Original Research

FACTORS ASSOCIATED WITH NUTRITIONAL STATUS OF INPATIENTS WITH TYPE 2 DIABETES AT HANOI MEDICAL UNIVERSITY HOSPITAL, 2020

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ABSTRACT

Aims: To identify factors associated with nutritional status of inpatients with type 2 diabetes.

Methods: A cross-sectional study was conducted on 97 inpatients with type 2 diabetes at the Department of Endocrinology and Respiratory, Hanoi Medical University Hospital, in 2020.

Results: The rates of overweight-obesity and abdominal obesity were 22.7% and 55.7%, respectively. The patients with secondary education or less had a 3.2 times and 10.6 times more likely to be overweight-obese and abdominal obesity, respectively, compared with the patients with higher education. Women were 2.8 times more likely to have abdominal obesity than men. Patients with physical inactivity or infrequent physical activity had a 2.5 times more likely to have abdominal obesity compared with patients with frequent physical activity. Patients who abuse alcohol were 3.7 times more likely to be overweight -obese than those who did not abuse alcohol.

Conclusion: High rates of overweight-obesity and abdominal obesity were found in inpatients with type 2 diabetes in the Department of Endocrinology and Respiratory. Education level and alcohol abuse were significantly associated with overweight-obesity. Gender, education level, and physical activity level were factors associated with abdominal obesity in patients with type 2 diabetes.

Keywords: type 2 diabetes, associated factors, Hanoi Medical University Hospital.

I. INTRODUCTION

Type 2 diabetes mellitus (T2D) is a heterogeneous metabolic disorder characterized by hyperglycemia due to defects in insulin secretion, insulin action, or both. Chronic elevation of glucose causes disturbances in carbohydrate, protein, and lipid metabolism, leading to damage to many different organs, especially the heart and blood vessels, kidneys, eyes, and nerves [1].

The disease tends to increase rapidly and cause severe consequences. According to a report by the International Diabetes Federation, an estimated 463 million people have diabetes in 2019 and this number is expected to reach 578 million by 2030 and 700 million by 2045 [2].

In treatment of diabetes, beside adherence to medication and appropriate exercise regimen, proper nutrition is an indispensable factor. Changes in society, culture, economy, and information technology significantly affect nutrition,

especially in developing countries like Viet Nam. The traditional high-carbohydrate, low-fat and high-fiber diet has been altered by a high-fat, high-calorie, and low-fiber diet. Moreover, urbanization and a sedentary lifestyle that contributes to excess energy intake is the major factor influencing the increased incidence of diabetes. Therefore, the study was carried out to identify factors associated to nutritional status of patients with T2D in order to give appropriate treatment in hospital.

II. METHODS

2.1. Study design and subjects

This cross-sectional study recruited subjects aged 18 years or older with T2D and inpatient treatment at the Department of Endocrinology–Respiratory Medicine, Hanoi Medical University Hospital in 2020.

Exclusion criteria: Subjects with diabetes under 6 months or severe and acute complications (coma, brain stroke) or pregnant women.

2.2. Sample size and subject selection

The sample size was estimated using the formula:

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

- *n*: number of subjects
- $Z_{(1-\alpha/2)} = 1.96$ with $\alpha = 0.05$
- d = 0.10: precision
- *p* = 0.272 (rate of overweight and obesity in T2D patients according to

previous study at the National Hospital of Endocrinology in 2017–2018 [3]). Estimated sample size with 10% non-response: *n* = 76. Actually collected sample were 97 subjects.

Sampling method: Subjects were continuously recruited from a list of T2D patients hospitalized in 48 hours, who met the inclusion and exclusion criteria.

2.3. Data collection

Directly interviewing subjects was used to collect information including age, gender, education level, occupation, lifestyle characteristics (smoking and alcohol consumption, physical activity), based on a pre-designed set of questions.
- *Nutritional status* was classified using BMI cut-offs (kg/m^2) according to the

criteria for the Asians [4]: normal (18.5–22.9), chronic energy deficiency (<18.5), overweight (23.0–24.9), and obesity (≥25.0).

- *Waist circumference* was grouped as normal (≤ 90cm in men and ≤ 80cm in

women) and abdominal obesity (> 90cm in men and > 80cm in women) [5].

- Alcohol abuse:

The amount of alcohol and/or beer consumed by one subject was calculated by the number of alcohol units/day (1 alcohol unit equivalent to 350ml of beer, or 50ml of spirits, or 150ml of wine). Subjects were considered to be abusing alcohol if they consumed ≥ 3 units per day for men and ≥ 2 units per day for women [6] .

- Physical activity:

+ Subjects are assessed as regular physical activity if exercise ≥ 30 minutes/day, 5 days/week; equivalent to 150 minutes/week without skipping exercise > 2 days.

+ Subjects were assessed as irregular physical activity (infrequent or inactive) if exercise <30 minutes/day or not enough 5 days/week [7, 8].

- Habit of smoking: according to World Health Organization in 1996, tobacco addiction refers to smoke continuously for ≥ 2 years and ≥ 5 cigarettes per day [9].

2.4. Statistical analysis

Data were entered using Epidata 3.1 software and analysed using SPSS 16.0 software. The association between factors (age, gender, etc.) and the nutritional status of the patients was examined by Chi-square and Fisher's exact test, and *p*-value and odds ratio (OR) with 95% confidence were reported.

2.5. Ethical consideration

The research proposal was approved by the Scientific Council of the Institute of Preventive Medicine and Public Health Training - Hanoi Medical University (Decision No. 4752/QD-HYT on October 23, 2020). Research subjects were explained specifically about the purpose and content of the research and voluntarily participate. All subject information was kept confidential and used only for research purposes and to provide feedback to the Hospital.

III. RESULTS

Table 1. *General information of the study subjects (n = 97)*

Information		*n*	%
Gender	Male	45	46.4
	Female	52	53.6
Age (years)	< 40	6	6.2
	40 – 59	27	27.8
	≥ 60	64	66.0
Education	Elementary school	41	42.3
	Secondary school	21	21.6
	High school	19	19.6
	College/University	16	16.5

Table 1 shows that out of a total of 97 patients participating in the study, 46.4% were men and 53.6% were women. The average age of the subjects was 63.5 ± 13.4 years, in which the patients over 60 years old accounted for the highest proportion (66%). Most of the subjects had elementary education level (42.3%).

The average BMI and waist circumference of the subjects were 22.8 ± 2.8 kg/m^2 and 85.6 ± 11.4 cm, respectively. The rates of overweight-obesity and abdominal obesity were 22.7% and 55.7%, respectively (Table 2).

Table 2. *Nutritional status of the study subjects (n = 97)*

Variables	n	%
BMI classification		
Chronic energy deficiency	5	5.2
Normal	70	72.1
Overweight – Obesity	22	22.7
Waist-circumference classification		
Normal	43	44.3
High (abdominal obesity)	54	55.7

Table 3. *Factors associated with overweight-obesity in the patients (n = 97)*

Characteristics	Overweight - Obesity	CED - Normal	OR	95% CI	p
Gender					
Male	9 (20.0)	36 (80,0)	0.75	0.3 – 2	0.56 [*]
Female	13 (25.0)	39 (75.0)			
Age group					
> 60 years	16 (25.0)	48 (75.0)	2.1	0.7 – 5.9	0.159 [*]
≤ 60 years	6 (18.2)	27 (81.8)			
High school education					
No	18 (29.0)	44 (71.0)	3.2	1.1 – 5.3	0.038 [**]
Yes	4 (11.4)	31 (88.6)			
Regular physical activity					
No	13 (28.3)	33 (71,7)	1.8	0.7 – 4.8	0.21 [*]
Yes	9 (17,6)	42 (82.4)			
Tobacco addiction					
Yes	1 (10,0)	9 (90.0)	0.35	0.4 – 2.9	0.35 [**]
No	21 (24.1)	66 (75.9)			
Abuse of alcohol					
Yes	8 (44.4)	10 (55.6)	3.7	1.2 – 11.1	0.015 [*]
No	22 (22.7)	75 (77.3)			

[*] χ^2 test, [**] Fisher's exact test. Data are n (%)

Table 3 shows factors associated with overweight-obesity in the patients with type 2 diabetes. Patients with less than high school education had a 3.2 times higher odd of overweight and obesity than patients with a high school education or higher (*p* = 0.038). Patients who abuse alcohol had a odd of being overweight-obese 3.7 times higher than that of no alcohol abuse (*p* = 0.015).

Table 4. *Factors associated with abdominal obesity in the patients (n = 97)*

Characteristics	Abdominal obesity	Normal	OR	95% CI	*p*
Gender					
Male	35 (67.3)	17 (32.7)	2.8	1.2 – 6.4	0.013 *
Female	19 (42.4)	26 (57.6)			
Age group					
> 60 years	36 (56.2)	28 (43.8)	1.1	0.5 – 2.5	0.9 *
≤ 60 years	18 (54.5)	15 (45.5)			
High school education					
No	47 (75.8)	15 (24.2)	10.6	4 – 28.2	< 0.01 *
Yes	8 (22.9)	27 (77.1)			
Regular physical activity					
No	31 (67.4)	15 (32.6)	2.5	1.1 – 5.8	0.04 *
Yes	23 (45.1)	28 (54.9)			
Tobacco addiction					
Yes	6 (60.0)	4 (40,0)	1.2	0.3 – 4.6	0.77 **
No	48 (55.2)	39 (44.8)			
Abuse of alcohol					
Yes	11 (61.1)	7 (38.9)	1.3	0.5 – 3.7	0.60 *
No	43 (54.4)	43 (44.3)			

*χ^2 test, **Fisher's exact test. Data are n (%)

Table 4 shows factors associated with abdominal obesity in the patients with type 2 diabetes. Women had a 2.8 times higher odd of abdominal obesity than men (*p* = 0.013). Patients with less than high school education had a 10.6 times higher odd of abdominal obesity than patients with high school education (*p* < 0.01). The patients with inactivity or infrequent physical activity had a 2.5 times higher odd of abdominal obesity than patients with regular physical activity (*p* = 0.04).

IV. DISCUSSION

Similar to the studies of the National Institute of Nutrition in the community, the prevalence of overweight and obesity tends to increase gradually with age and is higher in women. In our study, overweight and obesity were higher in women than in men (25% vs. 20%). The age group 60 years and older had more overweight-obesity than the group under 60 years old (25% vs. 18.2%), different from the research of Nguyen Thi Dinh in 2016 where the proportion of overweight and obesity decreases gradually by age group which were 22.2% at age 18–40, 16.4% at agegroup 40–65 and 16.1% at age 65 and above [10]. Thus, there may be epidemiological changes in overweight and obesity among groups of study subjects. This alarms the need for a plan to propagate and educate people with diabetes in the future about proper diet, lifestyle and exercise, prevention of complications of T2D as well as prevention of overweight and obesity. Although BMI is an important indicator to assess the degree of overweight and obesity, BMI does not reflect the distribution of body fat. Waist circumference is a simple indicator of visceral fat levels, especially for people of low or average weight. An increase in waist circumference is strongly associated with an increased risk of diabetes [11] and other metabolic disorders such as hypertension, cardiovascular disease, cancer, etc. even when BMI remains within the normal range [12] . In our study, the average waist circumference of the patient was 85.6 ± 11.4 cm, similar to the study of Pham Thi Thuy Huong at Quang Nam Central General Hospital in 2016–2017 showing that the waist circumference average was 85.6 ± 7.9 cm [13] .

The level of education is the basic to create a knowledge base, thereby influencing the subject's attitude, and ultimately, the subject's practice about the disease**.** Research by Vu Thi Tuyet Mai [14] on 131 T2D outpatients treated at Kien Giang General Hospital showed a relationship between the knowledge and practice of the study subjects' diet. Patients with good knowledge about diet had a 2.28 times higher odd of good practice (OR = 2.28, 95% CI: 1.61–3.23) compared to the group of subjects with no knowledge. Patients who can't read/write had a knowledge rate of 0.36 times (OR = 0.36, 95% CI: 0.19–0.69) compared to patients with high school education or higher. Primary school level patients had the odd of gaining knowledge of 0.6 times (OR = 0.6, 95% CI: 0.44–0.83) compared to patients with lower secondary school level or higher. In our study, illiterate/grade 1/grade 2 patients had a 3.2 times (OR = 3.2, 95% CI: 1.1–5.3, $p = 0.038$) higher odd of overweight and obesity and 10.6 times (OR = 10.6, 95% CI: 4.0–28.2, $p < 0.01$) higher odd of abdominal obesity than patients with education level 3 or higher. Low level of education is a barrier in absorbing new knowledge and changing bad habits. Lack of knowledge leads to incorrect attitudes and practices about the disease, thereby affecting the patient's treatment results. Therefore, it is necessary to strengthen communication, education, and nutrition counseling to improve knowledge about proper nutrition for people with type 2 diabetes, especially focusing on those with low education level.

Our study also showed that: patients with alcohol abuse had a 3.7 times higher odd of being overweight - obese

than the group without alcohol abuse (OR= 3.7, 95% CI=1.2–11.1, p = 0.015). Similar to our study, a study in China in 2014 has shown that patients with a habit of using alcohol and beer had higher odd of obesity and abdominal obesity [15]. According to the research results of Kimm SY et al., people who were physically active for at least 30 minutes/day and 5 days/week had lower BMI than those who were less physically active [16]. The results of our study are similar to Kimm's when patients with inactivity or infrequent physical activity had a 2.5 times higher odd of abdominal obesity than patients with regular physical activity (OR (95%CI) = 2.5 (1.1–5.8), p = 0.04). Health professionals recommend that patients should engage in moderate-intensity physical activity of at least 30 minutes a day, such as jogging, cycling or similar exercises appropriate to their lifestyle and physical condition. of the patient. If combined with intense exercises at least 2–3 times a week, it will bring more effects to health and body shape, such as participating in fitness classes, playing tennis, swimming wading, skiing, or similar exercise, depending on the patient's preference [17].

The present study has a limitation. It has not used multivariate logistic regression to test for the association of factors with nutritional status of patients. The cross-sectional study cannot give any cause-effect conclusion.

VI. CONCLUSION

A study on 97 T2D inpatients treated at the Department of Endocrinology–Respiratory Medicine, Hanoi Medical University Hospital in 2020 showed the high rates of overweight-obesity (22.7%) and abdominal obesity (55.7%).

Education level and alcohol abuse were significantly associated with overweight-obesity; gender, education level, and physical activity level were factors associated with abdominal obesity in patients with type 2 diabetes.

Recommendations

It is necessary to strengthen communication about healthy living habits for patients, especially about physical activity and alcohol abuse. Pay attention to subjects with low education to prevent overweight - obesity and abdominal obesity in people with type 2 diabetes.

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