https://doi.org/10.46389/rjd-2021-1008
www.rjdnmd.org

Rom J Diabetes Nutr Metab Dis
2021; volume 28, issue 1, pages 54-57

Original Research

Nutritional status and risk of diabetes mellitus type 2 among medical students

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Received: 4 June 2020 / Accepted: 22 February 2021

Abstract

Background and Aims: The phenomenon of the 21st century is a significant predominance of obesity in most countries. The metabolic effects of obesity (impaired glucose tolerance, type 2 diabetes mellitus (T2DM), hyperlipidemia, and hypertension) correlate more closely with abdominal obesity. **Purpose** is to investigate the features of nutritional status and the risk factors of the developing of T2DM in medical students. **Material and Methods:** 200 young medical students I-VI courses (according to WHO classification) were investigated. There were 140 Ukrainians and 60 - foreigners (Arabian). Physical examination (anthropometry), tonometry, anamnesis assessing, including data on the risks of the development of diabetes mellitus (DM) (Findrisk scale), and statistical methods were used. **Results:** Among the risk factors there are violations of the nutritional status, despite the students being sufficiently informed about the harmfulness of the use of fast food, alcohol consumption, insufficient physical activity (especially in Ukrainians), family history of type 2 diabetes mellitus (T2DM) (especially in foreigners) and having continuous stress were found to be the most significant. Almost most of foreign students consume alcohol and are smokers. That is a fairly high rate for medical students who are well aware of the harmfulness and consequences of alcohol abuse and smoking. Reducing the risk of developing T2DMand CVD is possible when changing modifiable risk factors, such as nutrition, physical activity, stress and deliverance of bad habits, such as smoking and drinking alcohol. **Conclusions:** 1. Most Ukrainian and foreign medical students have various risk factors of developing T2DM. Despite medical students being sufficiently informed about the harmfulness of consuming fast food, the risk factors were found to be one of the most significant. 3. Among risk factors of T2DMare excess weight and obesity as result of violations of the nutritional status, alcohol consumption, smoking (especially in foreign students), insufficient physical activity (especially in Ukrainian students) and family history of T2DM (especially in foreign students).

Keywords: medical students, obesity, risk factors, diabetes mellitus type 2, nutrition.

Background and Aims

The phenomenon of the 21st century is a significant predominance of obesity in most countries [10, 12]. Obesity is the most common risk factor for many serious medical problems that lead to decrease in the quality of life, a significant increase in morbidity and premature death [6, 8].

The American Association of Clinical Endocrinology and the American College of Endocrinology has proposed a new name for obesity in 2016, namely Adiposity-Based Chronic Disease. This name does not replace the term of "obesity", but it helps the doctor, regardless of specialty, to focus more upon the physio-pathological implications of excess weight [10].

At present it has been proved that adipocytes of various fat depots can differ in size and response to hormones [1, 5]. And the first proof is the fact that in men fat is deposited mainly on the abdomen whereas in women it is deposited in the lower torso. It is well known that the metabolic effects of obesity (impaired glucose tolerance, type 2 diabetes mellitus (T2DM), hyperlipidemia,

hypertension) correlate more closely with the obesity of the upper half of the body (so-called abdominal or android) than the lower (femoral) [3, 8–11].

The relationship of obesity with disorders of carbohydrate metabolism, including T2DM, continues to be of great interest, primarily because of the need to develop effective approaches to the prevention of target organs and cardiovascular and kidney damage, since to date, the existence of common mechanisms for the formation of cardiovascular complications and nephropathies of metabolic nature have been proved [2, 4, 7, 12]. **Purpose** is to investigate the features of nutritional status and the risk factors of the developing ofT2DM in medical students.

Material and Methods

A total of 200 young medical students, I-VI courses (according to WHO classification), were investigated. There were 140 Ukrainians and 60 - foreigners (Arabian). The average age was 21.0 (18.0; 25.0) years for Ukrainian students and 23.0 years (20.0; 29.0) for foreign students. Among the persons there were 67 men (47.8%) and 73 women (52.2%) - Ukrainian students; and 35 men (58.3%), and 25 women (41.7%) for foreign students.

The studies were conducted according to the developed program with careful evaluation of anamnestic, general clinical, and laboratory parameters.

An assessment was made from the history of life, the family history of diseases, the cardiovascular system, and T2DM. Certain complaints were collected that indicated the risk of the development of these pathologies. Anthropometry was performed. Body mass index (BMI) was defined as the ratio of body weight (kg) divided to square height (m^2). Waist circumstance was measured in the middle of the distance between the edge of the lower rib and the sacrum os ilium.

The nutritional status of each subject was evaluated. Students were surveyed and assessed on the find risk scale - risk assessment of T2DM. Statistical processing of research results was carried out by the methods of variation statistics implemented by the standard package of applications "STATISTICA® 6.1", serial number of the license AGAR 909E415822FA; Medcalc® Version 12.7.0.0.; Microsoft Excel.

The Kolmogorov-Smirnov single-assembly test was used to test the hypothesis of normal distribution. When describing quantitative characteristics, the median (Me) and interquartile scale (25%, 75%), for qualitative signs - in relative values are determined.

Results and Discussion

In the studied groups of students among Ukrainian (n = 140) the average body weight was 75.6 kg (55.0; 98,0). 22.1% (31 people) of students had obesity 1-3 degree (for WHO classification) [8], 15.0% (21 students) were overweight. Median BMI was 24.1 (21.5; 32.4) kg/m^2.

Among foreign students (n = 60), normal body weight was found in 21.6% (13 people), overweight – 18.4% (11 people) and obesity 1–3 degree - 60.0% (36 people). Median BMI was 28.1 (25.6; 36.4) kg/m^2. The average WC for Ukrainian students was 79.1 (55.4; 110.2) sm. At 37.1% (52 people) waist size is above the normal that confirms abdominal type. For foreign students the WC exceeds the normal levels in 65% (39 people). This indicates that the problem of overweight and obesity is more frequent among foreign students.

None of the students had a history of stable antihypertensive therapy or increased glycemia.

Among the risk factors for T2DM in Ukrainian students in the first place was violation of the nutritional status. Risks factors of T2DM among Ukrainian students are below:

1. Not eating vegetables and fruits daily – 40% (56 people).
2. Eating fast food: every day – 2.1% (3 person); once a week - 35% (49 people); once a month – 23.6% (33 people); very rarely – 37.9% (53 people).
3. The students who eat fast food depend on their mood – 62.9% (88 people).
4. The percent of people informed about the hazards of fast food is 97.8% (137 people).

5. Alcohol users (from once a week to once a month) consist 72.8% (102 people).
6. Smokers were 17.1% (24 people).
7. Do not do any daily physical activity – 51.4% (72 people).
8. 85% of students (119 people) were stressed.
9. Family history of T2DM was identified in 37.1% (52 people) of the respondents. A family history of cardiovascular diseases was detected in 82.8% (116 people) (table 1).

For foreign students, statistics looks a little different, but in the first place still is a violation of the nutritional status. Risks factors of T2DM:

1. Not eating vegetables and fruits daily - 63.3% (38 people).
2. Eating fast food: every day - 18.3% (11 people); once a week – 51.7% (31 people); once a month – 6.7% (4 people); very rarely – 23.3% (14 people).
3. The number of subjects who consume fast food depends on their mood – 25 % (15 people).
4. The people informed about the hazards of fast food – 90 % (54 students).
5. Alcohol users (from once a week to once a month) were 91.7% (55 people).
6. Smokers – 81.7% (49 people).
7. Do not do daily physical activity – 26.7% (16 people).
8. 95% of students have stress (57 people).
9. Identified family history of T2DM in 71.7% (43 people) of the respondents; family history of cardiovascular diseases was detected in 30% (18 people).

Thus, many Ukrainian and foreign medical students have the various risk factors of developing T2DM. Despite the students being sufficiently informed about the harmfulness of the use of fast food, among the risk factors are violations of the nutritional status, alcohol consumption, insufficient physical activity (especially at Ukrainians), family history of T2DM (especially at foreigners) and having continuous stress were found to be the most significant. Most of the foreign students consume alcohol and are smokers. That is a fairly high rate for medical students who are well aware of the harmfulness and consequences of alcohol abuse and smoking. Reducing the risk of developing T2DM and CVD is possible when changing modifiable risk factors, such as nutrition, physical activity, stress and deliverance of bad habits, such as smoking and drinking alcohol.

Conclusions

1. Most Ukrainian and foreign medical students have various risk factors of developing T2DM.

Table 1: Characteristics of the main risk factors T2DMamong medical students.

Marker, %	Ukrainian, n = 140	Foreign, n = 60
Not eating vegetables and fruits daily	40%	63.3%
Eating fast food: every day	2.1%	18.3%
Once a week	35%	51.7%
Once a month	23.6%	6.7%
Very rarely	37.9%	23.3%
Students who use fast food depends on their mood	62.9%	25 %
The percent of people informed about the hazards of fast food	97.8%	90 %
Alcohol users (from once a week to once a month)	72.8%	91.7%
Smokers	17.1%	81.7%
Do not make daily physical activity	51.4%	26.7%
Stable stressed	85%	95%
Identified family history of T2DM	37.1%	71.7%

https://doi.org/10.46389/rjd-2021-1008

2. Despite the medical students being sufficiently informed about the harmfulness of the using fast food, the risk factors were found to be one of the most significant.
3. Among risk factors of T2DMare excess weight and obesity as result of violations of the nutritional status, alcohol consumption, smoking (especially in foreign students), insufficient physical activity (especially in Ukrainian students) and family history of T2DM (especially at foreign students).
4. To prevent the development of T2DM, it is necessary to conduct a survey of medical students on the risk factors of DM (Findrisc score), identify symptoms of stress, and give recommendations of lifestyle modification.

Conflict of Interest

The authors declare no conflict of interest.

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