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Assessment of Calories Expended and Nutritional and Physical Activity Habits of Medical Faculty Students and Residents in Different Clinics

Emine Sınlık*, Nisa Zülal Sarı*, Sena Arpacı*, Gökçe Nur Durmuş*, Nurcan Aydoğan*, Şule Özbilgin*, Hazal Küçükali*, Volkan Hancı*

Department of Anesthesia and Intensive Care, Dokuz Eylül University Faculty of Medicine, İzmir, Türkiye
**Authors contributed equally.*

Abstract

BACKGROUND/AIMS: In our study, we aimed to assess the calorie expenditure amounts, feeding, night eating and physical activity habits of medical faculty students and assistants.

MATERIALS AND METHODS: A questionnaire consisting of 43 questions was applied to the students and assistant doctors of Dokuz Eylül University Faculty of Medicine and pedometer data obtained by their mobile phones were obtained and recorded.

RESULTS: Our study included 297 medical faculty students and 177 residents for a total of 474 individuals. The mean number of steps was 8,829.80±3,302.88 for students, and 6,618.33±2,811.08 for residents. The calories expended were 441.49±165.14 kCal for students and 330.91±140.55 kCal for assistants. The numbers of students and residents achieving the recommended 10,000 steps was 31.4% and 9.6%, respectively. According to the nutritional habits survey, the proportions of students and residents eating healthily were 32% and 35%, respectively. The incidence of night eating syndrome among students and residents was determined to be 4% and 6.8%. In our study, with increases in the monthly number of on-duty shifts and additional working times for residents, there was a positive correlation with weight, body mass index, dessert intake, soft drink intake and coffee intake; and a negative correlation with vegetable/fruit intake, pulses intake and nutritional habits scores.

CONCLUSION: In our study, medical students and residents did not reach the recommended physical activity levels within their working hours, two thirds of the students and residents had unhealthy nutrition and had higher rates of night eating syndrome compared to the normal population.

Keywords: Medical students, residents, physical activity, pedometry, nutritional habit, night eating syndrome

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ORCID IDs of the authors: E.S. 0000-0002-9472-9382; N.Z.S. 0000-0002-3759-7803; S.A. 0000-0003-4186-8407; G.N.D. 0000-0002-8163-7534; N.A. 0000-0001-6130-3919; Ş.Ö. 0000-0002-2940-8988; H.K. 0000-0003-2264-108x; V.H. 0000-0002-2227-194X.

Address for Correspondence: Şule Özbilgin
E-mail: sozbilginmd@mail.com
ORCID ID: orcid.org/0000-0002-2940-8988

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INTRODUCTION

Being a healthy individual is linked to fulfilling physical, social, emotional, and intellectual needs. Nutrition is a necessary and essential requirement for human life, along with our critical physiological needs such as breathing and excretion.[1] The residency and student periods require physical effort due to intense work tempos and on-duty intensity, occasionally with 24-36 hour periods spent in the hospital environment. Being on-duty, working night shifts, staying in the hospital for long hours, and the related intense physical activity may cause changes in the metabolic activity, physical activity, and nutritional intake patterns of residents and medical students.[2] Previous studies have assessed the nutritional intakes and metabolic markers of residents. Studies determined low intakes of vegetables and fruit in the diet. Additionally, high amounts of desserts, saturated fats, cholesterol, and caffeine intake are common among residents.[3] Eating disorders among medical faculty residents and students, especially night eating syndrome among students working shifts with disrupted normal diurnal rhythms, may cause hormonal changes.[1-3] Additionally, for residents in different departments and medical faculty students, very few studies have determined the mean activity amounts, the number of steps, calorie expenditure, nutritional habits, and night eating syndrome incidences. Our study aimed to assess the calorie expenditure amounts, feeding, night eating, and physical activity habits of students at the faculty of medicine and residents in different departments and to assess any practical factors.

MATERIALS AND METHODS

After receiving ethics committee permission [Dokuz Eylül University Ethics Committee approval was obtained (approval number: 2016/32-34], a 26-question nutritional habits survey[4] and a 17-question night eating survey,[5,6] for a total of 43 questions (Appendix 1), was administered to all Dokuz Eylül University Faculty of Medicine Students and Hospital residents in the basic medical sciences, internal medicine sciences and surgical medical sciences departments. The residents in basic medical science, internal medicine science, and surgical medical sciences had their total working hours and pedometer values while working recorded during three different times on duty. Three similar days when not on duty were measured with a pedometer using a previously downloaded "pedometer application" on their smartphones.[7] Following this, the mean of these values was obtained for their on-duty and off-duty days. Medical faculty students completed the nutritional habits and night eating survey, and the daily activity was assessed for students with their pedometer data.

Power Analysis

The number of volunteers to be included in our study was determined via power analysis. Rand determined the night eating syndrome incidence as being 1.5% in the average population.[8] Our study hypothesized that eating disorders would be higher among medical faculty students and residents and that their night eating syndrome incidence would be higher than for the general population, especially for residents working on-duty departments. As Rand determined,[8] for the average population, with a 1.5% value with an alpha error 0.05, a 7% difference between the groups, and 90% power required a sample number of at least 164 individuals.

Statistical Analysis

The data in our study were recorded and analyzed with the SPSS packet program. Residents in the basic medical sciences, internal medical sciences and surgical medical sciences, and medical faculty students had their physical activity measured with a pedometer application, and also their eating habits and night eating incidences were determined via a questionnaire. Variables with continuous values are given as mean ± standard deviation, with frequency variables given as numbers (n) and percentages (%). Adherence of data with continuous values to the normal distribution was tested with the Kolmogorov-Smirnov test. Comparison of continuous values was completed with the Kruskal-Wallis test, the Mann-Whitney U test, the One-Way ANOVA test, and Student's t-test depending on the normality test results and group numbers. Analysis of data with frequency was completed with the chi-square test and the Fisher's exact test depending on the group and case numbers. Significance was defined as p-values smaller than 0.05.

RESULTS

Our study included 297 medical faculty students and 177 residents for a total of 474 people. The 297 medical faculty students participating in our study were grouped according to their class level. Accordingly, of the 297 medical faculty students in our study, 95 were years 1-2-3, 153 were years 4-5, and 49 were year six students. Of the 177 residents participating in our study, 15 worked in basic medical sciences, 123 were working in internal medical sciences, and 39 worked in surgical medical sciences.

The medical faculty students participating in our study had a mean body mass index (BMI) of 22.37±3.17, with BMI values reducing from year 1 to 6. In our study, the mean number of steps taken by medical faculty students was 8,829.80±3,302.88. The students' nutritional habits score was mean 27.51±5.50, with a mean night eating score of 14.83±5.25. Those with nutritional habits score of above 30 comprised 32% of the students. 4% of the students had night eating score above 25 (Table 1).

The mean BMI of the residents included in our study was calculated as 23.75±3.57. The mean BMI was highest for the surgical medical sciences department. The mean number of steps within the working hours for the residents was 6,618.33±2,811.08, with the highest number of steps observed in the surgical medical sciences. The calorie amounts expended with these step numbers were 441.49±165.12 kCal for medical faculty students and 330.91±140.55 kCal for residents. The weekly mean working hours of the residents participating in our study was 60.88±23.77, with a mean on-duty working hours of 17.69±5.49. The mean steps/working hour rate for the surgical medical sciences (819.80±263.22) was the highest, with the mean on-duty steps/hour rate being highest for the internal medical sciences (551.64±282.86). The mean nutritional habits score for the residents participating in our study was 27.71±5.22, with the mean night eating score calculated as being 15.37±6.28. When compared with the basic and internal medical sciences, the surgical medical sciences had a lower nutritional habits score with a higher night eating score (Tables 2, 3).

In our study, as the class increased, the pulse consumption ($r=-0.160$; $p=0.06$) of medical faculty students decreased, while alcohol ($r=0.118$; $p=0.042$) and coffee ($r=0.243$; $p<0.001$) consumption increased. With an increase in monthly on-duty shifts and additional working durations of the residents, there was a positive correlation with weight ($r=0.250$; $p=0.001$), BMI ($r=0.273$; $p<0.001$), dessert intake ($r=0.171$; $p=0.023$),

Table 1. Demographic data, study data and step data of medical faculty students

	Student			
	Year 1, 2, 3; (n=95)	Year 4, 5; (n=153)	Year 6; (n=49)	Total; (n=297)
Mean age (years)	20.28±1.15	22.74±1.35	23.97±0.94	22.16±1.83
Weight (kg)	66.51±14.84	66.52±13.50	64.16±11.57	66.12±13.62
Height (cm)	171.07±9.26	171.43±8.82	171.04±9.07	171.25±8.97
BMI	22.53±3.67	22.47±3.05	21.78±2.43	22.37±3.17
Female/male	57 (60.0%)/38 (40.0%)	80 (52.3%)/73 (47.7%)	28 (57.1%)/21 (42.9%)	165 (55.6%)/132 (44.4%)
Mean number of steps	9696.86±2949.52	7622.56±3594.64	9271.40±3027.73	8829.80±3302.88
Mean calories (kCal)	484.84±147.47	380.12±178.73	465.60±150.38	441.49±165.14
Mean working hours	-	-	10.07±1.89	9.80±2.11
Mean steps/hour	-	-	928.79±275.10	962.43±295.37
Mean step/hour calorie (kCal)	-	-	46.43±13.75	48.12±14.76
>10000 steps	33.3%	23.3%	37.9%	31.4%
Nutritional habits score	28.32±5.61	26.99±5.44	27.55±5.42	27.51±5.50
Nutritional habits score >30	38 (40.0%)	43 (28.1%)	14 (28.6%)	95 (32.0%)
Night eating score	14.84±5.42	14.78±5.32	15.00±4.74	14.83±5.25
Night eating score >25/24-20/<20	5 (5.3%)/10 (10.5%)/80 (84.2%)	7 (4.6%)/21 (13.7%)/125 (81.7%)	0 (0%)/9 (18.4%)/40 (81.6%)	12 (4%)/40 (13.5%)/245 (82.5%)
Daily smoking (number of cigarettes)	1.43±4.17	2.59±6.54	2.34±5.01	2.18±5.64
Weekly alcohol (mL)	270.52±828.11	759.67±1653.78	1081.67±3666.20	656.33±1971.06

BMI: Body mass index.

soft drink intake (r=0.298; p<0.001) and coffee intake (r=0.206; p=0.006). Additionally, there was a negative correlation with fruit-vegetable intake (r=-0.251; p=0.001), pulse intake (r=-0.303; p<0.001) and nutritional habits score (r=-0.185; p=0.015).

DISCUSSION

Our study aimed to determine the activity levels of medical faculty students and residents. The mean number of steps per day for medical faculty students was 8,829.80±3,302.88, while the mean number of steps during work for residents was 6,618.33±2,811.08.

There are few studies assessing the activity levels of medical faculty students. The single study on this topic by Rye et al.[9] determined that 62 medical students in years 1-4 had mean step numbers of 10,703±3,986 per day. The researchers emphasized that 52% of students had steps above 10,000 per day.[9] In our study, the mean daily step numbers for medical students during the preclinical period for years 1, 2, and 3 were 9,696.86±2,949.52. The mean daily number of steps for medical students in years 4 and 5 when clinical internships begin was 7,622.56±3,594.64. In the internship period of year 6, and for residents, instead of steps being counted for the whole day, the mean number of steps in the working period was counted with a mean internship working hours of 10.07±1.89 hours, and mean the number of steps within the working period being 9,271.40±3,027.73. In our study, only 33.3% of year 1, 2, and 3 students and 23.3% of year 5 and 6 students exceeded the step limits.

When the mean step numbers during the work period for residents have been investigated, these studies are minimal. Rye et al.[9] stated that many doctors had difficulty sustaining a healthy lifestyle during their residency period. The researchers assessed 55 residents with residency durations of 1 to 4 years and stated that residents took a mean of 8,344±3,520 steps per day while working. The researchers emphasized that 35% of residents exceeded 10,000 steps. The researchers determined that senior residents took fewer steps compared to junior residents.

Murphy et al.[10] assessed the number of steps taken by 25 clinicians (15 surgeons, eight doctors, and two emergency medicine specialists) and 25 radiologists during their working days. They found that clinicians took 6,500-6,750 steps and radiologists took between 3,500-3,750 steps. They found a daily mean step difference of 2,985 between these two groups and reported a significant difference.[10]

Another study of emergency medicine residents recorded 91 working periods for 30 emergency medical residents and found that emergency medical residents took a mean of 7,333 steps (95% confidence interval 6,901-7,764). The researchers emphasized that the number of steps varied from 2,323 to 12,923 during the working periods, and only 9.9% reached the target number of steps of 10,000 during pedometer recording.[11] The study period evaluated 47.2% surgical and 52.7% internal medicine work periods with 49.4% daytime and 50.5% night shifts. They stated there was no significant difference in records above 10,000 steps in terms of department or day/night shifts.[11]

Another study evaluating cardiovascular specialists' daily physical activity investigated pedometer data for eight cardiovascular surgeons, seven cardiologists, five invasive cardiologists, and eight cardiac anesthesiologists (for a total of 28 doctors) over two weeks.[12] That study determined the step numbers during daily working hours were 6,540 for general cardiologists, 6,039 for cardiovascular surgeons, 5,910 for invasive cardiologists, and 5,553 for cardiac anesthesiologists. That study stated that there was no significant difference between the groups. That single-center small study by the researchers reported that physical activity related to work did not fulfill guideline recommendations.[12]

Table 2. Demographic data, study data and step data of residents

	Residents			
	Basic medical sciences; (n=15)	**Internal medical sciences; (n=123)**	**Surgical medical sciences; (n=39)**	**Total; (n=177)**
Mean age (years)	28.06±2.40	28.62±3.49	28.58±2.54	28.57±3.21
Weight (kg)	59.61±12.00	68.82±15.10	73.57±15.41	69.09±15.27
Height (cm)	164.06±9.33	169.28±8.75	173.26±10.22	169.72±9.40
BMI	22.05±3.53	23.80±3.66	24.27±3.16	23.75±3.57
Female/male	13 (86.7%)/2 (13.3%)	69 (56.1%)/54 (43.9%)	18 (46.2%)/21 (53.8%)	100 (56.5%)/77 (43.5%)
Seniority	21.09±16.03	22.21±14.47	29.41±17.58	23.80±15.55
Mean monthly on-call	0.66±1.79	5.80±5.99	7.53±2.61	5.75±5.43
Weekly working hours	40.00±0.00	54.19±19.10	88.11±17.89	60.88±23.77
Mean number of steps	4956.78±1854.84	6363.42±2607.69	8034.76±3197.26	6618.33±2811.08
Mean calories (kCal)	240.83±92.74	318.17±130.38	410.73±160.86	330.91±140.55
Mean working hours	8.09±0.30	8.19±1.34	9.89±3.41	8.55±2.06
Mean steps/hour	615.09±236.01	805.19±385.88	819.80±263.22	793.04±354.31
Mean step/hour calorie (kCal)	30.05±11.08	40.25±19.29	42.99±13.16	39.65±17.71
>10000 steps	9.1%	7.4%	16.7%	9.6%
Number of steps on duty	-	8381.73±3817.70	8939.54±3717.03	8509.04±3774.85
Mean calories on duty	-	419.08±190.88	466.97±185.85	425.45±188.74
Mean on duty working hours	-	16.25±4.74	21.19±5.81	17.69±5.49
On duty steps/hour	-	551.64±282.86	446.80±173.89	517.69±259.09
On duty steps/hour calorie (kCal)	-	27.58±14.14	25.34±8.69	25.88±19.95
On duty >10000 steps	-	27.4%	48.1%	33.3%
Nutritional habits score	28.33±3.30	27.93±5.19	26.79±5.89	27.71±5.22
Nutritional habits score >30	6 (40.0%)	44 (35.8%)	12 (30.8%)	62 (35.0%)
Night eating score	14.86±6.03	15.14±6.20	16.30±6.65	15.37±6.28
Night eating score >25/24-20/<20	1 (6.7%)/1 (6.7%)/13 (86.7%)	6 (4.9%)/19 (15.4%)/98 (79.7%)	5 (12.8%)/4 (10.3%)/30 (76.9%)	12 (6.8%)/24 (13.6%)/141 (79.7%)
Daily smoking (number of cigarettes)	0.66±2.58	3.35±7.71	7.20±9.96	3.97±8.16
Weekly alcohol (mL)	176.66±521.28	561.34±1277.53	1187.43±1783.35	666.69±1388.50

BMI: Body mass index.

A study assessing the number of steps taken by doctors in hospital evaluated the working day number of steps for 131 doctors.[13] Researchers determined the mean number of steps as 5,325 (interval: 1,105-10,250) with mean hourly step numbers of 548 (interval: 143-1,105).[13] The researchers reported no significant difference between internal medical sciences and surgical medical sciences or between senior and junior workers. Additionally, they emphasized that age and BMI were essential factors. An increase in age by each year was correlated with a reduction of 5 steps per hour on average. Each 1 kg/m^2 increase in BMI was correlated with a reduction of 20 steps per hour on average.[13] There was no significant difference between the surgical and internal medical sciences in our study in terms of mean step numbers. Additionally, there was no correlation identified between seniority, BMI, or age with the mean number of steps taken during working and on-duty shifts.

Another study[14] assessed the number of steps taken by 16 doctors (4 internal medicine specialists, four surgical specialists, four internal medicine residents, and four surgical residents) working in St. John's Hospital in Livingston. It was conducted over five working days and found the mean number of steps was 7,907 for internal residents, 5,068 for surgical residents, 4,822 for surgical specialists, and 4,647 for internal specialists. The distances walked while on-duty varied from 3.84 km (specialists) to 6.85 km (residents). The researchers emphasized that the walking did not fulfill the daily activity quotas recommended and reported that at least one hour of additional physical exercise was recommended daily to reach this quota.[14]

Studies have evaluated the number of medical students and doctors of varying seniority, but by workers in different branches in hospitals. A study assessing the number of steps taken by 180 health workers in a third stage hospital in Nigeria determined that the health workers' mean daily step number was 7,396.94±2,714.63. That study found that 20% of health workers took a minimum of 10,000 steps per day, with 34.4% slightly less active and 23.9% slightly active. That study found that 43.9% of health workers took more than 7,500 steps per day, with nurses having the highest value of 7,980 steps per day. Physiotherapists followed the nurses at 7,332 steps, and pharmacists were in the last place, taking 6,201 steps. That study emphasized no significant difference in terms of the number of steps taken by the health workers in different groups. That study also found a negative correlation between the number of steps taken by the health care workers with their ages, BMIs, and body fat ratios.[15]

Table 3. Demographic data, study data and step data of residents according to department

	Family practitioner (n=35)	Pediatrics (n=22)	Anesthesiology (n=22)	Emergency medicine (n=20)	Internal medicine (n=18)	Public health (n=15)
Mean age (years)	29.00±3.19	27.36±2.34	28.72±2.33	27.75±2.22	27.61±1.81	32.80±5.97
Weight (kg)	63.62±13.09	67.00±10.78	66.90±12.29	75.05±16.06	70.16±18.19	71.93±17.12
Height (cm)	168.62±7.20	166.27±8.27	169.63±10.51	170.68±10.89	171.27±8.07	167.53±8.70
BMI	22.20±3.31	24.17±3.00	23.09±2.41	25.52±3.41	23.63±4.67	25.31±3.79
Female/male	24 (68.6%)/11 (31.4%)	14 (63.6%)/8 (336.4%)	15 (68.2%)/7 (31.8%)	9 (45.0%)/11 (55.0%)	7 (38.9%)/11(61.1%)	9 (60%)/6 (40%)
Seniority	18.95±11.65	16.27±9.03	26.27±17.43	25.71±17.48	21.23±13.69	26.57±20.27
Mean monthly on-call	1.02±2.17	8.72±1.16	7.09±1.94	15.70±5.45	6.88±1.45	0±0
Weekly working hours	40.14±0.84	83.06±21.61	87.36±9.50	53.86±11.55	65.76±10.60	40.33±2.28
Mean number of steps	6049.40±2373.11	5658.57±2126.98	7773.61±3410.68	7026.73±2132.78	8683.95±2573.18	4143.47±2592.00
Mean calories (kCal)	302.47±118.65	282.92±106.34	392.68±170.53	351.33±106.63	434.19±128.65	207.17±129.60
Mean working hours	7.32±1.65	9.00±0.00	9.75±4.04	8.56±0.87	8.68±1.64	8.00±0.0
Mean steps/hour	896.94±480.09	628.73±236.33	804.89±271.40	817.73±225.61	1015.51±352.74	517.93±324.00
Mean step/hour calorie (kCal)	44.84±24.00	31.43±11.81	42.24±13.57	40.88±11.28	50.77±17.63	25.89±16.20
>10000 steps	2 (5.7%)	1 (4.5%)	3 (13.6%)	0 (0%)	3 (16.7%)	0 (0%)
Number of steps on duty	6718.66±2719.52	7889.72±3903.96	7924.14±2911.62	9945.63±2867.24	9261.19±4588.57	-
Mean calories on duty	335.93±135.97	394.48±195.19	399.20±145.58	497.28±143.36	463.05±229.42	-
Mean on duty working hours	14.13±6.06	17.15±1.39	18.92±3.76	11.48±3.14	18.89±5.73	-
On duty steps/hour	541.63±297.21	461.33±236.87	423.46±143.34	884.22±212.19	510.19±301.08	-
On duty steps/hour calorie (kCal)	27.08±14.86	23.06±11.84	23.17±7.16	44.21±10.60	25.50±15.05	-
On duty >10000 steps	0 (0%)	5 (22.7%)	6 (27.3%)	5 (25.0%)	5 (27.8%)	-
Nutritional habits score	28.25±4.34	30.45±4.70	27.18±5.59	24.90±5.32	27.66±5.25	28.60±3.90
Nutritional habits score >30	11 (31.4%)	11 (50%)	5 (22.7%)	4(20.0%)	7(38.9%)	7 (46.7%)
Night eating score	14.62±7.27	14.77±5.58	18.13±6.95	15.50±7.71	15.72±3.99	13.53±4.37
Night eating score >25/24-20/<20	2 (5.7%)/6 (17.1%)/27 (77.1%)	1 (4.5%)/0 (0%)/21 (95.5%)	4 (18.2%)/4(18.2%)/14 (63.6%)	2 (10%)/4 (20%)/14 (70%)	0 (0%)/3 (16.7%)/15 (83.3%)	0 (0%)/3 (20%)/12 (80%)
Daily smoking (number of cigarettes)	1.42±4.42	2.04±4.86	4.90±7.89	8.05±10.52	0.55±2.35	6.33±10.60
Weekly alcohol (mL)	401.42±621.01	45.45±213.20	839.09±1291.01	1138.75±2163.67	119.44±254.66	388.00±615.81

BMI: Body mass index.

In our study, the nutritional habits of medical faculty students and residents were assessed. A nutritional habits survey was applied in order to determine their nutritional style. Previous studies have stated that scores above 30 on this survey are related to healthy eating habits.[4] In our study, the mean nutritional habits score was determined to be 27.51±5.50. The proportion of students with nutritional habits score above thirty was 32.0%. The mean nutritional habits score for the residents participating in our study was determined to be 27.71±5.22. The proportion of residents with nutritional habits score above thirty was 35%. Studies assessing the nutritional habits of medical students are minimal. A single study on the topic by Rye et al.[9] found that medical students consumed less fruit and vegetables than recommended. In our study, 74.7% of medical students ate vegetables only 1-2 times per day, while 70.2% ate fruit only 1-2 times per day. Our study determined that medical students ate less fruit and vegetables than recommended. Similar to the study by Rye et al.,[9] our study showed that only 32% of medical students had scores indicating healthy eating. In comparison, 53.9% of medical students had fish consumption less than twice per week. It was determined that coffee consumption, junk food consumption, red meat, and white meat consumption increased as the student year increased, while pulse consumption decreased.

There may be changes in nutritional habits during the residency period, mainly due to on-duty hours and night shifts. Different studies have researched doctors' eating habits and a variety of influential factors. Mota et al.[3], emphasizing that on-duty work was typical during the residency period and may require doctors to stay in the hospital for 24 hours, reported that lifestyles with extended stays in the hospital affected nutritional intake, physical activity levels, and the metabolic patterns of individuals. In a study including 72 residents, 52 female, and 20 male, the researchers assessed participants with 3-day diets and the "Adapted Healthy Eating Index." They found bad dietary habits, reduced vegetable and fruit intake, as well as high intakes of desserts, saturated fats, cholesterol, and caffeine among both genders. According to their results, the researchers emphasized that the residents' workloads should be reviewed and developed among doctors in order to prevent the worsening of health problems and that health status should be monitored.[3] Rye et al.[9] found that residents consumed less fruit and vegetables than the recommended portions, with higher BMI and Framingham Risk Score for residents compared to students. The researchers emphasized that residents were less active and ate less fruit and vegetables than students, and this difference was related to high BMI, waist circumference, and cardiovascular risk.[9]

A study by Mota et al.,[2] including 72 residents, 52 female and 20 male, along with other studies, evaluated participants with a 3-day diet and the "Adapted Healthy Eating Index," on-duty durations, and nutritional intake patterns. They found a positive correlation for cereals, bread, and pasta intake with increased weekly additional working hours. There was a negative correlation for additional weekly working hours with fruit intake, bean intake, and the healthy eating index. The researchers emphasized that these factors were predisposing factors for excessive weight gain and metabolic disorder development in shift workers. In our study, there were positive correlations for weight (r=0.250; p=0.001), BMI (r=0.273; p<0.001), dessert intake (r=0.171; p=0.023), soft drink intake (r=0.298; p<0.001) and coffee intake (r=0.206; p=0.006) with increases in the monthly number of on-duty shifts and additional working times for residents. Additionally, there was a negative correlation with vegetable/fruit intake (r=-0.251; p=0.001), pulses intake (r=-0.303; p<0.001) and nutritional habits score (r=-0.185; p=0.015).

Night eating syndrome is characterized by the separation of eating and sleeping circadian rhythms and delayed eating, with symptoms such as evening hyperphagia, waking at night to eat, morning anorexia, and sleep disorders.[5] Night eating can be investigated with the 14-question Night Eating Survey developed by Allison et al.[16] The Turkish version of the survey's validity and reliability was researched by Atasoy et al.[5] This version was used in our study.[5] The incidence of night eating syndrome is reported as 1-1.5% in the adult population.[5] Our literature analysis did not encounter any articles on the incidence of night eating syndrome among medical faculty students or residents.

Additionally, in a study assessing the incidence of night eating syndrome among university students, night eating syndrome was assessed with an online survey of 1,636 university students with ages varying from 18 to 26 years. The incidence of night eating syndrome among university students was assessed to be 4.2%. When the researchers removed excessive eating, they reported this rate as being revised to 2.9%. The researchers did not find any correlation between night eating syndrome and BMI; however, they determined a correlation between night eating syndrome and anorexia nervosa in the study group.[17]

Another study assessing medical faculty students divided them into two groups as those with diurnal lifestyles and those with nocturnal lifestyles in terms of 24-hour endocrine patterns and they found that plasma leptin and melatonin levels peaked at 03.00 in the diurnal lifestyle group. In contrast, these levels were reduced in the group with a nocturnal lifestyle.[18] The researchers emphasized there was a link between night eating syndrome and melatonin and leptin level elevation. In that study, the group with a nocturnal lifestyle had significant decreases in insulin secretion at midnight and in the early hours of the morning; however, plasma glucose concentration continued at high levels. The researchers showed a strong correlation between glucose and insulin after eating in the diurnal lifestyle group, while this was disrupted in the nocturnal lifestyle group. They proposed that the nocturnal lifestyle disrupted the reaction of insulin to glucose. The researchers' results emphasized that individuals with nocturnal lifestyles had several risk factors regarding health, including night eating syndrome, obesity, and diabetes.[18]

Our study calculated the mean night eating score of medical faculty students as 14.38±5.25. The proportion of students with night eating score above 25 was 4%. There is no study assessing the incidence of night eating syndrome among medical doctors, residents, and specialist doctors. Additionally, in another study emphasizing that the prevalence of night eating syndrome and depression is increasing globally, nurses' night eating syndrome incidence was assessed. That study emphasized that nurses were at particular risk of night eating syndrome due to irregular eating behavior, shift work, and their stressful working environments. That study analyzed data from 3,617 nurses and determined the night eating syndrome incidence as being 5.7%[19]. In our study, the mean night eating score of the residents was 15.37±6.28, and the proportion of doctors with night eating syndrome scores above 25 was 6.8%. Compared with the basic and internal medical sciences, the nutritional habits score was lower for surgical medical sciences, while their night eating score was higher.

CONCLUSION

Our study aimed to assess the calorie expenditure amounts, nutritional and physical activity habits, and effective factors among medical faculty students and residents from different departments. We found that the mean number of steps for medical faculty students was 8,829.80±3,302.88, while for residents, the mean number of steps taken while working was 6,618.33±2,811.08. The proportions of students and residents reaching the recommended 10,000 steps were 31.4% and 9.6%, respectively. According to a nutritional habit survey, the proportions of students and residents eating healthily were 32% and 35%, respectively. The incidence rates of night eating syndrome among students and residents were 4% and 6.8%, respectively. In our study, there were a positive correlations for weight (r=0.250; p=0.001), BMI (r=0.273; p<0.001), dessert intake (r=0.171; p=0.023), soft drink intake (r=0.298; p<0.001) and coffee intake (r=0.206; p=0.006) with increases in the monthly number of on-duty shifts and additional working times for residents. Additionally, there were a negative correlations with vegetable/fruit intake (r=-0.251; p=0.001), pulses intake (r=-0.303; p<0.001) and their nutritional habits score (r=-0.185; p=0.015).

In conclusion, medical students and residents did not reach the recommended physical activity levels within their working hours, two thirds of students and residents had unhealthy nutrition and had higher rates of night eating syndrome than the general population. Among residents, an increase in on-duty and additional working hours increased their unhealthy eating behavior such as increased dessert intake, soft drink intake, and coffee intake and reduced their fruit, vegetable and pulse intake. Unhealthy eating habits begun in medical faculties and continuing during internships are continuously increasing among residents, especially with their additional working hours. Healthy eating programs should be created for residents. Awareness on this topic should be increased, with organizations actively leading the way on this topic and taking necessary precautions for healthy nutrition.

MAIN POINTS

- Medical students and residents did not reach the recommended physical activity levels within the working hours.
- Two thirds of the medical students and residents doctors had unhealthy nutrition.
- There was a positive correlation between weight, BMI, dessert intake, soft drink intake, and coffee intake; and there was a negative correlation with vegetable/fruit intake, pulses intake, and

nutritional habits scores with increases in the monthly number of on-duty shifts and additional working times for residents.

- Medical students and residents had higher rates of night eating syndrome compared to the general population.

ETHICS

Ethics Committee Approval: This study was approved by the Dokuz Eylül University Ethics Committee (approval number: 2016/32-34).

Informed Consent: It was obtained.

Authorship Contributions

Concept: E.S., N.Z.S., S.A., G.N.D., N.A., Ş.Ö., H.K., V.H., Design: E.S., N.Z.S., S.A., G.N.D., N.A., Ş.Ö., H.K., V.H., Data Collection and/or Processing: N.Z.S., S.A., G.N.D., N.A., Analysis and/or Interpretation: V.H., Literature Search: H.K., Writing: E.S., Ş.Ö.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

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REFERENCES

1. Mota MC, Waterhouse J, De-Souza DA, Rossato LT, Silva CM, Araújo MB, et al. Association between chronotype, food intake and physical activity in medical residents. Chronobiol Int. 2016; 33(6): 730-9.
2. Mota MC, Waterhouse J, De-Souza DA, Rossato LT, Silva CM, Araújo MB, et al. Sleep pattern is associated with adipokine levels and nutritional markers in resident physicians. Chronobiol Int. 2014; 31(10): 1130-8.
3. Mota MC, De-Souza DA, Rossato LT, Silva CM, Araújo MB, Tufik S, et al. Dietary patterns, metabolic markers and subjective sleep measures in resident physicians. Chronobiol Int. 2013; 30(8): 1032-41.
4. Simonelli-Muñoz AJ, Fortea MI, Salorio P, Gallego-Gomez JI, Sánchez-Bautista S, Balanza S. Dietary habits of patients with schizophrenia: a self-reported questionnaire survey. Int J Ment Health Nurs. 2012; 21(3): 220-8.
5. Atasoy N, Saraçlı Ö, Konuk N, Ankaralı H, Güriz SO, Akdemir A, et al. The reliability and validity of Turkish version of the Night Eating Questionnaire in psychiatric outpatient population. Anatolian Journal of Psychiatry. 2014; 15: 238-47.
6. Saraçlı Ö, Atasoy N, Akdemir A, Güriz O, Konuk N, Sevinçer GM, et al. The prevalence and clinical features of the night eating syndrome in psychiatric out-patient population. Compr Psychiatry. 2015; 57: 79-84.
7. Fong SS, Ng SS, Cheng YT, Zhang J, Chung LM, Chow GC, et al. Comparison between smartphone pedometer applications and traditional pedometers for improving physical activity and body mass index in community-dwelling older adults. J Phys Ther Sci. 2016; 28(5): 1651-6.
8. Rand CS, Macgregor AM, Stunkard AJ. The night eating syndrome in the general population and among postoperative obesity surgery patients. Int J Eat Disord. 1997; 22(1): 65-9.
9. Rye PL, Reeson ME, Pekrul CM, Asfour NA, Kundapur R, Wilson MP, et al. Comparing health behaviours of internal medicine residents and medical students: an observational study. Clin Invest Med. 2012; 35(1): E40-4.
10. Murphy IG, Murphy CG, Heffernan EJ. A comparative analysis of the occupational energy expenditure of radiologists versus clinicians. Ir J Med Sci. 2015; 184(4): 889-92.
11. Josephson EB, Caputo ND, Pedraza S, Reynolds T, Sharifi R, Waseem M, et al. A sedentary job? Measuring the physical activity of emergency medicine residents. J Emerg Med. 2013; 44(1): 204-8.
12. Abd TT, Kobylivker A, Perry A, Miller Iii J, Sperling L. Work-related physical activity among cardiovascular specialists. Clin Cardiol. 2012; 35(2): 78-82.
13. Goosen JH, Ettema HB, Kollen BJ, Verheyen CC. Hoeveel stappen zet een dokter in het ziekenhuis? Geen verschil tussen internisten en algemeen chirurgen, maar wel samenhang met leeftijd en BMI [How many steps does a doctor take in the hospital? No difference between internists and general surgeons, but a relationship with age and BMI]. Ned Tijdschr Geneeskd. 2008; 152(4): 203-6.
14. Jatkinson J, Goody RB, Walker CA. Walking at work: a pedometer study assessing the activity levels of doctors. Scott Med J. 2005; 50(2): 73-4.
15. Owoeye O, Tomori A, Akinbo S. Pedometer-determined physical activity profile of healthcare professionals in a Nigerian tertiary hospital. Niger Med J. 2016; 57(2): 99-103.
16. Allison KC, Lundgren JD, O'Reardon JP, Martino NS, Sarwer DB, Wadden TA, et al. The Night Eating Questionnaire (NEQ): psychometric properties of a measure of severity of the Night Eating Syndrome. Eat Behav. 2008; 9(1): 62-72.
17. Runfola CD, Allison KC, Hardy KK, Lock J, Peebles R. Prevalence and clinical significance of night eating syndrome in university students. J Adolesc Health. 2014; 55(1): 41-8.
18. Qin LQ, Li J, Wang Y, Wang J, Xu JY, Kaneko T. The effects of nocturnal life on endocrine circadian patterns in healthy adults. Life Sci. 2003; 73(19): 2467-75.
19. Kim OS, Kim MS, Lee JE, Jung H. Night-eating syndrome and the severity of self-reported depressive symptoms from the Korea Nurses' Health Study: analysis of propensity score matching and ordinal regression. Public Health. 2016; 141: 80-7.

Appendix 1 Link: http://glns.co/x9wa7