

ORIGINAL ARTICLE

Medicine Science 2021;10(1):64-76

Nutritional status and frequency of overweight and physical activity behaviors of medical school students and factors affecting these variables**Allahverdi Aghayev¹, Kursat Gurel², Ozen Tugba Simsek¹, Hande Ipek³, Erhan Eser⁴**¹Manisa Celal Bayar University, Faculty of Medicine, Manisa, Turkey²Columbia University, College of Physicians and Surgeon, Department of Neurology, New York, USA³Doç. Dr. Mustafa Kalemli Tavşanlı State Hospital, Department of Emergency Medicine, Kütahya, Turkey⁴Manisa Celal Bayar University, Faculty of Medicine, Department of Public Health, Manisa, Turkey

Received 27 July 2020; Accepted 29 September 2020

Available online 17.01.2021 with doi: 10.5455/medscience.2020.07.146

Copyright@Author(s) - Available online at www.medicinescience.org

Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

**Abstract**

Adequate nutrition and physical activity are of great importance for the general health and school success of individual, and for preventing obesity, cardiovascular diseases, diabetes mellitus, and cancer. The aim of study is to reveal the dimensions of the nutrition and physical activity behaviors of students in the 1-6 years of our medical faculty. In this study, 670 people (58.6%) were reached. The dependent variables are physical activity, nutrition, and body mass index (BMI). 16.3% of the students were overweight or obese; only 37.7% had a physical exercise at least one day a week. 29.4% of the students skip meals very often, 30.7% made a diet in the last 12 months. Students BMI > 25 had less diet; use more addictive substances, less participate in organized activities; are members of the community to a lesser extent and personal beliefs were found to be weaker. The most important variables affecting BMI are body perception and participation in organized activities. Living in a family home or dormitory and having room are the factors that affect the nutrition behavior positively and at least one cigarette per day affects negatively. The most important factors affecting adequate physical activity are to pay attention to weight, to make a holiday, to meet with friends in the evening and to study less than 2 hours per day. Being upper grades, not participating in organized activities, and depressive mood are other factors cause physical inactivity. In conclusion, systemic exercise and eating habits are insufficient. Students' positive habits are gradually decreasing as the period progresses. Faculty administrations should take measures for health promotion activities and should concentrate on students who are in grades 4 and above.

Keywords: Nutrition research, obesity, exercise epidemiology, young adult**Introduction**

Nutrition during adolescence and youth is of great importance in terms of the continuation of the healthy life of the individual, school success, obesity that may occur at later ages, also for the prevention of chronic diseases [1,2]. A balanced nutrition should be evaluated together with adequate physical activity. Both nutrition and exercise have complementary effects especially in the anthropometric development of the body in young people. The importance of adequate and regular exercise for the development of healthy lifestyle behavior patterns has been shown in many sources in the literature. Physical inactivity is a changeable risk factor for cardiovascular diseases and also it affects the medical management of many physiological disorders such as hypertension, obesity, cancer, diabetes mellitus, rheumatic diseases, and depression [3].

The statistical data published by the WHO Regional Office for Europe show that the prevalence of overweight in the European Region is between 30-80% among adults, approximately 20% among children and adolescents, and one-third of those are obese [4]. In a study on 3rd-grade students in medical school in Greece, it was found that one-third of students were overweight or obese and BMI was a strong predictor for hypertension, also it had been revealed that obese students had high cardiovascular disease risk factors such as serum lipids and lipoproteins [5].

In several studies done on university students in Turkey, students and young people were found to have poor and imbalanced nutrition [6-9]. Obesity prevalence in youth has an increasing trend in Turkey. Turkey Statistical Institute (TUIK) reported obesity prevalence in young people as 3.3% in 2014 and 3.8% in 2016 [10]. Individual small studies reported a range between 5.3% (Istanbul) and 23.7% (Bartın) [6, 7]

*Corresponding Author: Allahverdi Aghayev, Manisa Celal Bayar University, Faculty of Medicine, Department of Bölüm Belirtiniz Manisa, Turkey, E-mail: aghayevallahverdi@gmail.com

Nutritional behavior in adolescents and youth is influenced by many individual characteristics such as health status, nutrition information, personal belief, body image, nutritional preference,

growth process, genetic effects, individual control; environmental characteristics such as socio-cultural values, popular food, family structure, friend effect, socioeconomic status, country food production, food availability, and accessibility; and lifestyle factors such as money or shortage of time [11, 12].

Although obesity is primarily a result of physical inactivity and overfeeding, many additional individuals or social predisposing factors of obesity may be listed as age, marital status, smoking and alcohol habits, number of births, education level, occupation, working conditions, and income level [11, 12].

When international data are examined in terms of physical activity, we encounter different rates in university students in different countries. For example, in a study conducted on 216 medical students in Sudan, 44.9% of students had low, 32% had medium, 23.1% had a high level of physical activity [13]; in a study conducted at the University of Belgrade Medical School in Serbia, 15.3% of the students were physically inactive, 62.2% were minimally active [14]; 43% of the medical students in Poland exercised high, 45% had moderate exercise and 12% of the students exercised inadequately [15]; whereas the medical students of Kasturba (India) have a good physical activity at a rate of 61.9% [16].

The studies conducted in Turkey showed a very low-level physical activity in university students: The rate of moderate to high physical activity prevalence was only 17% among Hacettepe University students [17] and around 19% in Istanbul Universities [18].

Literature findings showed that physical activity rate has been affected by various physical factors (accessibility, possibilities), cultural factors (habit, perspective) and social environment (number of participants, education level, urbanization, transportation). However, when different demographic (population, economic status, occupation) and biological factors (age, gender, heredity) are examined, it was determined that physical inactivity increased with age and males are more active than females. The rate of exercise varies according to many psychological (mental state, motivational) and emotional factors (enjoyment, relaxation, stress) [19-20].

The aim of this study is to find the frequency of overweight and obesity and physical activity behaviors of class 1-6 students of Manisa Celal Bayar University School of Medicine in Manisa and the predictive factors of overweight/obesity and physical activity.

Material and Methods

Study Population

The data of this cross-sectional study was extracted from a comprehensive study titled "Health promotion behaviors and their causality in medical faculty students [Tıp fakültesi Öğrencilerinin Sağlığı geliştirme davranışları ve nedenselliği]". This research is based on the analysis of nutritional and physical activity data of a cross-sectional health promotion study that aims to reach all students without any sample selection, including the students of the class 1-6 students of Manisa Celal Bayar University Medical Faculty, who were educated in the 2016-2017 academic year. The

study data were collected in the lecture halls at the end of the lecture and after the verbal information was given to the students and the questionnaires were applied to the students who accepted to participate. In the medical faculty of the MCBU, 1154 medical students were studying in the period 2016-2017. The participation rate of the study was 58.06%. When the participation rate was evaluated according to the classes, the

participation rate was 87.4% for period 1, 57.1% for period 2, 61.7% for period 3, 58.3% for period 4, 32.6% for period 5 and 40.6% for term 6. The present study was approved by the Ethical Committee of Celal Bayar University Faculty of Health Sciences (ref no:47114). The more details about the study population were published elsewhere [21].

Dependent variables

Physical activity, nutrition habits, and Overweight/obesity are the dependent variables of our study.

Physical activity

Three questions were asked using the WHO exercise definition pattern to assess the physical activity variable: 1- "How often do you do physical training for at least 30 minutes, enough to sweat your underwear?"; 2- "What physical activity do you do if you exercise? (housework, running, hiking, sports activities or other)"; and 3- "What is your status as a licensed athlete?". WHO recommends that 18-64-year-old people should perform moderate physical activity for a total of approximately 150 minutes per week, often for at least two or three days a week and at least half an hour a day [22].

Nutrition habits

We assessed nutritional habits by three questions: 1- skipping meals; 2-weekly fruit consumption and 3- being on diet in the past year.

Overweight/obesity

Overweight/obesity was assessed by Body Mass Index (BMI). BMI was calculated by dividing the weight in kilograms by the square of the weight in meters. The subcategories of BMI are as follows: less than 18 kg/m² were underweight, the values between 18.00-24.99 kg / m² were normal and 25 kg/m² were overweight or obese.

Independent variables

Age, school class, family type, marital status, place of residence (dormitory/family home/student house), own room, number of siblings, education level of parents, family income, diagnosed a disease requiring continuous use of medication in the individual or his/her family, smoking-alcohol-addictive use situation, thought about the body, attention to weight, giving importance to general health and oral health, daily studying hours, participation in organized activities, membership in the official or social community, have a holiday in the last 12 months, sleep problems, assessment of health status compared to last year, the hopes about the future, the existence of affinities in which troubles and happiness are shared, personal belief and mood variables were questioned and evaluated as independent variables.

The World Health Organization Well-Being Index (WHO 5) was used to assess the depressive mood. WHO5 is a 5-item scale that evaluates emotional well-being within the last two weeks [23].

Univariate and multivariate analyses were conducted in this study. Chi-square tests were used in the comparison of categorical variables and Fisher's exact test in non-parametric conditions; Student T-tests were used in the comparison of two means for parametric conditions. Multivariate Logistic Regression models were established by using the variables which were found to be significant in the univariate analyses. SPSS 23.0 statistical package was used in statistical analysis. Type 1 error was accepted as 0.05 or less in all hypothesis testing.

Results

A total of 670 students participated in this study. The mean age of the participants was 21.25 ± 2.18 and the median age was 21.00 (min: 17, max: 33). Only 5 students (0.7%) were married. The other sociodemographic characteristics of the students were presented in table 1. 33.7% of the students were living with their families, 30.1% of them were living independently at their own house single of with their friends. Only 24.2% of the students stay in dormitories. 88.8% of the students have their individual own rooms in the place where they stay; 9.7% had no siblings, 10.9% had three or more siblings.

The distribution of the dependent variables is shown in Table 2. The mean BMI was 22.38 ± 3.66 and the median BMI was 21.95. 16.3% of the students were overweight or obese according to the BMI values.

When asked about the frequency of doing physical exercise weekly for at least 30 minutes and enough to sweat the underwear, About one-third (37.7%) of the students were doing exercise at least one day in a week, at least 30 minutes a day. The type of exercise is 35.2% walking, 25.5% sports activities, 19.1% household chores, 10.7% running, and 4.2% other activities such as yoga, pilates, cycling, weight training, bodybuilding.

It was found that 12.2% of the students were involved in more than one physical activity.

The frequency of skipping food (frequently or very frequently) was 29.4% and the mean number of fruit consuming days was 3.55 ± 2.06 (median:3.00 days) and 30.7% of the students had a diet in the last 12 months.

The distribution of the socio-economic and health risk variables are given in Table 3. The 10.1% of the students have at least one medically confirmed illness; 18.2% of the students are regular smokers; 13.1% consume alcohol drinks at least once or twice a week; 44.6% of the students have watched their weight; 18.2% had no or very little concerns about their general health; 9.5% had no or little emphasis on oral and dental health; 50.7% of them visited a dentist at least once in the past year.

316 (47.2%) of the students reach daily news via social media, 92 (13.7%) via television, 80 (11.9%) via internet newspapers, 68 (10.1%) via e-mail, 43 (6.4%) via friends or neighbors and 38 (5.7%) via newspaper or magazine.

Table 1. Socio-demographic characteristics of the study population

Gender	Categories	Frequency (%)
Class (Degree)	1	181 (27.0)
	2	126 (18.8)
	3	129 (19.3)
	4	109 (16.3)
	5	56 (8.4)
	6	69 (10.2)
Marital status	Single	658 (98.3)
	Married	5 (0.7)
	Missing	7(1.0)
Living situation	With family	226 (33.7)
	Dormitory	162 (24.3)
	With peers	202 (30.1)
	Alone	80 (11.9)
Having own room	Yes	595 (88.8)
	No	73 (10.9)
	Missing	2(0.3)
Family Type	Extended family	49 (7.3)
	Nuclear family	582 (86.9)
	Fragmented family	39 (5.8)
Number of siblings	None	65 (9.7)
	One or two	523 (78.1)
	Three or more	73 (10.9)
	Missing	9(1.3)
Educational status of mother	Illiterate	17 (2.5)
	Primary school graduate	111 (16.6)
	Middle school graduate	43 (6.4)
	High school graduate	165 (24.6)
	College degree or more	333 (49.8)
	Missing	1(0.1)
Educational status of mother	Illiterate	9 (1.3)
	Primary school graduate	71 (10.6)
	Middle school graduate	30 (4.5)
	High school graduate	116 (17.3)
	College degree or more	441 (65.9)
	Missing	3(0.4)
Family income staus	Higher than family expenditure	304 (45.4)
	Lower than family expenditure	50 (7.5)
	Equal to family expenditure	313 (46.7)
	Missing	3(0.4)

Table 2. Distribution of variables questioning physical activity and nutrition

Variables	Categories	Frequency (%)
Physical Activity		
Physical activity frequency	Never	85 (12.7)
	Occasionally	332 (49.6)
	1-2 days in a week	137 (20.4)
	3-4 days in a week	80 (11.9)
	5-6 days in a week	14 (2.1)
	Everyday	22 (3.3)
The most common type of physical activity	Chores	128 (19.1)
	Running	72 (10.7)
Living situation	Walking	236 (35.2)
	Sports activities	171 (25.5)
	Other	28 (4.2)
Being a licensed athlete	I'm still a licensed athlete	9 (1.3)
	I was a licensed athlete in the past	134 (20.0)
	I don't have a license	521 (77.8)
Nutrition		
BMI	Less than 18.0	36 (5.4)
	18-24.99	455 (67.9)
	25-29.99	86 (12.9)
	30 and over	23(3.4)
	Missing	67(10.0)
Frequency of skipping meal	Never	164 (24.5)
	Seldom	307 (45.8)
	Sometimes	156 (23.3)
	Often	41 (6.1)
	Missing	2(0.3)
How many days do you consume fruit in a week?	Never or 1 day	90 (13.4)
	2 or 3 days	285 (42.5)
	4 or 5 days	154 (23)
	6 or 7 days	130 (19.4)
	Missing	11(1.6)
Diet in the last year	Yes	206 (30.7)
	No	452 (67.5)
	Missing	12(1.8)
Body image perception	Too thin	9 (1.3)
	Thin	68 (10.7)
	Just right	352 (52.5)
	Fat	206 (30.7)
	Too fat	31 (4.6)
	Missing	4(0.6)

Table 2 continued.		
Do you watch your weight?	Never	72 (10.7)
	Seldom	227 (33.9)
	Sometimes	264 (39.4)
	Often	106 (15.8)
	Missing	1(0.1)
The factor that determines the behavior to pay attention to weight	Friend recommendation	17 (2.5)
	Measuring body weight	94 (14)
	Tight clothes	45 (6.7)
	Discontent with physical appearance	264 (39.4)
	Health	68 (10.1)
	Sport	6 (0.9)
	Missing	176(26.3)

Table 3. Distribution of social and health risk variables that affect nutrition and physical activity behavior

Variables	Categories	Frequency (%)
Existence of a person have a chronic disease in the family	Yes	222(33.1)
	No	448(66.9)
Having chronic disease	Yes	68(10.1)
	No	597(89.1)
	Missing	5(0.7)
Smoking at least one cigarette a day for six months or more	Evet	172 (25.7)
	Hayır	498 (74.3)
Keeping smoking	Everyday	122 (18.2)
	Occasionally	46 (6.9)
	Quit	90 (13.4)
	Don't smoke	412(61.5)
Frequency of consuming alcoholic beverages	Never	307 (45.8)
	Occasionally	138 (20.6)
	One time or more in a month	133 (19.9)
	One time or more in a week	77 (11.5)
	Everyday	11 (1.6)
	Missing	4(0.6)
Addictive substances use (except smoking/alcohol intake)	Yes	43 (6.4)
	No	622 (92.8)
	Missing	5(0.7)
Taking care of general health	None	16 (2.4)
	Very little	106 (15.8)
	Not bad	402 (60.0)
	Quite well	146 (21.8)
Taking care of oral health	None	7 (1.0)
	Very little	57 (8.5)
	Not bad	315 (47)
	Quite well	288 (43)
	Missing	3(0.4)

Table 3 continued.		
The last dental visit	In the past year	340(50.7)
	In the past 2 years	93 (13.9)
	In the past 3 years	37(5.5)
	4 years or more	94(14.0)
	I've never been	101(15)
	Missing	5(0.7)
Frequency of any sleep problems	Never	138(20.6)
	A little	228(34.0)
	Somewhat	153(22.8)
	Much	89(13.4)
	A great deal	55 (8.2)
	Missing	7(1.0)
Spirituality/Personal beliefs	Very strong(excellent)	171(25.5)
	Fairly strong(good)	31(47.3)
	Slightly strong(Not good)	113(16.9)
	Not strong(poor)	62(9.3)
	Missing	7(1.0)
Presence of intimate friendship	I have	570(85.0)
	I haven't(absent)	36 (5.4)
	Uncertain	60 (9.0)
	Missing	4(0.6)
Daily average study duration	0-4 hours	549(81.9)
	More than 4 hours	94 (14.1)
	Missing	27(4.0)
Spending time with friends after school	Never	59 (8.8)
	One or two days a week	294 (43.9)
	Three days or more a week	317 (47.3)
Time spent on social media in a day	0-2 hours	234 (34.9)
	2-4 hours	216(32.3)
	4 hours or more	159 (23.7)
	Uncertain	61(9.1)
Vacation length in last year	0-10 days	308 (46.0)
	More than 10 days	362 (54.0)
Membership of non-governmental organization or of social group	Yes	184 (27.5)
	No	475 (70.9)
	Missing	11(1.6)
Participation of organization as music band theater group. dance group, except sport organizations	Never	233(34.8)
	Seldom	317(47.3)
	Sometimes	84(12.5)
	Often	24(3.6)
	Missing	12(1.8)

When considering the academic burden and social activities of the students, we saw that students were studying 2.59 ± 1.79 days a week and %14 of them were studying daily four hours and over, and 2.69 ± 1.97 days in a week were spending time outside with friends in the evenings. The mean and median annual vacation days of the students were 18.2 and 10 days respectively, excluding their family visit days, whereas %16.7 had never gone on vacation in the past year. The average screen time (via the internet or cellular phones) was 3.64 ± 2.58 hours a day.

570 (85.1%) students had a friend who could share their worries or happiness. When asked what depth was shared with friends

who were known to share their troubles, in which 73.6 of these friends are intimate with close friends. 11.1% of the students were hopeless or very hopeless but the future and 48.6% of them were hopeful or very hopeful and 27.5% of them were members of any official social community (association, sports club, community, etc.). Only 34.8% did not participate in non-sports organized activities such as music groups, theater groups, chess club, dance, foreign language education. 21.5 of the students reported severe sleep problems; 44.1% had depressive mood in the last two weeks according to WHO criteria (WHO5).

Univariate statistical analysis results are given in Table 4.

Table 4. Relationship between nutrition and physical activity and independent variables (Univariate analysis)

Variables		BMI ≥ 25 kg/m ² n (%)	Regular and adequate nutrition n(%)	Adequate physical activity n(%)
Class(degree)	First-grade	20 (13.1)	***74 (40.9)	***92 (50.8)
	2nd, 3rd, 4th and 5th grades	77 (20.2)	144 (34.3)	147 (35.0)
	Final-grade	12 (17.4)	9 (13.0)	14 (20.3)
Living Situation	With family or dormitory	274 (80.8)	***171 (44.1)	**165 (42.5)
	With peers or alone	220 (83.3)	56 (19.9)	88 (31.2)
Having own room	Yes	99 (18.4)	***214 (36)	223 (37.5)
	No	10 (15.6)	12 (16.4)	29 (39.7)
Number of siblings	None	14 (23.0)	*33 (50.8)	29 (44.6)
	One or two	83 (17.8)	169 (32.3)	196 (37.5)
	Three or more	10 (15.2)	23 (31.5)	26 (35.6)
Smoking history	Yes	35 (22.0)	***39 (22.7)	65 (37.8)
	No	74 (16.7)	188 (37.8)	188 (37.8)
Current smoking status	Everyday	23 (20.5)	***19 (15.6)	42 (34.4)
	Ocaasionally	5 (11.6)	16 (34.8)	22 (47.8)
	Quit	17 (20.7)	36 (40.0)	35 (38.9)
Frequency of consuming alcoholic beverages	Never or occasionally	92 (17.8)	199 (34.4)	***205 (35.5)
	Once a month or a week or more	17 (20.0)	27 (30.7)	47 (53.4)
Addictive substances	Yes	**14 (34.1)	*8 (18.6)	**24 (55.8)
	Hayır	95 (17.0)	217 (34.9)	227 (36.5)
Body image perception	Too thin or thin	***0 (0.0)	30 (39.0)	23 (29.9)
	Just Right	30 (9.2)	115 (32.7)	139 (39.5)
	Fat or too fat	79 (37.8)	79 (33.3)	89 (37.6)
Watching own weight	Never or seldom	50 (18.5)	92 (30.8)	***56 (18.7)
	Sometimes or often	59 (17.8)	134 (36.2)	197 (53.2)
Diet in the last 12 month	Yes	***49 (25.8)	***89 (43.2)	**94 (45.6)
	No	60 (14.9)	136 (30.1)	153 (33.8)

Chi Square: * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$;

Table 4 continued.

Variables		BMI ≥ 25 kg/m ² n (%)	Regular and adequate nutrition n(%)	Adequate physical activity n(%)
Taking care of general health	None or very little	23 (20.4)	**28 (23.0)	43(35.2)
	Not bad or quite well	86 (17.6)	199 (36.3)	210 (38.3)
Last dental visit	In the past year	47 (15.3)	*128 (37.6)	**145 (42.6)
	Never or more than a year	61 (20.8)	94 (28.9)	106 (32.6)
Participation in organized activities	Never or seldom	*97 (19.7)	180 (32.7)	***193 (35.1)
	Sometimes or often	9 (9.0)	42 (38.9)	56 (51.9)
Membership to the social community	Yes	*22 (12.9)	70 (38.0)	*80 (43.5)
	No	84 (19.9)	152 (32.0)	165 (34.7)
Vacation length in last year	Never	25 (25.5)	***53 (47.3)	***43 (38.4)
	1-9 days	30 (16.7)	37 (18.9)	37 (18.9)
	10 days or more	54 (16.6)	137 (37.8)	173 (47.8)
Daily average study duration	0-2 hour	61 (18.8)	***135 (37.5)	***168 (46.7)
	2-4 hour	20 (11.8)	68 (36.0)	53 (28.0)
	4 hour and more	18 (20.5)	16 (17.0)	22 (23.4)
Going out with friends in the evening	Zero days a week	12 (24.5)	***32 (54.2)	**13 (22.0)
	One or two days a week	47 (18.1)	110 (37.4)	102 (34.7)
	Three days a week or more	50 (17.0)	85 (26.8)	138 (43.5)
Personal belief	Very or fairly strong	**67 (15.4)	160 (32.8)	174 (35.7)
	Slightly or not strong	41 (25.5)	62 (35.4)	75 (42.9)
Mood	Depressive	52 (19.8)	***75 (25.7)	***75 (25.7)
	Non-depressive	56 (16.8)	150 (40.5)	174 (47.0)
BMI	24.99kg/m ² and below	-	160 (32.4)	188 (38.1)
	25 kg/m ² and above	-	38 (34.9)	45 (41.3)
Nutrition character	Positive/regular	38 (19.2)	-	**102 (44.9)
	Negative/irregular	71 (17.5)	-	151 (34.1)
Physical activity	Adequate level	45 (19.3)	**102 (40.3)	-
	Inadequate level	64 (17.3)	125 (30.0)	-

Chi Square: * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$;

The independent variables that had not shown a significant relationship with any of the dependent variables are family type; marital status; mother and father education level; a disease that requires constant use of medicines; chronic illness in the family; the level of importance given to oral and dental health; the presence of hepatitis B vaccine; daily social media or console game playing duration; frequency of sleep problems and the presence of a friend who is shared trouble or happiness.

Overweight/obesity

The age of the students was not found as a predictive factor for any of the dependent variables ($p > 0.05$). In the univariate analyses, it was found that 27.5% of the students having BMI > 25.00 perceived

themselves inconsistently in normal body weight ($p < 0.001$). The students having BMI > 25.00 was significantly more likely on diet during past 12 months ($p < 0.001$); used more addictive except for smoking and alcohol ($p < 0.01$); had less participation in organized social activities ($p < 0.05$); had fewer membership rates to the societies or community groups ($p < 0.05$) and had weaker personal beliefs or spirituality ($p < 0.001$).

Nutrition

The relationship between positive and balanced nutrition and independent variables are presented in Table 4. The students who are in the advanced classes ($p < 0.001$); who are living at home alone or with friends ($p < 0.001$); who are living in a shared room

($p < 0.001$); who has higher the number of siblings ($p < 0.05$); who are smokers ($p < 0.001$) has insufficient and unbalanced nutritional behaviors. Additionally, non-alcohol addictive substance users ($p < 0.05$); those who was on diet in the last 12 months ($p < 0.001$); who are physical activity ($p < 0.01$); who pay more attention to their general health ($p < 0.01$) and who had more dentist examinations in the last year ($p < 0.05$) had balanced and adequate nutrition. It was also observed that the students who had enough and balanced nutrition had less vacation ($p < 0.001$); studied less lessons per day ($p < 0.001$); had less time with their friends in the evenings after the lesson ($p < 0.001$) and had more positive moods in the last two weeks ($p < 0.001$) with significant relationships.

Physical activity

Physical activity levels are lower in students of advanced school classes ($p < 0.001$); in students who live with their family members or in dormitory compared to living friends or alone ($p < 0.01$). The students who consumed alcohol ($p < 0.001$) and those who had addictive substance experience had more positive physical activity levels than others.

Students who paid less attention to their weight ($p < 0.001$); who have negative and unbalanced nutrition ($p < 0.01$); who have less diet in the last twelve months ($p < 0.01$); who have never gone to the last dental examination for more than a year ($p < 0.01$); who participated less in organized activities ($p < 0.001$) and who were not members of a formal or social community ($p < 0.05$) had higher levels of physical inactivity as well. It was also found that those who did inadequate physical activity had less holiday ($p < 0.001$); studied more daily lessons ($p < 0.001$); had less time with their friends after the lesson in the evenings ($p < 0.01$) and had more depressive mood in the last two weeks ($p < 0.001$).

As presented in Figure 1, negative behaviors such as physical inactivity, unbalanced nutrition, inadequate fruit serving, and skipping meals have increasing trends towards upper classes ($p < 0.001$ for each).

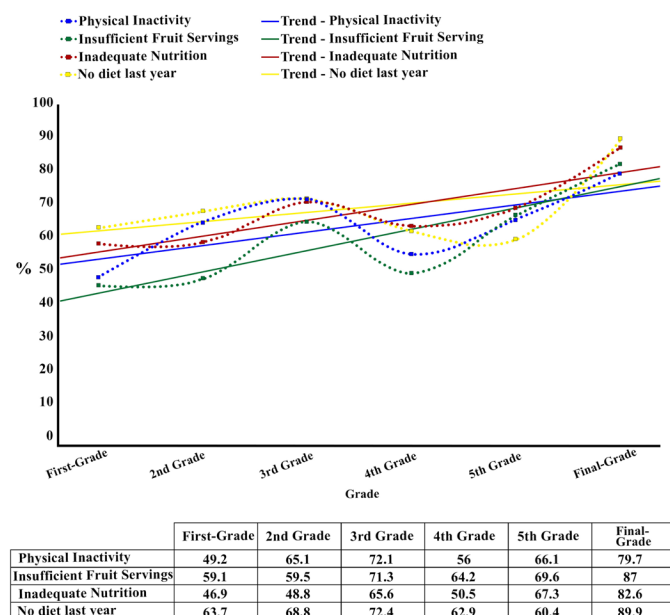


Figure 1. Distribution of dependent variables by class

In logistic regression analysis, the most important variable affecting BMI is "body perception". Participation in organized activities was found to be another variable affecting the BMI (Table 5a).

As a result of univariate analysis, a significant positive relationship was found between nutrition characteristics and variables examined in the logistic regression model, it was understood that staying in a family or dormitory and having an individual's own room were the variables affecting the nutrition behavior of the individual. In addition, it was determined that smoking and dieting are other factors that affect dietary behavior (Table 5b).

When logistic regression analysis was performed to determine the predictors of physical activity, the most important factors affecting students' positive physical activity behavior were attention to weight, spending holiday for 10 days or more, meeting with friends outside the home in the evening, and less than 2 hours of daily study variables. However, being in an advanced school class, less participation in organized activities, and having depressive mood are other predictors of physical inactivity (Table 5c).

Table 5. Independent variables affecting BMI, nutrition and physical activity (Stepped Logistic regression reduced end models)

Model 1: Dependent variable BMI*

	P	OR**	%95 Confidence Interval	
			Lower Limit	Upper Limit
Body image perception	p<0.001	7.685	4.684	12.608
Participation in organized activities	p<0.05	2.398	1.074	5.352
Constant	p<0.001	0.035		

Negelkerke R2: 0.256 ; * The variables that give results in Table 4 are included in the model. **OR: Ods Ratio

Model 2: Dependent variable Nutrition*

	P	OR**	%95 Confidence Interval	
			Lower Limit	Upper Limit
Living situation	p<0.01	2.691	1.313	5.516
Having own room	p<0.01	8.112	1.933	34.031
Current smoking status	p<0.05			
Smoking at least one daily	p<0.001	3.199	1.490	6.869
Diet last 12 month	p<0.05	2.037	1.031	4.024
Going out with friends in the evening	p>0.05			
Going out for less days in the evening	p<0.05	0.244	0.068	0.871
Constant	p>0.05	0.262		

Negelkerke R2: 0.292 ; * The variables that give results in Table 4 are included in the model. **OR: Ods Ratio

Model 3: Dependent variable Physical Activity*				
	P	OR**	%95 Confidence Interval	
			Lower Limit	Upper Limit
Class(degree)	p<0.05			
Watching own weight	p<0.001	4.431	2.925	6.713
Participation in organized activities	p<0.01	1.961	1.190	3.231
Vacation length in last year	p<0.001	3.045	1.840	5.041
Daily study time	p<0.001			
Less study time per day	p<0.05	0.504	0.259	0.981
Going out in the evening	p<0.01			
Going out for more days in the evening	p<0.001	4.132	1.892	9.022
Mood	p<0.05	1.525	1.021	2.279
Constant	p<0.01	0.186		

Negellkerke R2: 0.327 ; * The variables that give results in Table 4 are included in the model.**OR: Ods Ratio

Discussion

The foundations of health behaviors that affect the quality of life in older ages are laid during childhood and youth. So, it is important to question these behaviors at younger ages and to investigate the factors that affect them. This study differs from others in that, it is not only conducted on the young population but also on medical faculty students who will guide the population in terms of health promotion after graduation.

The mean BMI of the university students who participated in our study was $22.38 (\pm 3.66)$ kg/m². In a study involving female students studying at three different universities in Istanbul, the mean BMI was 20.8 ± 3.0 kg / m² [6]; In another study involving the university students of Bartın, the mean BMI was 22.92 ± 3.71 kg / m² [7]; In the study conducted among the medical students in Ankara, BMI values were found as 21.30 ± 2.72 kg / m² [17]. When the international literature were analyzed, the mean BMI distributions of university students were 22.8 ± 4.3 kg / m² in Sudan [13]; 22.24 ± 2.95 [14] in Belgrade, Serbia; 21.2 ± 0.3 for female students and 24.2 ± 0.4 for male medical students in Poland [15]; 22.2 ± 3.3 [24]; on average 22.2 kg / m² for men and 20.8 for women in eight South-East Asian countries [25]; 25.5 ± 0.5 kg / m² for boys and 22.7 ± 0.4 kg / m² for girls among medical students in US [26]; and the mean BMI 24.1 kg/m² in males, 29.4 kg/m² in females in Saudi Arabia medical school [27]; and 21.717 ± 4.33 kg/m² in Pakistan [28]. Our mean BMI figures are closer to developed countries than in developing countries' medical students.

The overweight and obesity prevalences in our study sample were 14.3% and 3.8% respectively. The overweight and obesity prevalences were 18.8% and 4.9% in Bartın University, whereas the overall overweight plus obesity rate is around 11% in Zonguldak university. Our figures are somewhat higher than Zonguldak but

lower than Bartın University's findings. When we consider the weakness (BMI<18.00) prevalence of our medical faculty (6.5%) it's rather lower than Istanbul University which is around 15%. This difference is very difficult to interpret. This great gap between two universities may be attributed to the gender composition of the samples: Istanbul sample is a pure female sample while ours is a mixed sample. It was thought that the fact that the rate of weakness (15.7%) in the study in Istanbul was higher than the obesity rate (5.3%) was probably due to the increased interest in the body image of female students in the research universe and the trend of having a "slim body" appearance, which is widespread especially among women [6]. Again, according to the study data in Bartın, it was assumed that the prevalence of obesity prevalence among female students was statistically less than that of male students because female students paid more attention to their feeding habits and body appearance [7].

When the prevalence distributions of overweight and obesity among university students were examined, the prevalence of overweight and obesity was determined to be 22.2% and 6.5% in Sudan, [13]; 16.6% and 1.2% in Serbia [14]; 21.3% and 2.9% [16] in India; 17% and 2% in Malaysia [29]; 16.6% and 1% [30] in Iran; 10.2% and 20.9% in Pakistan [31] respectively. In a study of medical students in the USA, the prevalence of overweight and obesity was 25.8% and 6.2% for first-year students and 27.8% and 5.1% for fourth-year students, respectively [26]. In another study of Pakistan Karachi, the combined frequency of pre-obese and obese medical students was 33.2%, also 14.8% of students were pre-obesity, 11.9% were obesity class I, and 6.5% were obesity class II [28]. Turkish medical students have closer BMI figures to developing countries but lower than in the US, whereas the BMI prevalences are rather higher in the medical students of poor countries such as Pakistan, India, and Sudan. The recent BMI increase in the urban populations of the poor countries may explain this difference.

We found that in this study, 62.3% of the students had insufficient physical activity and 12.7% had no physical activity. Similarly, in a previous study on first-year medical students in our university, it was found that 13.8% of the first-year students did not exercise at all and about 90% did not perform physical activity at the recommended level [32]. Several studies that were conducted on the physical activity levels of university students revealed that 15% of the students were not physically active in a study conducted in Ankara [17]; and 30.7% in Istanbul [18]. Compared to other studies conducted in Turkey, our students are more inactive than the ones studying in Istanbul [18] and Ankara [17] universities. This difference may be attributed to the "adequate exercise" criterion. Our exercise criteria are "lasting at least half an hour and enough to sweat the underwear" at least one day in a week.

When we consider physical activity levels in the interantional studies: in Sudan, 44.9% of students have low, 32,0% have moderate and 23.1% have high physical activity levels [13]; 15.3% of the students were physically inactive and 62.2% were minimally active in Serbia [14]; 43% of students had high, 45% moderate and 12% had low level of exercise in Poland [15]; 61.9% of students had good physical activity in India [16]; half of the students (49.9%) had low physical activity, 33.6% moderate and 16.6% high physical activity in South East Asian countries [25];

10.5% of the students were involved in mild activity, 20.7% were in moderate activity, and 68.9% were in severe activity another study on medical students in South India [33]; 30% of university students had been exercising regular exercises for more than six months in Iran [30]; 65% of the male and 80% of the female medical students were not exercise in Saudi Arabia [27]; 36% of females and 52% of males medical students exercised ≥ 150 minutes/week in California [34]; %47.8 of medical students of Pakistan had regular physical activity [28]. We think that the prevalence of high levels of physical activity in India stems from the opportunities provided by the university because in this study it was found that more than half of the students (55%) used the sports facilities provided on the university campus [16]. In another study conducted in Malaysia, 84% of students exercising on campus, and 75% of all students stated that the sports facilities on campus were adequate [29]. The frequency of sufficient exercising is somewhat close to that of in Sudan [13], Serbia [14], and Iran [30] but lower than India [16] and Poland [15].

In a study conducted on preclinical students in the Medical School in Malaysia, it was determined that 76% of the students were physically active; 59% of the students exercising regularly; 78% of female students continued to exercise during the menstrual cycle; 10% represent the university, state or country in athletic competitions; 25% won medals in the competitions [29]. In our study, it was found that 20% of the students were athletes in their past and 1.2% were still licensed, athletes. This shows that government-wide measures should be taken for sports and young people should be encouraged for sports activities.

Students who had adequate physical activity had more positive feeding habits ($p < 0.01$). Similar to our findings in a study conducted in Samsun, it was found that physical exercise positively influenced eating habits [8]. In Malaysia, the majority of physically inactive students (67%), students with low (63%) and moderate (61%) activity had three meals a day, while 50% of students with high physical activity had more than three meals a day and half of those took nutritional supplements [29]. However, we found that having a balanced and adequate nutrition perception did not have a significant effect on physical activity [29]. In the study conducted at the University of Belgrade, it was determined by the statistical significance relationship that those who do high levels of physical activity consume more vegetables, fruits, and whole-grain bread; however, minimal active students consumed more margarine, mayonnaise, white flour products and commercial drinks [14]. In Poland, it was revealed that university students with high levels of physical activity consumed fewer carbohydrates such as galactose and sucrose [15].

In our study, there was no significant relationship between BMI and adequate physical activity. Similarly, some studies in the literature also did not determine the meaning relationship in terms of BMI and physical activity indicators [13, 14, 17, 25, 29-31]. This is thought to be due to individual differences in the selected research universe. In a study evaluating physical activity in medical students in South India, no significant relationship was found between BMI and physical activity, but students with BMI ≥ 25 kg / m² were found to be physically more active, and this situation was assumed to be overweight as a strong motivation for students to initiate physical activity [33].

In the Turkish studies mentioned above, students have consumed unhealthy and unbalanced food [6-9] and this negative behavior pattern in youth poses a risk for future health problems [3, 8]. In several international studies, poor nutrition including snacks, low red meat consumption, abstinence from fatty foods and abundant cholesterol, being a man, and coming from a wealthy family were associated with BMI obesity [15, 25, 31].

In our study, it was determined that 29.4% of the students skipped meals frequently or very frequently. This finding is consistent with other studies conducted in Turkey [7, 8, 32, 35] and some other international studies [25, 29, 31, 28]. These studies showed that one of the main problems related to the nutritional behaviors of university students is skipping main meals, especially breakfast. Accordingly, informing young people that the skipping behavior causes unhealthy ready-to-eat food consumption as well as that there is no suitable process to lose weight should be one of the main goals in gaining proper and healthy eating habits.

It was found that 13.4% of the students who participated in our study ate fruit only one day or never ate it. Different percentages were obtained in different international studies: In South-East Asia, the average number of daily fruit servings of university students was found to be 1.4 [25]. In Saudi Arabia,

it was appointed that 35% of medical students did not consume regular basis fruits and vegetables [27] and in California, it was detected that merely 10% of students consumed the recommended servings of fruit and vegetables [34].

Only 33.9% of the students were fed adequately in terms of positive and balanced nutritional value that we created by dichotomizing the variables of skipping meals and eating fruits. In a study on 438 undergraduate medical students in South India, less than 50% consumed a balanced diet [33]. In a study on 638 adolescents in Istanbul, it was found that 99.8% of the students were in the risk group in terms of feeding habits at different degrees [9]. In another study, it was determined that 40% of university students were not fed enough and balanced [7]. In the study conducted on university students in Samsun province, the frequency of obesity was significantly higher in those who were fed with sugary and fatty foods in intermediate meals [8]. As a result, it is of great importance that university students gain healthy and balanced eating habits for health protection and health promotion.

The trends of overweight, malnutrition, and inadequate physical activity:

The trends of obesity and overweight among classes showed similar reverse U shaped patterns. At the beginning of medical education (1st class) the rates were quite low (13.1% for BMI > 25.00 and 1.7% for BMI > 30.0); the trend of body weight peak was observed at the mid classes (especially at class 3; 21.8% for BMI > 25.00 and 4.6% for BMI > 30.0) and then BMI starts to decrease in the final classes (17.4% for BMI > 25.00 and 4.3% for BMI > 30.0).

Inadequate physical activity and nutrition trends, on the other hand, showed a different trend (S-shaped) pattern than BMI (see figure 1). Both physical activity and nutrition showed similar trends in classes. Linear increases of inadequate physical activity and poor nutrition prevalences are observed from the 1st class

to 3rd class and the worse situation is observed in the 3rd class (midclass). The mid classes have a very high theoretical academic load which might lead to unbalanced nutrition. The lower physical activity levels that were seen in the mid classes are consistent with this fact. In contrary to the obesity trend -which starts to decrease from the 3rd class to the final class- a slight recovery is observed in the 4th class in physical activity and nutrition, but a linear worsening trend is observed from the 4th class to the final class. This increasing trend may be due to the pressure of the upcoming final board exam (Medical specialty Board Exam – TUS) which restricts the time of the medical students to allocate exercise and other social activities.

In our study, it was seen that the students who were educated in the advanced classes performed less physical activity than the early classes of medical school. Its already known that students of advanced classes have subjected to more intensive theoretical and practical training in clinical rotations, and the final grade students were also prepared for the specialty (board) exams. In a study on medical students in the USA, cardiovascular fitness scores of the students from the first grade to the fourth grade were found to tend to decrease, but these rates were 'very good' for both sexes [26]. However, in a study conducted among preclinical students in Malaysia, it was found that age was not a significant statistical variable for physical activity, but most of the physically active students were first-year students [29].

In our study, a statistically significant relationship was found between the class of the students and the positive and balanced nutrition behavior. It was determined that 40.9% of the students in the first year of education have balanced nutrition features, but only 13% of the students in the sixth grade received a balanced diet. We assume that this may be caused by factors such as fatigue, lack of time, stress, and anorexia based on stress, due to the intensive working conditions of sixth-grade medical students. In a study on medical students in Pakistan, a statistically significant increase was found between upper-class education and central obesity [31]. In a study on first, third, and sixth-grade medical school students in Saudi Arabia, no significant difference was found between classes in terms of obesity, regular eating habits, regular weekly fruit-eating, and physical activity [27].

To see the relationship between overweight and inadequate physical activity we performed a series of univariate and multivariate analyses. Overweight, inadequate nutrition and inadequate physical activity are the dependent variables of this study.

There was a consistency between BMI and body perception in univariate and multivariate analyses. This consistency between body perception and body image on BMI has been shown in a study on female students at the Medical School in Brazil as well [24].

In our study, both univariate analyzes and multivariate regression analyzes showed that the students who paid attention to their weight had more physical activity. In the study conducted in Istanbul, it was found that 72.6% of the students exercised for healthy living, 71.2% for feeling good, 60.6% for relieving tension, and 31.4% for entertainment [18]. In the study conducted in Malaysia, it was found that 53% of the students exercised to be healthy, 29% for staying physically fit, and 12% for recreational purposes [29].

The predictors of

The predictors of dieting in this study are being overweight, having adequate physical activity. This shows that health promotion is a multi-factorial pattern of behavior and that an individual with a positive trait is likely to exhibit another positive behavior as expected. Similar findings were observed in the literature as well [8].

In our study, it was found that those who live in families or dormitories were fed more balanced and had more physical activities than those living with friends or alone at home ($p < 0.01$). Similar findings were observed in a study conducted in university students in Bartın [7] and Malaysia [29].

We found that smoker students have negative and unbalanced feeding habits, consistent with Serbian study results [14]. Our results also revealed that negative and unbalanced nutrition characteristics were predictors of depressive mood in line with the finding of another Turkish study conducted in Ankara [35] and Pakistan Karachi [28] and physically active students had more positive moods [8, 18]. Our results also showed that students who went to the dentist examination in the last year were more physically active and had more regular and balanced nutrition. We observed that overweight and obese students were less involved in organized social activities and had fewer contacts with their intimate friends.

These results may indicate that the coexistence of negative health-promoting attributes such as obesity, unbalanced nutrition, and smoking habit in students can provide evidence for a holistic health promotion pattern (all or nothing) in students.

Limitations of the study: One of the important limitations of this study is the low participation rate (58.1%). The low participation rates differ by classes and higher rates were reached in pre-clinic classes whereas lower rates were obtained in clinic classes. We could only conduct one round for questionnaire application and could not follow to a second-round since the questionnaires were filled out anonymously by the students, and therefore, those who did not fill out the questionnaire later could not be reached. Another and very important imitation is the self-reported height and weight values. This may not bias the results since we assume that all university students are aware of this height and weight but we are not sure if they were honest when reporting their values.

Conclusion

The results of this study revealed that overweight and obesity prevalences in medical students are similar to that of developed countries except for the US, but systematic exercise (physical activity) habits were inadequate among medical students globally. The most important variable affecting body weight is body perception. Positive nutrition and exercise habits of medical students gradually decrease as the class (term) progresses.

There is a need to promote physical activity and adequate nutrition habits in medical schools and to emphasize the importance of promoting physical activity. The school authorities should take effective measures to support the students in terms of health promotion activities, and these measures should be focused

especially on students who are in terms of 4 and above.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

This study was approved by the Ethical Committee of Celal Bayar University Faculty of Health Sciences (ref no: 47114)

References

- Mukudi E. Nutrition status, education participation, and school achievement among Kenyan middle-school children. *J Nutr.* 2003;19:612-6.
- Şanhır N, Yabancı N. Okul çağında beslenme. 7-14 yaş Çocuk Gelişimi ve Eğitimi Dizisi. 1. Baskı. Morpa Kültür Yayınları, İstanbul, 2005;139-58.
- Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. *CMAJ.* 2006;174:801-9.
- The challenge of obesity in the WHO European region and the strategies for response, Ed. Francesco Branca, Haik Nikogosian ve Tim Lobstein, WHO, Denmark, 2007. https://www.euro.who.int/__data/assets/pdf_file/0010/74746/E90711.pdf access date 6.11.2019
- Bertsias G, Mammas I, Linardakis M, et al. Overweight and obesity in relation to cardiovascular disease risk factors among medical students in Crete, Greece. *BMC Public Health.* 2003;3:3.
- Garibağaoğlu M, Budak N, Öner N, et al. Üç farklı üniversitede eğitim gören kız öğrencilerin beslenme durumları ve vücut ağırlıklarının değerlendirmesi. *Sağlık Bilim Derg.* 2006;15:173-80.
- Dülger H, Mayda AS. Bartın Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Öğrencilerinde Beslenme Alışkanlıkları ve Obezite Prevalansı. *DÜ Sağlık Bil Enst Derg.* 2016;6:173-7.
- Acar ZÖ. Üniversite öğrencilerinde obezite ve yaşam davranışları. Uzmanlık Tezi. Ondokuz Mayıs Üniversitesi, Samsun, 2015.
- Demirezen E, Coşansu G. Adölesan Çağı Öğrencilerde Beslenme Alışkanlıklarının Değerlendirilmesi. *STED.* 2005;14:174-8.
- Türkiye Sağlık Araştırması, TÜİK, 2016. <http://tuikweb.tuik.gov.tr/PreHaberBultenleri.do?id=24573#> access date 31.05.2017
- Neumark-Sztainer D, Story M, Perry C, et al. Factors influencing food choices of adolescents: Findings from focus-group discussions with adolescents. *J Am Diet Assoc.* 1999;99:929-37.
- Gorin AA, Crane MM, Jelalian E, et al. The obesogenic environment, Handbook of Childhood and Adolescent Obesity. Springer Science, Business Media LLC, New York, USA. 2008:145-61.
- Yousif MM, Kaddam LA, Humeda HS. Correlation between physical activity, eating behavior and obesity among Sudanese medical students Sudan. *BMC Nutr.* 2019;5:6.
- Janković G, Stanojević Z, Mazić S, et al. Physical activity and dietary habits among second year students of the school of Medicine, University of Belgrad. *J Phys Educ Sport.* 2017;15:239-48.
- Grygiel-Górniak B, Tomczak A, Krulikowska N, et al. Physical activity, nutritional status, and dietary habits of students of a medical university. *J Sport Health Sci.* 2016;12:261-7.
- Rao CR, Darshan B, Das N, et al. Practice of physical activity among future doctors: a cross sectional analysis. *Int J Prev Med.* 2012;3:365-9.
- Savcı S, Öztürk M, Arıkan H, et al. Üniversite öğrencilerinin fiziksel aktivite düzeyleri. *Türk Kardiyol Dern Ars.* 2006;34:166-172.
- Oğuz S, Çamcı G, Yılmaz RK. Üniversite öğrencilerinin fiziksel aktivite yapma durumu ve fiziksel aktivitenin kalp sağlığına etkisini bilme durumu. *GUSBİD.* 2018;7:54-61.
- Eyler AA. Personal, social, and environmental correlates of physical activity in rural Midwestern white women, *Am J Prev Med.* 2003;25:86-92.
- Vanhees L, Lefevre J, Philippaerts R, et al. How to assess physical activity? How to assess physical fitness? *Eur J Cardio Prev R.* 2005;12:102-14.
- Gürel K, Aghayev A, Ipek H, et al. Trends and determinants of quality of life and self-rated health in the course of medical education among medical students. *Int J Med Sci.* 2020;9:118-27.
- World Health Organization. Global recommendations on physical activity for health. World Health Organization. <https://apps.who.int/iris/handle/10665/44399> access date 17.01.2020
- Saipanish R, Lotrakul M, Sumrithe S. Reliability and validity of the Thai version of the WHO-Five Well-Being Index in primary care patients. *Psychiatry Clin Neurosci.* 2009;63:141-6.
- Bosi ML, Nogueira JA. Body image and eating behavior among medical students: eating disorders among medical students. *Epidemiology (Sunnyvale).* 2016;6(4).
- Peltzer, K, Pengpid, S. The association of dietary behaviors and physical activity levels with general and central obesity among ASEAN University Students. *AIMS Public Health.* 2017;4:301-3.
- Brehm B, Summer S, Khoury J, et al. Health status and lifestyle habits of us medical students: A longitudinal study. *Ann Med Health Sci Res.* 2016;6:341.
- Al-Qahtani MH. Dietary Habits of Saudi Medical Students at University of Dammam. *Int J Health Sci (Qassim).* 2016;10:353-62.
- Asghar A, Masood Shah A, Ali Hussain A, et al. Frequency of pre-obesity and obesity in medical students of karachi and the predisposing lifestyle habits. *Cureus.* 2019;11:e3948.
- Asousi MA. Physical activity among preclinical medical students at the University of Malaya, Malaysia. *JNHFS.* 2016;4:1-8.
- Najarkolaei FR, Talatappeh HD, Naghavi S. Physical activity and nutrition status in the university students: a mix method study. *JHPSH.* 2015;2:201-6.
- Assir MK, Khan Z, Shafiq M, et al. High prevalence of preobesity and obesity among medical students of Lahore and its relation with dietary habits and physical activity. *Indian J Endocr Metab.* 2016;20:206.
- Selçuk KT, Karataş S, Çetinkaya İE, et al. Celal Bayar Üniversitesi Tıp Fakültesi Dönem 1 öğrencilerinin bazı sağlık davranışları ve okul ortamından beklentilerinin değerlendirmesi. *CBU-SBED.* 2016;3:413-8.
- Saranya SV, Rao CR, Kumar SC, et al. Dietary habits and physical activity among medical students of a teaching hospital in South India: A descriptive analysis. *Trop J Med Res.* 2016;19:172-7.
- Bergeron N, Al-Saiegh S, Ip EJ. An analysis of california pharmacy and medical students' dietary and lifestyle practices. *Am J Pharm Educ.* 2017;81:5956.
- Çetin G, Sarper F. Tıp fakültesi birinci ve son sınıfa devam eden öğrencilerin beslenme bilgi ve alışkanlıkları üzerine bir araştırma. 21. yüzyılda eğitim ve toplum. 2013;2:84-104.