

# The Association of Family Support and Health Education with the Status of Overweight and Obesity in Patients with Type 2 Diabetes Receiving Outpatient Treatment: Evidence from a Hospital in Vietnam

Health Services Insights  
Volume 14: 1–8  
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DOI: 10.1177/11786329211014793



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**ABSTRACT:** This study aims to establish the association of family support and nutrition and health education by health workers with the status of overweight and obesity among patients with type 2 diabetes mellitus (T2DM) receiving outpatient treatment at a hospital. This descriptive cross-sectional study was conducted on 280 outpatients with type 2 diabetes at Bach Mai hospital from December 2019 to September 2020 by using assessments of anthropometric parameters and examining dietary habits and family support, as well as nutrition and health education and counseling by health workers. The prevalence of overweight and obesity in patients with T2DM was 35.4% (51.2% in men and 22.2% in women;  $P < .05$ ). Patients never or rarely supported by their families or counseled by health workers were more vulnerable to overweight and obesity than those who frequently received support and counseling (OR = 1.41 vs 2.06;  $P < .05$ ). Family support and counseling from health workers play a crucial role in promoting and sustaining healthy dietary habits and proper physical exercise in diabetic patients, contributing to their lowered risk of overweight and obesity.

**KEYWORDS:** Type 2 diabetes, overweight, obesity, family support, nutritional and health education and counseling, Vietnam

**RECEIVED:** December 30, 2020. **ACCEPTED:** April 13, 2021.

**TYPE:** Critical Issues in Health Services in Vietnam - Original Research

**FUNDING:** The author(s) received no financial support for the research, authorship, and/or publication of this article.

**DECLARATION OF CONFLICTING INTERESTS:** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## Introduction

Diabetes is a chronic disease related to nutrition and lifestyles, which proves to rapidly increase in many countries worldwide. In 2010, about 285 million adults aged 20 to 79 years throughout the world were estimated to suffer from this disease, rising to 425 million in 2017 and continuing to experience an exponential upward trend in developing countries.<sup>1,2</sup>

Vietnam has the largest number of patients with type 2 diabetes mellitus (T2DM) in the South-East Asia Region. In particular, in 2015, the national prevalence of this disease was 4.1%, while pre-diabetic patients aged 18 to 69 years accounted for 3.6%. In 2017, this disease was found among up to 3.53 million Vietnamese residents.<sup>3,4</sup>

Many studies in Vietnam and other countries worldwide indicated that a large proportion of patients with T2DM developed overweight and obesity. According to a study by Wakili et al<sup>5</sup> in Abuja, only 25% of the study participants had a BMI within the normal range, 20.8% of them were overweight, and 52.5% were obese, including 27% with class III obesity (BMI > 40). The proportions of obesity among diabetic patients were relatively high in studies conducted in Kenya (overweight: 50.9%; obesity: 24.9%), India (overweight: 24%; obesity: 52%), and Malaysia (overweight and obesity: 86.5%).<sup>6–8</sup> Another study also carried out in India showed that 65% of the diabetic patients had a waist-to-hip ratio (WHR) beyond the normal range, including 100% of the female patients with a WHR > 0.8 and 37.8% of male ones with a WHR > 0.95.<sup>7</sup>

In Vietnam, Vo et al<sup>9</sup> reported that 30.1% of patients with diabetes or a high fasting blood sugar level had a BMI > 25. Studies on T2DM patients in several other provinces in Vietnam also pointed out that half of these patients suffered from overweight and obesity (51.5% in Ben Tre, 54.4% in Thanh Hoa, and 65.4% in Quang Ninh).<sup>10–12</sup> Some other studies in Vietnam also showed that a high proportion of T2DM patients had abdominal obesity, ranging from 50% to 90%.<sup>13–15</sup>

Overweight and obesity may have detrimental effects on T2DM treatment outcomes by affecting the endocrine system and metabolism, resulting in impaired glucose tolerance (IGT) and insulin resistance in the body. Insulin resistance is the main reason why blood sugar levels in diabetic patients increase and become hard to control over time, leading to their high risk of blindness, kidney failure, coronary artery disease (CAD), and neurological diseases.<sup>16,17</sup> Furthermore, a larger waist circumference, or increased visceral fat, profoundly impacts fat cells and is positively associated with insulin resistance.<sup>17</sup> Therefore, the regulation of body weight and abdominal weight plays a crucial part in blood sugar control and diabetes treatment.

Several studies worldwide demonstrated the effects of familial support and nutritional education on the status of overweight and obesity in T2DM patients. Interventions that involve support from families and society achieved positive results as they helped improve dietary and physical exercise patterns suitable for patients, thereby enhancing their nutritional status and



contributing to blood sugar control and better treatment outcomes.<sup>18-20</sup>

In Vietnam, although some studies have been conducted to explore the nutritional status of diabetic patients, they are only limited to describing the patients' nutritional status or dietary patterns or analyzing the association of factors such as dietary patterns, treatment adherence, knowledge, lifestyles, and daily routines with the status of overweight and obesity in diabetic patients. Those studies have not examined the role of families or communication and counseling by health workers in the risk of overweight and obesity among these patients.<sup>9,10,13,21</sup>

This article aims to assess the association of familial support and nutrition and health education and counseling from health workers with the status of overweight and obesity in T2DM patients to provide further scientific evidence which is expected to serve as the basis for recommendations for improving the nutritional status of T2DM patients to enhance the effectiveness of their treatment.

## Materials and Methods

### Study design

This cross-sectional study was carried out on T2DM outpatients in Bach Mai hospital—a hospital-based in Hanoi and considered to be one of the largest special rank hospitals in Vietnam—from December 2019 to September 2020 (data were collected from May 2020 to June 2020). Patients were excluded from the study at the study time if expecting a baby, having any comorbidities, such as mental disorders, depression, or not being able to control their own behavior.

### Sampling

In this study, we used the sample size for 1 proportion, where  $Z_{1-\alpha/2}$  as the 95% confidence interval ( $\alpha=0.05$ ) had a value of 1.96, the estimated proportion of T2DM patients suffering from overweight and obesity  $P=.533$ ,<sup>13</sup> and the absolute precision required  $d=0.06$ . The sample size ( $n$ ) was calculated to be 266. With an estimated 5% of diabetic patients refused to participate in the study, the final sample size consisted of 280 patients.

About thirty patients with T2DM had health checks and outpatient treatment at Bach Mai hospital daily. To ensure the quality of data collection, the study applied the convenient sampling method to select ten patients per day whereby those who met the study's criteria had their anthropometric parameters measured and were then interviewed. The sampling process ceased when the sample was sufficiently taken.

### Data collection

Data were collected from May to June 2020 when patients had routine health checks at the hospital. After the patients had their health checked, the research team introduced the study to them and asked for their consent to voluntary participation in

the study. The team used standardized tools to measure the weights, heights, waist circumferences, and hip circumferences of those who agreed to join the study. These parameters were then recorded in anthropometric data collection forms. The research team then interviewed the patients to explore factors related to overweight and obesity. The laboratory test parameters, namely fasting blood sugar levels and HbA1C levels, were collected from the patients' medical records in their most recent routine health checks.

By the end of each day, all questionnaires were cross-checked to identify and timely recollect missing information.

## Measures

### Outcome variables

- A patient is considered to suffer from overweight and obesity if having a BMI  $\geq 25$ <sup>22</sup>

### Explanatory variables

- Demographic information of the study participants covered age, gender, occupation, educational level, residence, average income, diabetes duration, and the duration of diabetes treatment; complications, fasting blood sugar levels, and HbA1c levels.
- A normal waist circumference (WC) for females is  $<80$  cm, while a high WC is  $\geq 80$  cm. In males, a healthy WC is  $<90$  cm, and a high WC is  $\geq 90$  cm.<sup>39,23</sup>
- An ideal waist-to-hip ratio (WHR) is  $<0.9$ , and a high WHR is  $\geq 0.9$  for males. For females, the ideal WHR is  $<0.8$ , whereas a WHR  $\geq 0.8$  is considered to be high<sup>23</sup>
- The frequency of consuming foods recommended and not recommended for diabetic patients within 1 month before the study was divided into 2 levels (Frequently and never/rarely).
- The group of variables concerning behavior and lifestyle: doing exercise (frequently, rarely/never), smoking (yes/no), and drinking alcoholic beverages (yes/no).
- Variables related to family support (reminding the patient to take medications, reminding the patient to do physical exercise, and preparing meals) were divided into 2 levels: frequently, and rarely/never.
- Variables related to health education (receiving counseling from health workers [frequently/rarely/never] and participation in group communication at hospital [frequently/rarely/never]).

### Data analysis

After having been collected, data were cleansed, then entered using Epidata 3.1 and finally analyzed with SPSS 20.0. Frequencies ( $n$ ) and proportions (%) were employed to present

categorical variables, whereas means and standard deviations were used to display quantitative variables. Univariate and multivariate logistic regression analyses with “Enter” method (enters all variables into the equation at the beginning) were used to explore the associations of independent factors with the status of overweight and obesity in patients with T2DM.

### *Ethical considerations*

The study was approved by the Ethical Committee of Hanoi University of Public Health (according to Decision No. 54/2020/YTCC-HD3). The research team obtained approval to conduct the study from the Hospital Director Board before the data collection was undertaken. Each participant was given a consent form and asked to read it carefully and sign it before the interview started, they could withdraw from the study at any time without any consequences. At the end of each interview, a counseling session about nutrition for the diabetic patient was provided to the participant by the research team. The study results were to be disseminated to relevant stakeholders to inform policies and interventions to improve the health of diabetic patients and paved the way for future studies.

### **Findings**

Table 1 shows that male patients and female patients were 45.4% and 54.6%, respectively;  $P > .05$ ), and the age of the study participants was 61.1 years. The study participants had relatively high education levels, with 36.4% having a bachelor's degree. About one-third of all participants were retired (37.9.5%) and 27.7% of them were employees. Most of them were married (80.0%) and resided in urban areas (83.2%), while more than half of them (57.5%) had an income within 5 to <10 million Vietnam dong per month.

Patients suffering from diabetes and receiving diabetes treatment for  $\leq 5$  years made up 63.9% of all participants. The rate of complications was high (87.9%). Most patients (84.6%) had a fasting blood sugar level of  $\geq 7$  mmol/L (77.5%) and an HbA1C level of  $\geq 6.5\%$  in their most recent medical examinations. The rate of patients who adhered to medication was low (47.9%)

Table 2 shows that the mean BMI was 24.3, in which the figure for men was significantly higher than that for women (25.4 and 23.4, respectively;  $P < .001$ ). The prevalence of overweight in all study participants, regardless of gender, was 35.4%; however, the figure in men was more than twice as high as that in women (51.2% vs 22.2%;  $P < .001$ )

Regarding abdominal fat, two-thirds of female patients (71.9%) had a high waist circumference, and 73.9% had a high WHR. These figures statistically significantly exceeded those in male patients ( $P < .05$ ).

Table 3 shows that in the univariate models, factors statistically significantly associated with the status of overweight and obesity in diabetic patients included gender, use of recommended foods, use of non-recommended foods, physical exercise, family support, counseling from health workers, and

participation in group communication sessions at the hospital ( $P < .05$ ). However, when those factors were included in the multivariate model, only 4 factors, namely the use of recommended foods, physical exercise, family support, and counseling from health workers, had a statistically significant association with the status of overweight and obesity in diabetic patients. The patients who rarely or never consumed recommended foods, rarely or never did physical exercise, rarely or never received support from their families, or did not receive counseling from health workers were more likely to suffer from overweight and obesity than their counterparts in the corresponding groups (OR: 3.39; 2.77; 1.41, and 2.06;  $P < .05$ ).

### **Discussion**

#### *The status of overweight and obesity in patients with type 2 diabetes mellitus*

The status of overweight and obesity plays an important role in controlling blood sugar levels in patients with T2DM. Patients with a high waist circumference have increased adipose tissue mass, which interferes with the function of fat cells and leads to heightened insulin resistance, resulting in a higher rate of diabetic complications.<sup>24,25</sup>

The prevalence of overweight and obesity in our study was lower than in other studies conducted in other countries worldwide, for example, a study in Abuja in 2019 (25%) and another study in India (21%).<sup>5,7</sup> The difference in the nutritional status of T2DM patients can be explained by the divergence in customs, cultures, and lifestyles of citizens in different countries. Similarly, the prevalence of overweight and obesity in our study was lower than those in 2 other studies in Vietnam conducted in 2017 and 2018.<sup>13,26</sup> This may be because these 2 studies used 2 different nutritional status classifications according to BMI, 1 developed by the International Diabetes Institute (IDI) and the other by the WPRO (BMI  $\geq 23$  is considered as overweight-obesity), while our study referred to the WHO classification of overweight and obesity (BMI  $\geq 25$ ).

However, the prevalence of overweight and obesity in our study was higher than in studies by Vo et al<sup>9</sup> and Le<sup>27</sup> implemented in certain hospitals in Vietnam (30.1%, and 17.5%, respectively). A possible explanation for this difference is that our study was conducted in one of the largest hospitals in Vietnam whose patients may have better economic conditions or suffer from more serious T2DM than those in previous studies. This might lead to our study's having a higher prevalence of overweight and obesity, compared to other studies.

#### *Factors associated with the risk of overweight and obesity*

The univariate and multivariate analyses in our study indicate statistically significant associations with family support and nutrition education and counseling by health workers ( $P < .05$ ). The study results show that the consumption of recommended foods and engagement in physical activity were statistically

**Table 1.** General information of study participants (n=280).

INFORMATION		FREQUENCY (N)	RATE (%)
Age*	<40	10	3.6
	40-49	35	12.5
	50-59	63	22.5
	≥60	172	61.4
	Total	280	100
	Mean age (X ± SD)	61.1 ± 11.0	
Gender	Male	127	45.4
	Female	153	54.6
Education level*	Have not completed high school education	46	16.4
	Completed high school education	66	23.6
	Intermediate/college education	66	23.6
	Graduate and postgraduate education	102	36.4
Occupation*	Having employment in agriculture, forestry, and fishery	30	10.7
	Blue-collar workers, white-collar workers, civil servants	77	27.5
	Having employment in services and business	63	22.5
	Retired	106	37.9
	Others	4	1.4
Marital status*	Single	7	2.5
	Married	224	80.0
	Divorced/separated/widowed	49	17.5
Residence*	Rural	47	16.8
	Urban	233	83.2
Monthly income*	<5 million dongs	48	17.1
	5-<10 million dongs	161	57.5
	10-15 million dongs	60	21.4
	>15 million dongs	11	3.9
Duration of type 2 diabetes*	≤5 years	179	63.9
	>5 years	101	36.1
Duration of type 2 diabetes treatment*	≤5 years	179	63.9
	>5 years	101	36.1
Presence of complications*	Yes (cardiovascular complications, or those related to eyes, kidneys, and other bodily organs)	246	87.9
	No	34	12.1
Fasting blood sugar level*	<7 mmol/L	63	22.5
	>7 mmol/L	217	77.5
HbA1c level*	<6.5%	43	15.4
	>6.5%	237	84.6
Medication adherence*	Always take medications according to indications	134	47.9
	Sometimes forget to take medications	90	32.1
	Frequently forget to take medications	56	20.0

\*P &lt; .001.

**Table 2.** The status of overweight and obesity in study participants (n=280).

INFORMATION	MALE (N=127)	FEMALE (N=153)	TOTAL (N=280)
Weight (kg)	68.4 ± 7.8	57.2 ± 7.5	62.3 ± 9.5
Height (cm)	164.9 ± 6.1	155.8 ± 4.9	159.9 ± 7.1
BMI (kg/m <sup>2</sup> )*	25.4 ± 2.4	23.4 ± 3.0	24.3 ± 2.9
Prevalence of overweight and obesity (BMI ≥25) (n, %)*	65 (51.2)	34 (22.2)	99 (35.4)
Waist circumference (cm)	89.0 ± 7.5	85.1 ± 9.8	86.9 ± 9.0
Prevalence of high waist circumference (%) (≥80cm for women; ≥90cm for men)*	59 (46.5)	110 (71.9)	169 (60.4)
Waist-to-hip ratio (WHR)	0.9 ± 0.1	0.9 ± 0.1	0.9 ± 0.1
Prevalence of high WHR (%) (>0.9 for men; >0.85 for women)**	72 (56.7)	113 (73.9)	185 (66.1)

\*P &lt; .001. \*\*P &lt; .05.

**Table 3.** Associations of several factors with overweight and obesity.

		UNIVARIATE			MULTIVARIATE		
		OR	95% CI	P	OR	95% CI	P
Age	<60 years	–	–	–			
	≥60 years	0.73	0.44-1.20	.248			
Gender	Female	–	–	–	–	–	–
	Male	3.669	2.19-6.14	.001	0.137	0.01-1.49	.103
Education level	Intermediate/college/university	–	–	–			
	Completed high school education	0.789	0.47-1.30	.375			
Occupation	Civil servants/blue-collar workers/ white-collar workers, retired	–	–	–			
	Employees in agriculture, forestry, or fishery	0.904	0.40-2.01	1.00			
Marital status	Married	–	–	–			
	Single, divorced, separated, widowed	0.671	0.36-1.22	.212			
Residence	Urban	–	–	–			
	Rural	0.654	0.32-1.30	.246			
Monthly income	≥10 million dong	–	–	–			
	<10 million dong	0.622	0.35-1.08	.114			
Duration of type 2 diabetes	≤5 years	–	–	–			
	>5 years	1.02	0.61-1.69	1.000			
Duration of type 2 diabetes treatment	≤5 years	–	–	–			
	>5 years	1.070	0.64-1.78	.795			
Presence of complications	No	–	–	–			
	Yes	0.754	0.36-1.56	.450			
Fasting blood sugar level	<7mmol/l	–	–	–			
	≥7mmol/l	1.489	0.80-2.74	.232			

(Continued)

Table 3. (Continued)

		UNIVARIATE			MULTIVARIATE		
		OR	95% CI	P	OR	95% CI	P
HbA1c level	<6.5%	–	–	–			
	≥6.5%	1.158	0.58-2.31	.731			
Medication adherence	Yes	–	–	–			
	No	1.495	0.91-2.45	.133			
Consuming recommended foods	Frequently						
	Never or rarely	3.646	1.30-10.18	.014	3.39	1.03-11.15	.0444
Consuming non-recommended foods	Never or rarely	–	–	–	–	–	–
	Frequently	3.975	1.15-13.73	.029	3.21	0.78-13.1	.105
Doing physical exercise	Frequently	–	–	–	–	–	–
	Never or rarely	2.756	1.38-5.48	.004	2.77	1.25-6.12	.012
Use of cigarettes	No	–	–	–	–	–	–
	Yes	3.128	1.88-5.20	.0001	2.25	0.67-7.57	.188
Use of alcoholic beverages (e.g., wine or beer)	No	–	–	–	–	–	–
	Yes	3.246	1.94-5.43	.0001	0.155	0.01-2.13	.164
Receiving family support	Frequently	–	–	–	–	–	–
	Never or rarely	1.87	1.10-3.15	.01	1.41	1.26-2.62	.026
Receiving nutrition and health education and counseling from health workers	Frequently	–	–	–	–	–	–
	Never or rarely	3.11	1.62-5.95	.001	2.068	1.01-4.29	.042
Participating in group communication sessions at hospital	Frequently	–	–	–	–	–	–
	Never or rarely	1.82	1.1-2.99	0.024	1.30	0.72-2.37	0.381

significantly associated with the likelihood of being overweight and obese. More specifically, patients who rarely or never ate recommended foods and exercised were 3.39 and 2.77 times more likely to suffer from overweight and obesity than those who frequently consumed such foods and exercised, respectively ( $P < .05$ ). This might result from the influence of family support and counseling by health workers on the patients' dietary habits and exercise regime. Indeed, the patients who received care and support from their family, as well as instructions from health workers, tended to have better habits of eating and doing physical exercise. This result resembled those from other studies conducted worldwide.

Regarding family support, our study result was consistent with that of the study by Patel et al<sup>7</sup> conducted on 399 patients with T2DM (2012), in which they pointed out that the status of overweight and obesity in 77% of the patients receiving family support became less severe. In Vietnam, a study by Luu<sup>28</sup> also suggested increased family support to help patients improve their nutritional status and adherence to dietary patterns.

In terms of nutritional education and counseling for patients, a study in Nigeria showed that the risk of overweight and obesity among patients who were not provided with counseling was twice as much as that among those who received counseling.<sup>29</sup>

Several previous studies on how health education influenced patients with T2DM figured out the relationship between the patients' participation in a course on diabetes self-management education and their behavior change practices. Accordingly, the changes in eating- and exercise-related behaviors among those who participated in this course statistically significantly differed from those among patients who did not attend it. This result implies the importance of the participation in the health promotion and practice activities of the course that could prevent or delay potential diabetes complications among persons with T2DM, including doing physical exercise and choosing healthy foods, thereby reducing the severity of overweight and obesity and contributing to mitigating T2DM complications.<sup>18,19</sup> According to a systematic review of 19 randomized controlled trials enrolling 2319 patients with T2DM altogether, interventions often depended on health education to induce changes in individual behavior and self-management, aiming to equip patients with the knowledge and change their behavior. Interventions involving family and social support proved to achieve promising results in terms of controlling the patients' eating and exercise habits. This helped improve the patients' nutritional status and HbA1C levels after 3 months (–0.25% points (95% CI –0.40 to –0.11)).<sup>20</sup>

To sum up, family support and counseling from health workers have positive effects on T2DM patients' eating and exercise habits, thereby improving their status of overweight and obesity. As our study was conducted in Bach Mai hospital—one of the largest central-level hospitals, nutrition and health education, and counseling activities for patients have been well implemented. In particular, the hospital held nutrition and health education and counseling sessions regularly in combination with communication activities concerning overweight and obesity for patients with T2DM. This facilitates these patients' access to information about being overweight and obese and helps them gain a better understanding of overweight and obesity as well as T2DM. A good understanding of the disease and family support help T2DM patients to follow healthy dietary and exercise habits, thereby improving their nutritional status and health. These factors can be added to recommendations for managing diabetic patients.

### Study limitations

Our present study was conducted in Bach Mai hospital—a hospital at the central level, whose patients might have better economic conditions or suffer from diabetes of higher severity; hence, the prevalence of overweight and obesity among those patients may be greater than among those from other health facilities.

Furthermore, some questions in our study were retrospective by nature, which required patients to recall events or activities they had experienced, such as what they ate, drank, or exercised, while most of them were older people. This might lead to recall bias. Therefore, our present study consulted other data collection tools from previous studies to make proper adjustments to our questionnaire and trained our investigators thoroughly to collect data most accurately.

### Conclusions and recommendations

The prevalence of overweight and obesity among patients with T2DM was 35.4% (51.2% for men vs 22.2% for women;  $P < .05$ ). Compared to patients who frequently received support from their families or counseling from health workers, those who never or rarely did had a higher risk of being overweight and obese (OR=1.41 and OR=2.06, respectively;  $P < .05$ ). Family support and counseling from health workers play an important role in promoting and sustaining healthy eating and exercise patterns among patients with T2DM, contributing to lowering their risk of developing overweight and obesity.

### Acknowledgements

We would like to thank all patients for their enthusiastic participation in this study. We are grateful to the Boards of Bach Mai Hospital for agreeing and cooperating with us in data collection.

### Authors Contribution

Thanh Ha and Sinh led the design and conceptualization of the study, as well as the reporting of results. Thanh Ha and Thu Ha performed the analyses and contributed to the written manuscript. All authors read and approved the final manuscript.

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