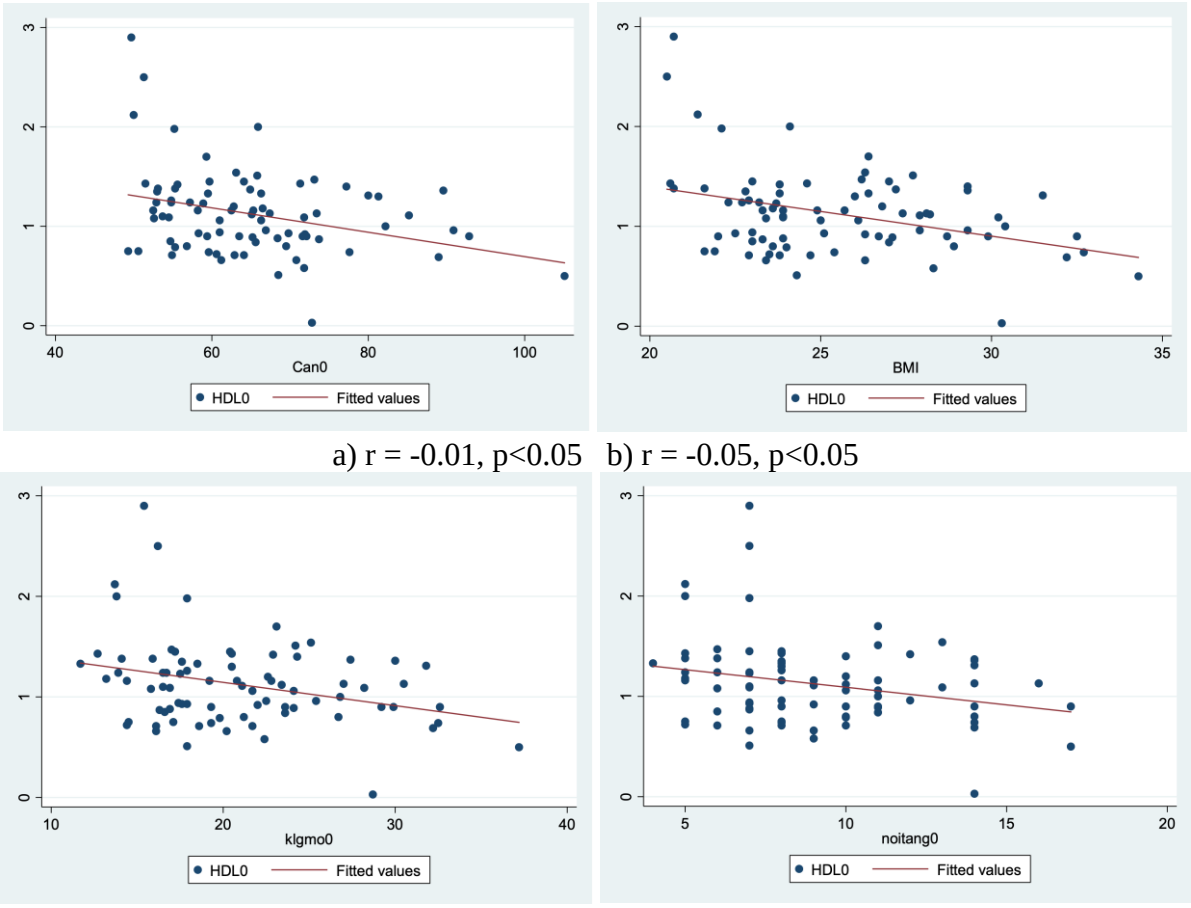
There were no differences of the proportion of higher TC, higher LDL-C, and higher TG between groups with different nutritional status. Obesity class II group had the highest percentage of all three disorders.



a) r=0.05, p<0.05b) r=0.07, p<0.05c) r=0.1, p<0.05

Figure 1. The association between LDL cholesterol and body fat mass (a), percent body mass (b) and visceral fat (c).

The LDL-C index was positively correlated with body fat mass, body fat percentage, and visceral fat index (r>0). These association were significantly (p<0.05)



a) r = -0.01, p<0.05 b) r = -0.05, p<0.05

c) r = -0.02, p<0.05d) r = -0.04, p<0.05

Figure 2. The association between HDL cholesterol and weight (a), BMI index (b), body fat mass (c), and visceral fat (d) (p<0.05)

The HDL-C index was negative correlated with weight, BMI, body fat mass, and visceral fat index (r<0). These association were significantly (p<0.05)

IV. DISCUSSION

Our study is one of the few studies in Vietnam to characterize dyslipidemia in overweight and obese adults aged 40 to 60 in Hanoi. The finding showed that the proportion of increase in total cholesterol was 57,5%, the percentage of high LDL cholesterol was 65,0%, and the rate of high triglyceride was 58,8%. These dyslipidemia percentages were concerning for the general public's health.

The rate of dyslipidemia in our study was also higher than WHO's statistics. According to WHO report, the prevalence of hypercholesterolemia in the community can range from 5-53% in the community for men and ranges from 4-40% for women [3]. Thus, for the overweight and obese population as in this study, the rate of hyperlipidemia is relatively high. Cardiovascular disease is the leading cause of death and disability in many countries around the world. Many theories have been suggested that this condition may be due to the rapid increase in cardiovascular disease risk factors, one of them was poor nutritional habits and inactivity, leading to an

increased incidence of overweight and obesity worldwide [4]. Changes in body composition have been shown to be more important than weight loss in reducing the associated risks of death and disability. Evidence suggests that a high body fat percentage increases the risk of hypertension, cardiovascular diseases, and type 2 diabetes. Women with a high waist-to-hip ratio and high visceral fat have an increased risk of death. because of cardiovascular disease. Therefore, assessment of body composition and fat distribution is very important. In our study, there was also a positive correlation between the high body fat percentage and the LDL cholesterol.

Measurement of BMI is one of the most common methods for diagnosing overweight and obesity and is directly related to the risks of disability and death. Epidemiological evidence suggests that abdominal obesity, as measured by waist/hip ratio, is also valuable in predicting insulin resistance, dyslipidemia, and other associated health risks related to overweight and obesity. In addition to BMI and waist/hip ratio, how other body composition metrics relate to health risks remains a big question for researchers. Some studies have shown that body fat percentage is a better discriminator for cardiovascular diseases than conventional anthropometric indices, but others suggest a role for percentage. Body fat is only comparable to other metrics. But in our study, BMI index was only founded to associated with HDL cholesterol

In our study, a new technique was applied with the InBody 370 machine, which can accurately analyze the amount of general fat, visceral fat and % visceral fat, muscle mass, bone. This is an easy and non-invasive technique that gives more reliable results than BMI. In fact, BMI does not distinguish between weight gain due to muscle or fat gain and causes misunderstanding if the subject is a muscle-dominated GYM, or a sedentary housewife but very high in fat.

For visceral fat index, some studies have shown that there is a relationship between total cholesterol and LDL-C and visceral fat status [5]. Visceral fat has been shown to be strongly associated with insulin resistance, atherosclerotic dyslipidemia (increased triglycerides, decreased HDL-C, and decreased LDL-C molecular size), hypertension, and proinflammatory status [6]. Reducing visceral fat has been shown to increase HDL, increase LDL and HDL molecular size, and decrease triglycerides[7]. In our study, visceral fat was correlated with both LDL - C and HDL-C.

The imbalance between daily calorie intake and expenditure as well as reduced physical activity are two of the numerous risk factors for overweight and obesity that have drawn the greatest attention from research. Consuming energy-dense food, like confectionaries, sugars, soft drinks, fats, and alcohol, were highly correlated with obesity and chronic diseases. Physical inactiveness, watching television or prolonged screen time, short sleep duration or shift work, stress, obesogenic environment (urbanization and industrialization), smoking, and frequent use of a taxi for transportation were determinant factors for overweight/obesity. For our ongoing study to reduce overweight/obesity and dyslipidemia in middle-aged and older persons, improving nutrition and raising activity levels are additional topics of interest.

V. CONCLUSION

The percentage of total cholesterol, high LDL cholesterol and triglyceride among overweight and obese people in Hanoi were high (57,5%, 65,0% and 58,8%, respectively). Some body composition indexes might have correlation with blood lipid but further studies need to be done to confirm these correlation.

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