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THE RELATIONS BETWEEN SLEEP PATTERNS, NIGHT EATING HABITS, AND BODY MASS INDEX OF THE STUDENTS OF THE DEPARTMENT OF NUTRITION AND DIETETICS

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ONAY

Bu tez Yeditepe Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliğinin ilgili maddeleri uyarınca yukarıdaki jüri tarafından uygun görülmüş ve Enstitü Yönetim Kurulu'nun 02./06./2017 tarih ve 2017/10-05 sayılı kararı ile onaylanmıştır.

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DECLARATION

I hereby declare that this masters dissertation is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

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LIST OF SYMBOLS AND ABBREVIATIONS

1. BMI: Body Mass Index
2. LEM: Late Evening Meals
3. NES: Night Eating Syndrome
4. SCN: Suprachiasmatic Nucleus
5. SRED: Sleep Related Eating Disorder

ABSTRACT

Öztürk, İ. (2017). The Relations Between Sleep Patterns, Night Eating Habits, And Body Mass Index Of The Students Of The Department Of Nutrition And Dietetics. Yeditepe University, Institute of Health Science, Department of Nutrition and Dietetics, MSc thesis, İstanbul.

Obesity regarded as a threat that can lead to serious diseases worldwide. Factors such as decreased physical activity, frequent consumption of ready to eat and high calorie foods increase the risk of obesity. Sleeping habits and late eating habits are among the factors that increase the risk of obesity in many age groups. This study was conducted to determine the effects of college students' sleeping habits and late eating habits, BMI, waist circumference, and fat mass measurements, which are included in the young adult group, which are less studied in than other age groups.

During the study period, participants' BMI and fat masses were measured with a body analyzer and their waist circumference was measured with the meter. A questionnaire was used to question sleeping habits, eating behaviors, accommodation opportunities and exercise habits of participants.

According to the results obtained, no significant relationship was found between university students in the age range of 18-24, for their sleeping habits and consumption of foods consumed in the process of being awake late at night, except consumption of chips and wine at the weekend. Due to the circumstances of the research, only girl students were involved.
The non-significant differences in parameters were associated with the fact that almost all of the participants were not overweight or obese, the study only conducted by female students, and the group have no bad eating or sleeping habits to cause obesity.
It is anticipated that similar studies to be conducted in the future may lead to different outcomes if applied to a larger population, taking both sexes into account.

Keywords: Sleep, Late Eating, Circadian Rhythm, Sleep Timing, Meal Timing

ÖZET

Öztürk, İ. (2017). Beslenme Ve Diyetetik Bölümü Öğrencilerinin Uyku Düzeni, Uyku Öncesi Yeme Alışkanlıkları Ve Vücut Kitle Endeksleri Arasındaki İlişkiler. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Beslenme ve Diyetetik ABD., Master Tezi. İstanbul.

Obezite dünya çapında ciddi hastalıklara yakalanmaya yol açabilecek bir tehdit unsuru olarak değerlendirilmektedir. Azalmış fiziksel aktivite, yemeye hazır, yüksek kalorili besinlerin sıkça tüketilmesi gibi faktörler obezite riskini arttırmaktadır. Uyku alışkanlıkları ve geç saatlerde yemek yeme alışkanlıkları da birçok yaş grubunda obezite riskini arttıran faktörler arasında yer almaktadır. Bu çalışma, diğer yaş gruplarına kıyasla daha az değerlendirilmeye alınan, genç yetişkin grubuna dâhil olan, üniversite öğrencilerinin uyku alışkanlıklarının ve geç saatte yemek yeme alışkanlıklarının, BKİ, bel çevresi ve yağ kütlesi ölçümlerinin üzerindeki etkilerinin saptanması amacıyla yapılmıştır.

Çalışma sürecinde katılımcıların BKİ ve yağ kütleleri vücut analiz cihazıyla, bel çevreleri de mezura yardımıyla ölçülmüştür. Katılımcılara; uyku alışkanlıklarını, yeme davranışlarını, konaklama imkânlarını ve egzersiz alışkanlıklarını sorgulayan bir anket uygulanmıştır.

Elde edilen sonuçlara göre; 18-24 yaş aralığında bulunan üniversite öğrencilerinin uyku alışkanlıkları ve geç saatlerde uyanık kaldıkları sürece tükettikleri besinler arasında cips tüketimi ve hafta sonu şarap tüketimi haricinde anlamlı bir ilişki saptanmamıştır. Araştırma koşullar dolayısıyla yalnızca kız öğrenciler arasında gerçekleştirilmiştir. Parametreler arasında anlamlı bir sonuç çıkmaması, katılımcıların neredeyse tamamının fazla kilolu veya obez olmamasıyla, yalnızca kız öğrencilerle gerçekleştirilen bir çalışma olmasıyla ve uygulanan grubun besin tüketim tercihlerinin ve uyku alışkanlıklarının obezite için bir risk faktörü olarak değerlendirilmemesiyle ilişkilendirilmiştir. İleride yapılacak benzer çalışmalar, her iki cinsiyeti de ele alarak daha büyük bir kitle üzerinde uygulanırsa farklı sonuçların ortaya çıkabileceği ön görülmektedir.

Anahtar Kelimeler: Uyku, Geç Saatte Yeme, Sirkadian Ritm, Uyku Zamanlaması, Öğün Zamanlaması

1. INTRODUCTION AND PURPOSE

In a world developing rapidly, people are required work more than it was before in order to achieve their goals due to the increasing population. For those who are in the pursuit of success, sleep can become of secondary importance.

Considering that communication is moving to the virtual environments and that individuals' habits of socializing based on physical activities are gradually perishing, we can see that a generation is being raised spending hours looking at computer screens and/or other electronic devices. Due to several reasons, sleep has become an ignorable option for people.

Unfavorable changes in sleep and eating patterns are now increasing in incidence in all age groups. Factors such as gender, race, socioeconomic status and age may prove differences in people's exposure to obesity.

Moreover, in a world changing so rapidly, a similarly rapid change in eating habits of the people is inevitable. Preference of fast food which is square, the lack of importance placed on a healthy diet, and the idea of buying time even from our meals may seem attractive to those who work for long hours which require continued focus.

Disrupted eating habits and reduced physical activity profiles lead people into obesity which is the primary reason of a number of metabolic disorders in the long term. Today, two third of the North American adults are overweight or obese while 23 million children living in the USA are obese. In DRC, on the other hand, 23.2% of the adult population is overweight or obese [1,8].

There are a number of factors affecting obesity. The frequency of meals and the meal scheduling change depending on the culture and the individual. Changing mealtimes is a risk factor which varies from one individual to another and which may trigger obesity.

According to the National Health Survey, 28.3% of the adults sleep 6 hours or less at night [17]. Changing sleep patterns and decreased sleep duration is closely associated with obesity.

It was found that the body mass index (BMI) of people from all ages who sleep less than 7.7 hours was higher than the ones who sleep more than 7.7 hours a day on an average [6]. Cuypers et al. reported that a very insufficient sleep duration (less than 5 hours) will be required in order to associate sleep deprivation and obesity [9].

In addition, night eating syndrome was addressed in the literature as a factor which may trigger obesity. Night eating syndrome (NES) may lead individuals into consuming food high in calories at late hours.

Several studies have included night eating syndrome to eating disorders and further researched this phenomenon.

Most of the studies available in the literature compare the obesity in children or adults with their sleeping patterns. Reilly et al., in a study on children at the age of 3, found that the obesity risk of children who sleep less than normal pose the increased risk of obesity by 45% when they are 7.

Another study conducted on young people suggested a reciprocal relationship between obesity and sleep duration. Factors such as lower sleep quality, delayed sleep phase are separately associated with the obesity estimations [9]. However, the literature offers limited amount of studies on the age group which can be defined as young people. University students are found to be an attractive population to study in terms of the relationship between their sleep and nutrition patterns given their changing lifestyle and their academic responsibilities.

It is known that individuals who have a higher calorie intake in dinner have a higher total energy intake when compared to those who have a higher calorie intake in breakfast [1]. As the night eating habit is common in university students, this study explores the relationship between circadian rhythm, timing of meals and obesity.

This study was conducted taking into account the accommodation conditions, availability of food, and sleep durations of university students. As the accommodation preferences of students coming from other cities change significantly, their eating habits tend to differ from their previous lifestyles.

Increased academic performance may have a negative effect on the sleep patterns of students.

In the light of all these assessments, the question if the changing lifestyle of university students increases their disposition to obesity has become an interesting subject to study. It was believed that to build this study on a comparison of students currently at different stages of their academic careers is the best option in order to understand if such changes are more obvious with the increased adaptation to the conditions as the students proceed in their academic lives.

A literature review on similar studies focusing on this age group in Turkey gave no results. And this is one of the reasons behind the motivations of this study.

In this context, this study is conducted in order to identify the relationship between individuals' sleeping patterns, their dietary habits and the occurrence of obesity.

2. LITERATURE REVIEW

2.1. OBESITY

Obesity is a disorder where body fat mass increases extremely over the lean body weight and where a person gains more weight than normal with respect to his/her height. A number of methods are used to identify obesity in people. Body mass index (BMI) is a practical criterion commonly used to identify this disorder [BMI = Weight (kg)/height^2 (m^2)]. Waist circumference and waist-to-hip ratio are criteria used in defining the fat distribution in the body [22].

WHO classification of obesity

Classification	BMI (kg/m²)	Risk of co-morbidity
Underweight	Less than 18.5	
Normal	18.5 - 24.9	Not increased
Overweight or pre-obese	25.0 - 29.9	Increased
Obesity, further classified as:	≥30.0	Increased as follows:
– Class I	30.0 - 34.9	– Moderate
– Class II	35.0 - 39.9	– Severe
– Class III	≥40.0	– Very severe

Source: Adapted from WHO 1997

Figure 1. Obesity Classification

Waist to Hip Circumference Ratio Standards for Men and Women

	Age (years)	Disease Risk Related to Obesity			
		Low	Moderate	High	Very High
MEN	20-29	<0.83	0.83-0.88	0.89-0.94	>0.94
	30-39	<0.84	0.84-0.91	0.92-0.96	>0.96
	40-49	<0.88	0.88-0.95	0.96-1.00	>1.00
	50-59	<0.90	0.90-0.96	0.97-1.02	>1.02
	60-69	<0.91	0.91-0.98	0.99-1.03	>1.03
WOMEN	20-29	<0.71	0.71-0.77	0.78-0.82	>0.82
	30-39	<0.72	0.72-0.78	0.79-0.84	>0.84
	40-49	<0.73	0.73-0.79	0.80-0.87	>0.87
	50-59	<0.74	0.74-0.81	0.82-0.88	>0.88
	60-69	<0.76	0.76-0.83	0.84-0.90	>0.90

(Adapted from Heyward VH, Stolarcyzk LM: Applied Body Composition Assessment. Champaign IL, Human Kinetics, 1996, p82.)

Figure 2. Waist-to-Hip Ratio Standards for Women and Men

According to the report of World Health Organization, obesity is the main cause of type 2 diabetes by 80%, coronary heart disease by 35%, and hypertension by 55% [22,24].

Obesity has become a health issue which affects the world both in terms of health and economy, therefore, its cure is extensively investigated all around the world [2].

2.1.1. Reasons and the Prevalence of Obesity

Today, two third of the North American adults are overweight or obese while 23 million children living in the USA are obese [1].

In DRC, on the other hand, 23.2% of the adult population is overweight or obese [8].

In Turkey, prevalence of obesity is increasing every day just like the rest of the world.

According to the preliminary report issued by the Ministry of Health of Turkey, "Nutrition and Health Survey of Turkey-2010", prevalence of obesity in Turkey is found,

- 20.5% in Men,
- 41.0% in Women,
- 30.3% in Total.

In the world, at least 2.8 million lives perish annually due to the complications arising from being overweight and/or obese [24].

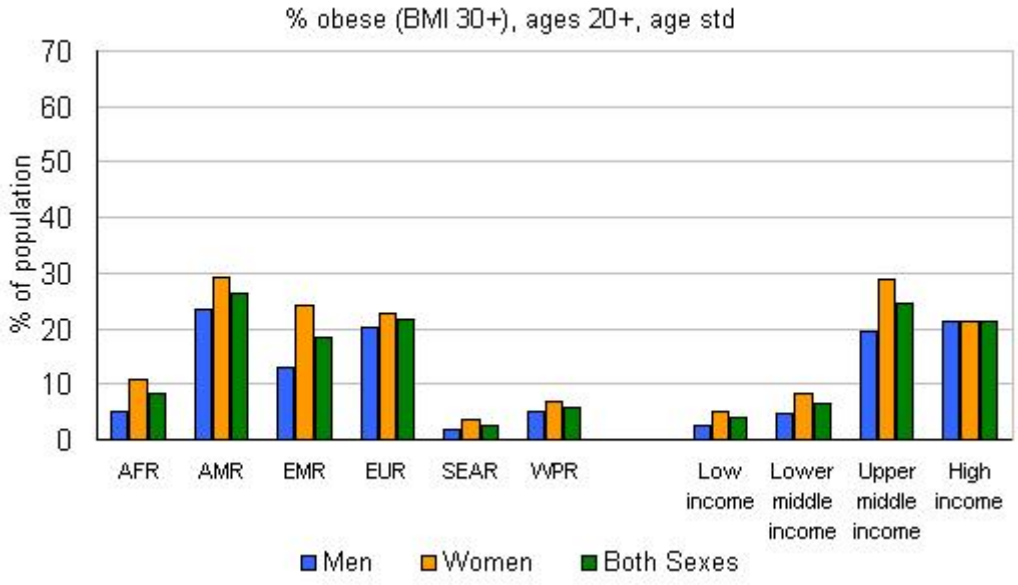
Increased body mass index prevalence is observed proportionally with the increased income level. In countries where the majority has high or above average income, the number of overweight individuals doubles the countries where the majority has below average income. In terms of obesity, the ratio of obesity in countries with low income is at 7% while it reaches up to 24% in countries with medium and high income which reveals a 3-fold difference [24].

Obesity also differs according to factors such as age and gender.

The prevalence of obesity in women is higher than that of men. As an exception, obesity rate of men and women in countries with higher income are comparable.

In countries with low and average income levels, on the other hand, female obesity is almost two-fold higher than that of male obesity [24].

The average BMI of Turkish adults is 25.4 for men and 27.7 for women. The average waist circumference of Turkish adults is 93cm for men and 92.5cm for women [22].



(WHO)

Figure 3. Obesity Levels in Accordance with Socioeconomic Distribution

A closer look into the relationship between age and obesity shows that increasing age of children also increases their ratio of being overweight or obese [1].

Obesity is the number one reason behind 1 million deaths annually.

According to the research conducted in Turkey, it was found that the elimination of obesity will reduce the deceased ration by 11.1% in men and 15.8% in women [22].

10.4% of the health expenditures in the USA in 2008 was spent on disorders arising from obesity and immobility. In Canada, on the other hand, the same expenditure added up to 7% of all the health expenditures [23].

Obesity is also has a negative impact on the individual's education. According to a research conducted on 2nd grade university students in Germany, a positive correlation was found between the students' scores and their BMI scores [16].

2.1.2. Relationship Between Nutrition and Obesity

There have been several attempts to build a relationship between obesity and eating disorders aimed at their treatment in the recent years [2].

There are three essential relationships between nutrition and body composition. If the calorie intake is less than or equals to or close to calorie expenditure, then the weight will be maintained, while calorie intake is more than calorie expenditure, then the person will gain weight.

Energy balance is of utmost importance in body mass management. However, it can be hard to limit and control energy intake [12].

Losing weight leads to a reduction in the fat and protein mass of the body. Protein loss is reduced with slow and long-term weight loss supported by exercise and it is preferred to reduce the decrease in the basal metabolism rate. When the weight lost is around 0.5 to 1kg per week, it is possible to keep the decrease in basal metabolism rate and the loss of proteins at a minimal level. With such a rate of weight loss, it is possible to lose around 10-15% of the body weight at the end of the year [22].

Dietary habits of individuals depend on a number of factors. A study found that factors such as age, gender, and ethnic origin affect the eating habits in individuals with ages ranging between 2 and 18. The same study observed increased energy intake in children with increasing age (+8 kcal/year) and female children consumed significantly less calories when compared to male children (-42 kcal)[1].

2.1.3. Role of Exercise

Diet and physical activity are essential factors affecting the BMI [19]. It is possible for an individual to improve his/her quality of life with healthy eating and physical activity.

Increasing availability of technology leads to a decrease in the physical activity rate of the new generation. Children and adolescents are facing decreased physical activity due to the time spent on technologic devices such computers, tablets, smartphones, namely, due to “screening time” which may increase their risk of obesity.

In European countries, it is a tradition for children and adolescents to watch TV after school for at least 2 hours. In addition, they are spending at least 1 hour daily on computer [16].

A study showed that the habits such as watching TV in the afternoon is gaining popularity among children which in return decreases their physical activity and that their energy intake is increased due to technological devices such as TV without even noticing it [1].

An increase in fat accumulation and a decrease in the oxidation of the food consumed are the case due to reduced physical activity in the later hours [1].

It is not only the time spent on technologic devices which reduces the physical activity. The competitive environment formed due to the increasing world population may lead individuals into a sedentary lifestyle in order to succeed in their professional and academic endeavors.

A study conducted in DRC associated doing homework with sedentary lifestyle. As a country with high population, children in Chinese schools are rather competitive. It was found that almost half of the children studying in DRC spend an average of 2 hours doing their homework both on weekdays and weekends [10].

In the USA, it was found that the cost of coronary diseases is increased around $24 billion dollars due to inactivity, while it was increased by $2 billion dollars for column cancer with an increase in the risk by 18% and 22%, respectively [23].

It was estimated that the health burden of physically active people is 30% lower than that of inactive people. In the UK where obesity affects 20% of the population and inactivity is seen as one of the factors behind it, it is estimated that the cost of obesity is $500 billion [23].

The research showed that physical activity reduces personal annual health expenses by $500. According to the data from 2008, the costs related to an inactive lifestyle add up to $80 billion dollars in health expenditures.

2.2. SLEEP

Sleep is a natural need just like the need for eating. If it is to have a healthy life for extended periods, individuals need to sufficient and quality sleeping pattern.

A number of reasons caused by today's order of the world may require people to work for longer hours than it was before. This situation limits the time one can set aside for himself/herself. When it comes to doing social activities, going on a vacation or completing a project before the deadline, individuals may choose to compromise on their sleep in order to buy time. According to the National Health Survey conducted between 2004 and 2007, 28.3% of the adults sleep 6 hours or less at night [17]. A sleep that is less than 6 hours is defined as a nap [9]. On the other hand, having irregular sleep at least 4 nights a week is defined as "sleep deprivation" [2].

Many studies showed that when the already disrupted eating habits combine with a disrupted sleep pattern, the risk of obesity increases. It was found that the BMI of people from all ages who sleep less than 7.7 hours was higher than the ones who sleep more than 7.7 hours a day on an average [6].

The risk of obesity due to disrupted sleeping pattern can be explored from many angles. According to the research by Baron et al., sleeping later than normal at night (that the middle of the sleep is around 05:30 am or later) may lead to obesity. On the other hand, the study took note of the increased calorie intake of the people who sleep later than normal after 20:00 [8].

Another study showed that individuals compensate their increased need of energy due to sleep deprivation with increased energy intake (from food) [17]. For example, the extra energy needed by a bedridden patient to stay awake for an extra 8 hours was calculated to be 134 kcal [17].

Drowsiness in daytime significantly limits physical activity [10]. As increased food consumption and decreased physical activity may lead to weight gain, they can increase the risk of obesity exponentially.

Sleep is as much needed by adults as adolescents, toddlers and preteens.

When sleep duration is shorter in a growing body, it is associated with increased fat accumulation.

A study reported that children who sleep for shorter periods are prone to decreased physical activity and to consume food and drinks with higher calorie profile [7]. As insufficient and poor sleep may lead the child to be “drowsy” during the day, decreased physical activity is an expected outcome. This can be explained with the fact that children staying up late are actually sleep deprived. Going to bed late as a result of activities such as watching TV, spending time on computer or doing homework, children may develop a habit of consuming high calorie food which accompanies these activities. It is believed that sleep is not only associated with childhood obesity but also with the increased risk of obesity in the future. Reilly et al., in a study on British children at the age of 3, found that the obesity risk of children who sleep less than normal pose the increased risk of obesity by 45% when they are 7. A similar study conducted in the US showed that 3rd graders with short sleep durations are exposed to the increased risk of being overweight by the 6th grade [7].

Patients with limited sleep due to different reasons or those who are sleep deprived are found to have factors such as gender and race involved in their situation. In this context, men put on more weight when compared to women [17].

2.2.1. Circadian Rhythm and Hormones

Sleep is regulated by circadian rhythm and homeostatic balance [5]. The risk of a change in the balance of the body with the changing sleep pattern can be explained with it being regulated by circadian rhythm and homeostatic balance.

Since 2001, different biological clocks (heart, liver, pancreas, etc.) were defined other than the one which is at the core of our body (Suprachiasmatic Nucleus; SCN). When these biological clocks work independent from the core biological clock, a disorder called “chronodisruption” occurs. This disorder may lead to health issues such as cancer, cardiovascular diseases and depression [3].

The main purpose of circadian rhythm is to prepare the organism to the environmental factors and in doing that, making it easier to access food and to make better estimations of where the food is [3].

Limiting the consumption of food at unfavorable hours of the day leads to physiological differences which may change the periferal clocks up to 12 hours, while it does not change the core biological clock [3].

According to a number of studies, some levels of hormones such as cortisol, ghrelin and leptin and their rhythms are affected by sleep limitations. It was suggested that hormonal changes of varying leptin and ghrelin levels of short term sleep may lead to reduced energy consumption and increase appetite in the body [18]. Many studies claimed that such a hormonal change may lead to reduced energy consumption and increased energy intake (accompanied by increased appetite) which result in weight gain [7]. As a meaningful explanation of the relationship between short sleep duration and obesity, increased insulin resistance, reduced glucose tolerance and sleep deprivation were assessed for their impact on the appetite mechanisms [10]. It is believed that increases in lipogenic hormones such as cortisol and disorders such as activation in inflammatory tracks can explain the relationship between short sleep and BMI [19].

Sleep is not accepted just as a risk factor behind the obesity. Poor and short sleep is also associated with metabolic syndrome, type 2 diabetes, hypertension and cardiovascular diseases [14]. Changes in metabolism such as increased glucose and insulin concentrations were detected in people who were active in nighttime and who consumed food during these hours under lab conditions.

The same study showed that the population investigated under this study gave results similar to those of pre-diabetic individuals and that their plasma leptin levels are decreased significantly [3].

52.1% of the US citizens have no quality of sleep while 8% of these people are diabetic at the same time. A study conducted on diabetic individuals showed that patients prescribed with both insulin and oral anti-diabetic medication have a shorter sleep duration when compared to those who are prescribed with insulin or oral anti-diabetic medication. The study found a significant relationship between short sleep, poor sleep quality and anti-diabetic medication use. These results are in support of the relationship between poor glycemic control and disrupted sleep [14].

The mechanism behind our appetite is regulated mainly by two hormones. Ghrelin is a hormone which is produced and released mainly by the stomach and it plays an important role in increasing one’s appetite, while leptin is secreted by adipose tissue and it accounts for the satiety activity.

A previous study showed that intravenous glucose infusion to individuals who sleep less than 4 hours led to increased ghrelin and decreased leptin levels.

In addition, self-reports of the individuals showed increased appetite for food rich in carbohydrates [17]. It was found in another study that the leptin levels of individuals who sleep less than 5 hours at an average are 15.5% lower than that of individuals who sleep 8 hours at an average [6].

Briefly, sleep is a mechanism regulated by circadian rhythm and homeostatic balance. However, any disruption in the sleep pattern and reduced sleep quality may alter the circadian rhythm and homeostatic balance which in return may result in obesity and metabolic diseases.

2.2.2. Sleep Timing, Sleep Duration and Obesity

Many changes which are recognized as obesity risk factors are also associated with sleep duration [4].

With decreased sleep duration the level of obesity increases in the population [4].

Due to several reasons, individuals may choose to reduce their sleep duration. In the USA, among the general reasons behind compromising on sleep duration are work, traveling and time reserved for leisure activities [4].

Although many studies focused on sleep duration, it is believed that it would be a meaningful method to explore obesity in this context assessing sleep duration in connection with sleep timing [7].

Night eating behavior is one of the most important factors behind the general belief that decreased sleep duration leads to obesity. Research on this field suggests that “Night Eaters” are those who eat after 8 pm [5].

A study reported that individuals who go to bed later than normal consume 248 kcal more than those with regular sleeping patterns, that they consume more food after 8 pm, and that they tend to prefer food rich in calories and that they consume less vegetables/fruits [5].

The same study reported a BMI of 23.7 for individuals who sleep at normal hours while the same was 26 for those who go to bed late [5].

Sleep duration may vary according to several socio-demographic factors such as gender, sharing an apartment with someone, etc. The prevalence of short sleep duration increases with increasing age in women.

A decline in this prevalence is observed after a certain age range (30 to 44). On the other hand, there is no significant difference in men. An increase in the sleep duration is observed for both male and female pensioners [11]. Difficulty falling asleep in women is associated with high BMI (individuals with difficulty: 27.6; individuals without difficulty: 25.3)[4]. Being married or living with someone is considered to be a factor affecting the sleep duration both in men and women [11]. Short sleep duration and consequently increased BMI are observed most commonly in Hispanics and Asians [4].

A study conducted on nurses working in shifts showed that individuals work in the night shift tend to consume reduced amounts of vegetables, fruits, and meat, while consuming increased amounts of alcoholic and sugary drinks, and it was concluded that individuals working in the night shift tend to consume reduced amounts of proteins [19].

Reduced sleep duration is generally addressed in connection with increased energy intake. When compared to those who sleep for normal durations, individuals who sleep less than normal tend to consume more calories after 8 pm which translates into higher BMI scores [17].

A study conducted on patients with sleep limitation showed that when patients sleep around 4 am on the “late night” days display increased macro nutrition consumption, and extra energy intake which is associated with increased frequency of meals when compared to the “normal night” days when they go to sleep by 10 pm.

Sleep timing is recognized as a factor affecting the weight loss process.

A study conducted on guinea pigs showed that guinea pigs which were kept alert at times when they should have been sleeping and then fed put on more weight when compared to those guinea pigs fed at normal times although the food intake was the same [17].

It was found that not only sleep duration but also sleep timing is a vital aspect in children and adolescents. Irregularities in total sleep duration and sleep timing not only lead to obesity but also increase the risk of obesity in later ages.

It was also found that sleep duration and sleep timing have an impact on the nutritional preferences of children and adolescents. In the last hundred year, the sleep duration of children and adolescents is decreased by 0.75 minutes each year. It was found that 40% of the children at school-age do not have sufficient sleep [10].

According to a study conducted in Australia, the obesity risk is 1.5 times higher in children who go to bed late and wake up late when compared to those who go to bed early and wake up early. The same study identified increased fast-food consumption and reduced consumption of milk and dairy products; however, no significant relationship was found between vegetable and fruit consumption [18].

According to Chronotype studies, morning-type children tend to have a lower BMI than evening-type children.

This is explained by the fact that evening hours offer less opportunities for physical activity, that it promotes more sedentary habits, that it results in increased consumption of snacks, and increased exposure to the advertisements of high-calorie food [7]. It was found that individuals who go to bed early and wake up early are physically more active. It was observed that they take 927 steps more than individuals who go to bed late and wake up late. The individuals who go to bed early and wake up early have met their MNPA guidelines (>60 min/day physical activity) by 83%, while it was 75% for those who go to bed late and wake up late.

Children who go to bed late and wake up late are found to be obese 1.5 times more than those who go to bed early and wake up early, while their physical activity level was 1.8 times higher and their “screening time” was 2.9 higher than the latter [7].

Sleep is not only an aspect which affects eating habits. A study on the adolescents showed that adolescents who sleep less than 8 hours are prone to substance abuse, suicidal thoughts, feeling unhappy and desperate, physical inactivity and consumption of sugar-sweetened beverages [9]. The preference of sleeping late is also associated with smoking, alcohol consumption and over consumption of caffeine [5].

Cuypers et al. reported that a very insufficient sleep duration (less than 5 hours) will be required in order to associate sleep deprivation and obesity [9].

Another study conducted on young people suggested a reciprocal relationship between obesity and sleep duration. Factors such as lower sleep quality, delayed sleep phase are separately associated with the obesity estimations [9].

Differences in sleep duration between weekdays and weekends and changes in typical sleep timing are also associated with being overweight or obese [4].

In the light of this information, it can be said that increasing the sleep duration on weekends when the sleep duration is insufficient in weekdays due to school or work may not be a balancing factor.

2.2.3. Night Eating Syndrome

In some cases, individuals' increased energy intake at late hours may go out of their control. Night eating is observed independent from sleep limitations or sleep timing. Night eating syndrome (NES) which is considered to be an eating disorder, may lead individuals into consuming food high in calories at late hours.

NES is considered a disorder of the circadian rhythm independent from eating and sleeping [2].

NES may lead to the disruption of the communication between circadian clock and periferal organs [2].

In order to be able to diagnose NES;

- 25% or more of the daily food intake takes place after dinner,
- consumption of at least 2 meals at night,
- or at least three of the following criteria: bad appetite in the morning; increased need to eat in the period between dinner and bedtime; the need for eating in order to fall asleep or changes in the mood in the nighttime [15].

Diagnosis of NES does not necessarily mean that the person is also obese. 1-1.5% of the general population is diagnosed with NES while this figure is 4-9% in the obese population [15].

Another study conducted on a younger population did not find any correlation between NES and BMI. Building on the available research, the possibility of NES to cause weight gain in time is speculated.

And this explains the conclusions of previous studies resulted in "no relationship between NES and BMI" [15]. Especially the fact that the obesity prevalence in NES diagnosed university students is low can be explained with the common knowledge about NES leading to obesity with increased age.

Due to similar reasons, there was no relationship found between NES and obesity in later ages.

The inability to obtain significant results for the relationship between BMI and NES for the people above 60 can be explained with the weakness due to several age-dependent diseases. Night eating habit persists with old age while diseases may lead to lower BMI scores [15].

A study showed that night eating is associated with “Food Addiction” which is a sense of need to consume specific food. Food Addiction is still being debated as a cause of obesity. Advocates of this argument believe that food with high energy content which is easily available or their ingredients such as salt, sugar, etc. may result in addiction-like behavior [13].

Similar in its symptoms, another NES-like eating disorder, SRED (Sleep Related Eating Disorder), was also identified to progress with unusual food choices.

The frequency of night eating may also be based on the changes in the mood of the individual. Night eating has found to facilitate the regulation of negative emotions in previous research, thus night eating is associated with increased emotional eating [13].

Recognized as psychiatry cases, NES patients are found to have high BMI scores and another study on diabetes patients showed that 9.7% of the patients also had NES [2].

The risk of NES differs according to a number of parameters. While men are more prone to night eating syndrome when compared to women, there is a medium level genetic transfer in both men and women [2].

There is a misconception about NES that individuals wake up in the middle of the night and eat unconsciously. However, a study which was based on video recordings showed that all the NES diagnosed participants were eating consciously when they were awake [2].

In children and adolescents, on the other hand, this issue was addressed quite differently. There is no general consensus on a relationship between obesity and NES in children.

However, it was suggested that children may develop night eating habits as a response to parental pressure [2].

2.3.MEAL FREQUENCY AND MEAL TIMING

2.3.1. Meal Frequency and Obesity

The U.S. Department of Labor defines the duration of a meal as 30 minutes. Moreover, when there is at least 30 minutes between two meals, then these meals are considered two separate meals [17].

When investigating sleep and eating patterns, breakfast is the meal studied with priority. An increased meal frequency is commonly observed with the reduced sleep duration and adoption of night eating behaviors.

Breakfast has received extensive interest from academic scientists in the context of meal frequency and obesity. As a meal consumed after a long term fasting during sleep, it is an important meal in terms of its timing and content. A correlation was found between skipping breakfast and being overweight or obese. Nevertheless, dyslipidaemia, insulin sensitivity, type 2 diabetes, blood pressure and coronary heart diseases are also associated with skipping breakfast [12].

The total energy intake of individuals who skip breakfast was found to be higher than those who have breakfast [3].

Frequency of meals as part of eating habits is not a factor which can lead to obesity by itself. Another study considered eating speed as one of the factors affecting the body weight.

Eating fast is considered as a factor with impact on satiety, portion size, energy intake, body weight and metabolic profile of the person [12].

2.3.2. Meal Timing and Obesity

Although the mechanism between meal timing and obesity is still not clear, it is believed that hormones may play a role in this mechanism. Changes in the meal timing may lead to the disruption of the order which in return leads to changes in circadian rhythm, therefore, altering hormone secretion patterns [3].

Unusual meal times may cause disorder in circadian rhythm and consequently health problems in people [3].

Changes in meal timing may change the ghrelin secretion timing up to 24 hours which in return may affect the physiologic control of hunger [3].

Right meal timing can help avoid obesity and eliminate the dangerous impact of a diet rich in fat [3].

After a short or long sleep, after hormonal changes, body may have an increased need for energy. Here, the first meal to be consumed after sleep gains importance. When it comes to obesity control, timing of meals, especially of those close to bedtime and their contents gains importance and they should not be overlooked.

Meal timing gains importance not only with the obesity risk involved but also its impact on the success of weight loss. A study which involved 12 weeks monitoring of the participants showed that individuals who eat more in the morning were more successful in losing weight when compared to those who eat more at night. Moreover, it was also found that insulin resistance of individuals who consume higher calories in breakfast decreases greatly in comparison [3].

It is known that individuals who have a higher calorie intake in dinner have a higher total energy intake when compared to those who have a higher calorie intake in breakfast [1]. A similar study observed that individuals who have high calorie intake in breakfast lose significantly more weight when compared to those who have high calorie intake in dinner [3].

Accompanying decreased physical activity later in the day, the consumption of high-calorie food is considered a factor increasing the risk of obesity. However, night eating behavior as a possible risk factor of obesity is not addressed only in terms of the consumption of high-calorie food.

A study conducted on guinea pigs showed that guinea pigs which were able to eat as much as they want, found that their glucose uptake was higher in evening when compared to morning hours [3]. This study shows that human body can have varying sensitivities for different macro nutrition at different hours.

Termed Late Night Meals (LEM) and defined as meals consumed a late hours, these meals are associated with the prevalence of obesity, postprandial hyperglycemia, and night time hypertriglyceridemia [12].

In a group of healthy participants, it was found that individuals who have meals between 11 pm and 5 am lose weight slower than those who have meals before 3 pm [17].

Wang et al. suggested that there is no correlation between high energy intake in the morning and obesity, however, they observed that obesity risk doubles when individuals consume more than 33% of their daily total energy intake at night when compared to its consumption in the morning [3].

Meal timing is considered a risk factor of obesity also for children. Research showed that overweight children consume 23 kcal more than their healthy peers in the timeframe between 4 pm and 8 pm; while obese children consume 27.4 kcal more than their healthy peers in the same timeframe [1].

3. MATERIALS AND METHODS

3.1. Analysis

This study was conducted on a total number of 104 female students, ages ranging between 18 and 25, who currently study in the 1st, 2nd, and 3rd grade of the Faculty of Health Sciences, Department of Nutrition and Dietetics of Yeditepe University. A literature review aimed at exploring sleep patterns, nutrition and night eating habits showed that there is limited amount of research focusing on young adults, university students, which was the motivation behind the population selection of this study. As the male population studying in this department is rather low, this group and 4th grade Department of Nutrition and Dietetics students were not included to the study.

BMI (Weight (kg)/ Height^2 (m^2)),body fat percentage and waist circumferences of the participants were measured as part of the analysis. The necessary height measurements for BMI scoring were taken using a stadiometer, and the measurements were taken barefoot when participants' heels were in contact with the device, aligning the apparatus with the top of their heads. BMI of the participants was then calculated using a body composition analysis device with the height and weight measurements taken. Nevertheless, InBody 230 body composition analysis device was used to measure body fat percentages. In order to cause any deviation, participants' waist circumference measurements were taken by the same researcher using inflexible tape measure suitable for medical purposes.

The sleep pattern and eating behavior research part of the study was performed using a questionnaire developed building on a literature review. In order to ensure that necessary information is inquired, researchers developed new survey questions inspired by available questionnaires.

In this questionnaire, all possible accommodation statuses were inquired using a classification involving "Family/Relative's Home", "Student Shared Flat", "Yurt (Campus)", "Dormitory (State)", and "Dormitory (Private)".

Sleep patterns are explored in two groups, namely, weekdays and weekends.

The participants were then asked to classify themselves under one of the items - “Go to bed late and wake up early”, “Go to bed early and wake up early”, “Go to bed early and wake up late”, “Go to bed late and wake up late”- developed taking the example of a previous study in order to investigate how long the participants sleep on weekdays and weekends, and if they have a habit of sleeping in daytime [7].

Participants were asked to specify their breakfast habits, and how many snacks and how many meals they consume in a day as part of the inquiry about their eating habits. Building on a previous study, participants were asked to specify their frequency – “Never/Less than once in a month”, “1-2 times in a month”, “Once a week”, “2-4 times a week”, “5-6 times a week”, “Every night”- of consumption of some specific food items between the dinner time and bedtime [8]. Ass the participants are students, a number of convenient food items commonly preferred by students were included in the assessment. Considering also the possibility of different accommodation styles may affect the choice of food items, the food items investigated were not limited with "ready-made" food.

Moreover, alcohol consumption of the participants was also investigated. The frequency scale used in the inquiry about their eating behaviors was used also in this section and commonly available types of alcoholic beverages were included.

Exercise habits of the participants were inquired based on the fulfillment of the criteria of “At least 3 days a week and at least for 30 minutes” [25].

In order to conduct this study and to confirm its ethical status, ethics committee approval for Observational Research was obtained from Bahçeşehir University Clinic Research Ethics Committee.

3.2.Statistical Analysis

SPSS 15.0 for Windows software was used for statistical analysis.

Complementary statistics were expressed in numbers and percentages for categorical variables and in averages, standard deviation, min. and max. values for numerical variables.

As the numerical variables do not meet the normal distribution condition, Mann Whitney U Test was used in comparison of two independent groups, while Kruskal Wallis test was used in the case of comparison of more than two groups.

Subgroup analysis was performed using Mann Whitney U test and was interpreted using Bonferroni correction. Correlations between numerical variables were explored using Spearman correlation analysis as they did not meet the parametric test conditions.

Chi Square Analysis was used to compare the ratios of the groups. Monte Carlo Simulation was used in cases where the conditions were not met.

Statistical alpha significance level was taken as $p<0.05$.

4. RESULTS

4.1.General Data

This study was conducted on a total number of 104 female students who currently study in the 1st, 2nd, and 3rd grades of the Faculty of Health Sciences, Department of Nutrition and Dietetics of Yeditepe University. It was defined that most of the participants are accommodated in dormitories. According to the survey, it was found that 40.2% of the participants regularly exercise while 59.8% do not exercise (Table 1).

Table 1. General Properties I

		Av.±SD	Min-Max
Age		20.8±1.4	18-24
BMI		20.4±2.6	15.8-31,7
Waist Circumference (cm)		65.6±6.2	54-93
Fat Mass (kg)		14.9±5.8	6.9-39.0
		Number	Percentage
Grade	1st grade	43	42.2
	2nd grade	14	13.7
	3rd grade	45	44.1
Accommodation	Family/Relative's home	32	31.4
	Student shared flat	43	42.2
	Dormitory (campus)	22	21.6
	Dormitory (private)	5	4.9
Exercise	Yes	41	40.2
	No	61	59.8

A statistically significant difference was found in the BMI, waist circumference and fat mass averages of the students across grades (p=0.006 p=0.005 p=0.011) (Table 2). The BMI, waist circumference and fat mass levels of 1st grade students were significantly lower than that of 2nd grade and 3rd grade students (1st grade average: 18.5; 2nd grade average: 21.3; 3rd grade average: 21.1) (Table 2). There was no significant difference between 2nd and 3rd grade students (Table 3).

There was no statistically significant difference between BMI, waist circumference and fat mass averages of the groups with regards to their accommodation types and exercise habits.

An assessment of the accommodation type showed that students living in campus dorms have the highest BMI, waist circumference and fat mass scores.

Although there was no statistically significant difference between exercise habits of the participants in terms of their BMI, waist circumference and fat mass scores, it was observed that fat mass percentage of those who exercise was lower than those who do not (Exercising group: 14.2 kg; non-exercising group: 15.4 kg) (Table 2).

Table 2. General Properties II

		BMI		**Waist circumference (cm)**		**Fat mass (kg)**	
		Av.	SD	Av.	SD	Av.	SD
Grade	1st grade	19.5	2.1	63.5	4.9	13.1	4.6
	2nd grade	21.3	2.1	68.4	6.2	16.6	4.5
	3rd grade	21.1	3.0	66.7	6.8	16.2	6.7
	p	0.006		0.005		0.011	
Accommodation	Family/Relative's home	20.6	2.4	65.7	5.8	15.6	6.0
	Student shared flat	19.9	2.1	64.5	5.7	13.3	4.4
	Dormitory (campus)	21.4	3.4	68.2	7.6	17.1	7.2
	Dormitory (private)	20.0	3.3	63.8	3.5	14.9	6.0
	p	0.247		0.136		0.147	
Exercise	Yes	20.4	2.1	65.8	5.3	14.2	5.3
	No	20.5	3.0	65.5	6.8	15.4	6.1
	p	0.700		0.356		0.299	

Table 3. Subgroup Analyses

	BMI	**Waist circumference (cm)**	**Fat mass (kg)**
	p	p	p
1st grade vs. 2nd grade	0.008	0.005	0.013
1st grade vs. 3rd grade	0.008	0.012	0.015
2nd grade vs. 3rd grade	0.428	0.235	0.449

Bonferroni correction p<0.017

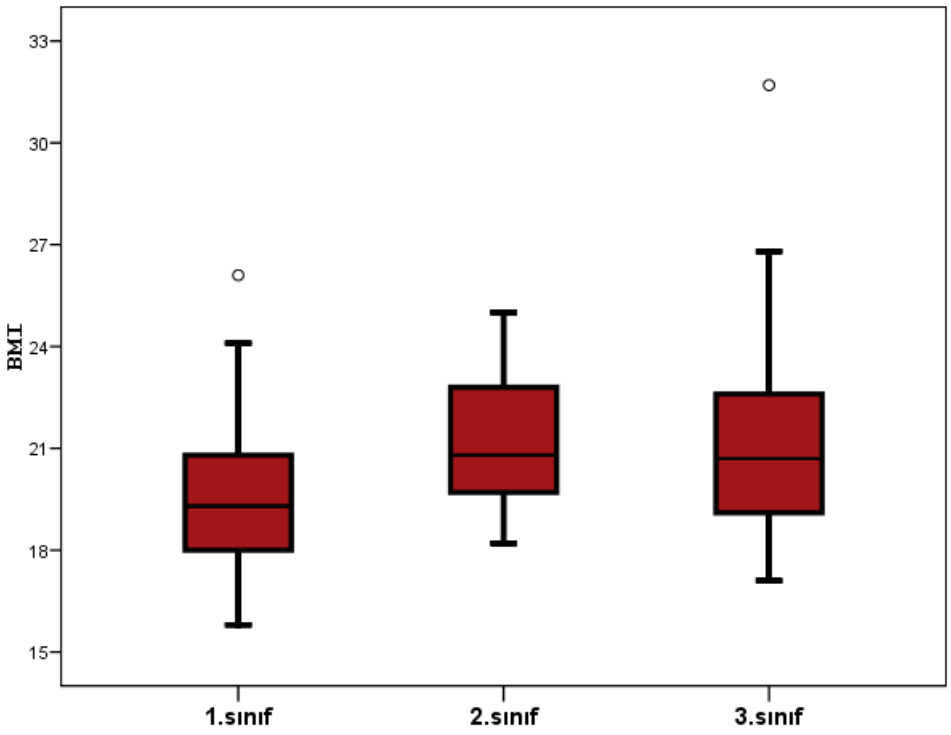


Fig. 4. BMI Distribution of the Participants with Regards to Their Grades

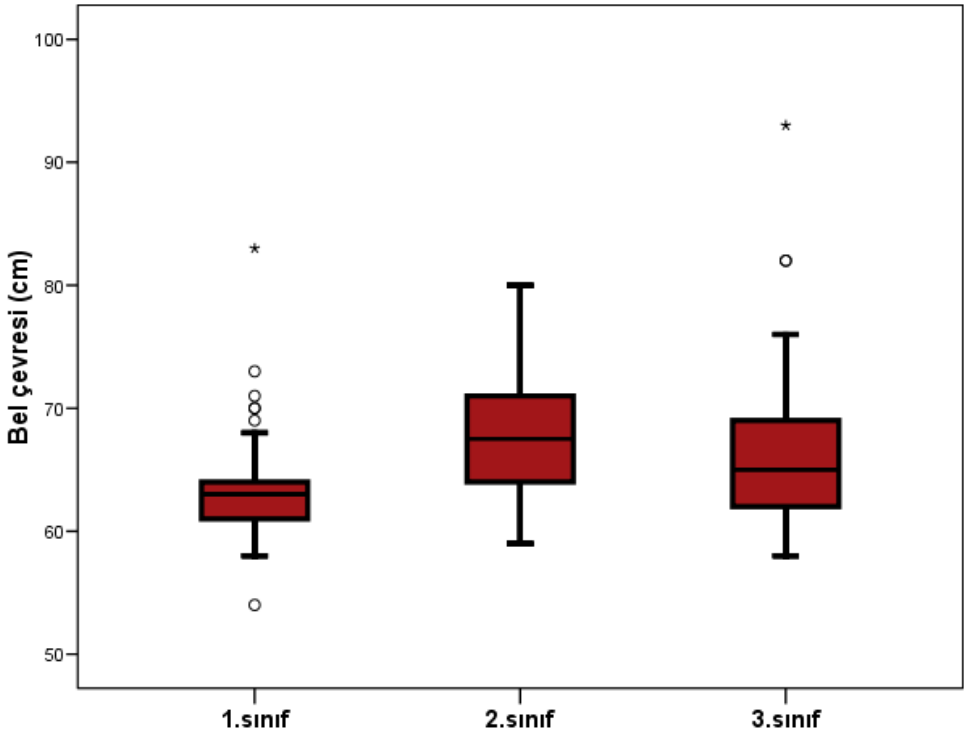


Fig. 5. Waist Circumference Distribution of the Participants with Regards to Their Grades

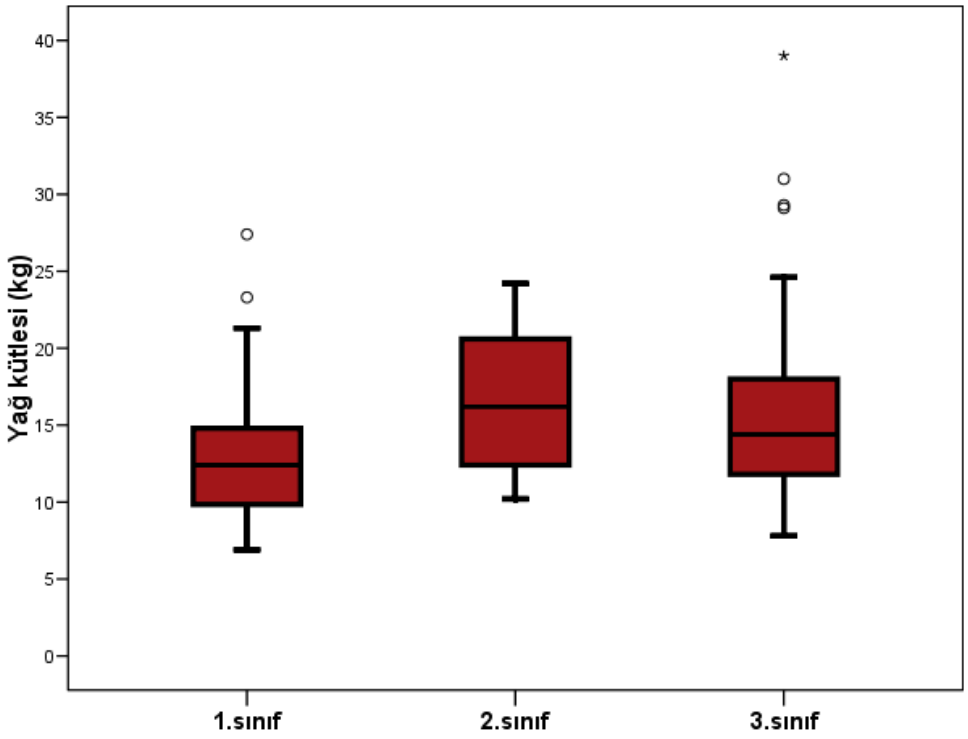


Fig. 6. Fat Mass Distribution of the Participants with Regards to Their Grades

4.2.Sleep Pattern

4.2.1. Sleep Pattern on Weekdays

The average sleep duration of the participants was found to be 7.1 hours. According to the results obtained, it was found that 66.7% of the participants do not sleep in the daytime on weekdays, while 60.8% of the participants defined themselves under the group which goes to bed late and wakes up early (Table 4). There was no statistically significant relationship between the participants' sleep duration on weekdays and their BMI, waist circumference and fat mass levels (p=0.507 p=0.341 p=0.210, respectively). There was no statistically significant difference in the BMI, waist circumference and fat mass averages of the students who sleep in daytime on weekdays and who do not and those who wake up early or late (p=0.741 p=0.898 p=0,815 p=0.635 p=0.967 p=0.543, respectively) (Table 5).

While the fat mass of the group who do not sleep in the daytime on weekdays was higher, it was also found that the participants under the group which 'goes to bed late and wakes up late' has higher fat mass when compared to the other groups (Table 5).

Table 4. Sleep Pattern on weekdays

		Av.±SD	Min-Max
Sleep duration on weekdays (h)		7.1±0.9	5-9
		Number	Percentage
Daytime sleeping on weekdays	Yes	34	33.3
	No	68	66.7
Going to bed late-early and waking up late-early on weekdays	Goes to bed late and wakes up early	62	60.8
	Goes to bed early and wakes up early	26	25.5
	Goes to bed late and wakes up late	10	9.8
	Goes to bed early and wakes up late	4	3.9

Table 5. BMI, Waist Circumference and Fat Mass with Respect to Sleep Pattern on weekdays

		BMI		Waist circumference (cm)		Fat mass (kg) (kg)	
		rho	**p**	**rho**	**p**	**rho**	**p**
Sleep duration on weekdays (h)		-0.066	0.507	-0.095	0.341	-0.125	0.210
		Av.± SD	**Median**	**Av.± SD**	**Median**	**Av.± SD**	**Median**
Daytime sleeping on weekdays	Yes	20.2±2.1	20.2	65.8±6.3	64	14.5±4.3	14.45
	No	20.6±2.9	20	65.5±6.2	64	15.2±6.4	13.1
	p	0.741		0.898		0.815	
Going to bed late-early and waking up late-early on weekdays	Goes to bed late and wakes up early	20.2±2.6	19.55	65.5±6.6	64	14.6±5.7	13.4
	Goes to bed early and wakes up early	20.5±2.7	19.85	65.4±4.7	64	14.9±6.1	12.5
	Goes to bed late and wakes up late	21.3±2.9	20.75	67.3±8.3	64.5	17.0±6.1	14.8
	Goes to bed early and wakes up late	20.7±2.7	20.4	64.5±4.4	65.5	15.3±5.6	14.15
	p	0.635		0.967		0.543	

4.2.2 Sleep Patterns on Weekends

It was observed that majority of the participants have reported that they are in the group which 'goes to bed late and wakes up late' and that they did not sleep in daytime (75.5%, 81.4%) (Table 6). There was no statistically significant relationship between the participants' sleep duration on weekends and their BMI, waist circumference and fat mass levels (p=0.262 p=0.531 p=0.185, respectively).

There was no statistically significant difference in the BMI, waist circumference and fat mass averages of the students who sleep in daytime during weekends and who do not and those who go to bed early and wake up late (p=0.627 p=0.382 p=0.986 p=0.648

p=0.751 p=0.309, respectively). It was found that the highest BMI, waist circumference and fat mass scores are obtained from the participants classified under the group which 'goes to bed late and wakes up early' on weekends. Nevertheless, it was observed that individuals who do not sleep in daytime on weekends have higher fat mass when compared to those who sleep in daytime on weekends (Table 7).

Table 6. Sleep Pattern on Weekends

		Av.±SD	Min-Max
Sleep duration on weekends (h)		9.0±1.2	5-12
		Number	Percentage
Daytime sleep on weekends	Yes	19	18.6
	No	83	81.4
Going to bed late-early and waking up late-early on weekends	Goes to bed late and wakes up early	12	11.8
	Goes to bed early and wakes up early	10	9.8
	Goes to bed late and wakes up late	77	75.5
	Goes to bed early and wakes up late	3	2.9

Table 7. BMI, Waist Circumference and Fat Mass with Respect to Sleep Pattern on Weekends

		BMI		Waist circumference (cm)		Fat mass (kg) (kg)	
		rho	**p**	**rho**	**p**	**rho**	**p**
Sleep duration on weekends (h)		0.112	0.262	0.063	0.531	0.132	0.185
		Av.	**SD**	**Av.**	**SD**	**Av.**	**SD**
Daytime sleep on weekends	Yes	20.1	2.1	65.1	6.3	14.2	4.1
	No	20.5	2.7	65.7	6.2	15.1	6.1
	p	0.627		0.382		0.986	
Going to bed late-early and waking up late-early on weekends	Goes to bed late and wakes up early	19.8	1.7	65.4	6.5	14.0	4.1
	Goes to bed early and wakes up early	20.4	2.7	64.3	5.6	13.4	7.3
	Goes to bed late and wakes up late	20.5	2.7	65.8	6.4	15.1	5.7
	Goes to bed early and wakes up late	22.3	3.8	66.3	4.7	18.5	8.3
	p	0.648		0.751		0.309	

4.3.Eating Patterns

4.3.1. Eating Patterns on Weekdays

It was observed that 69.6% of the participants have the habit of having breakfast on weekdays (Table 8). A statistically significant relationship was found between the number of snacks participants have on weekdays. It was found that BMI scores, waist circumference and fat mass of the participants who have 3 snacks were significantly lower than the participants who have 2 snacks (p=0.025, p=0.025, p=0.040, respectively) (Table 9).

There was no statistically significant difference in the BMI, waist circumference and fat mass averages of the students who have or have not the habit of having breakfast on weekdays (p=0.054 p=0,557 p=0.171, respectively). BMI scores, waist circumference and fat mass of the participants who have the habit of having breakfast on weekdays were higher (Table 9).

Table 8. Eating Habits on Weekdays

		n	%
Number of meals on weekdays	1	2	2.0
	2	38	37.3
	3	60	58.8
	4	2	2.0
Number of snacks on weekdays	0	1	1.0
	1	31	30.4
	2	49	48.0
	3	18	17.6
	4	3	2.9
Habit of having breakfast on weekdays	Yes	71	69.6
	No	31	30.4

Table 9. BMI, Waist Circumference and Fat Mass with Respect to Eating Habits on Weekdays

		BMI		**Waist circumference (cm)**		**Fat mass (kg) (kg)**	
		rho	**p**	**rho**	**p**	**rho**	**p**
Number of meals on weekdays		0.149	0.134	0.033	0.741	0.059	0.558
Number of snacks on weekdays		0.015	0.878	0.059	0.555	-0.037	0.711
		Av.	**SD**	**Av.**	**SD**	**Av.**	**SD**
Number of meals on weekdays	0-1	22.0±6.2	22	69.5±7.8	69.5	20.0±12.9	19.95
	2	19.8±2.1	19.35	64.5±4.1	64	13.9±4.3	13.55
	3 or more	20.8±2.8	20.45	66.2±7.1	64	15.4±6.3	14
	p	0.272		0.519		0.662	
Number of snacks on weekdays	0-1	19.9±2.4	19.45	64.1±4.9	63	14.1±4.9	12.95
	2	21.1±2.7	20.7	67.5±7.0	66	16.3±6.2	14.8
	3 or more	19.6±2.6	19	63.6±4.8	64	13.1±5.6	11.8
	p	0.025		0.025		0.040	
Habit of having breakfast on weekdays	Yes	20.7±2.7	20.2	66.1±6.8	64	15.4±6.0	14.4
	No	19.8±2.4	19.2	64.5±4.94	64	13.8±5.2	12.5
	p	0.054		0.557		0.171	

4.3.2. Eating Patterns on Weekends

An increase was observed in the number of snacks participants have on weekends In addition, it was found that almost all of the participants have the habit of having breakfast on weekends (Table 10).

BMI scores, waist circumference and fat mass of the participants who do not have the habit of having breakfast on weekends were higher than that of participants who have this habit (Table 11).

Table 10. Eating Habits on Weekends

		Av.±SD	Min-Max
Number of meals on weekends	2	52	51.0
	3	49	48.0
	4	1	1.0
Number of snacks on weekends	0	2	2.0
	1	26	25.5
	2	39	38.2
	3	28	27.5
	4	6	5.9
	5	1	1.0
		Number	Percentage
Habit of having breakfast on weekends	Yes	100	98.0
	No	2	2.0

Table 11. BMI, Waist Circumference and Fat Mass with Respect to Eating Habits on Weekends

		BMI		**Waist circumference (cm)**		**Fat mass (kg) (kg)**	
		rho	**p**	**rho**	**p**	**rho**	**p**
Number of meals on weekends		-0.039	0.699	0.026	0.792	-0.102	0.309
Number of snacks on weekends		0.027	0.788	0.032	0.750	0.021	0.833
		Av.± SD	**Median**	**Av.± SD**	**Median**	**Av.± SD**	**Median**
Number of meals on weekends	2	20.6±2.9	20.3	65.6±6.7	64	15.5±6.3	14.3
	3-4	20.3±2.4	19.6	65.6±5.7	64	14.3±5.2	13.6
	p	0.815		0.697		0.380	
Number of snacks on weekends	0-1	20.7±3.2	20.4	66.4±8.1	63.8	15.2±6.8	13.7
	2	20.1±2.2	19.4	65.2±5.3	64	14.6±5.2	13.6
	3 or more	20.6±2.7	20.7	65.4±5.4	64	15.0±5.7	14.4
		0.628		0.882		0.957	
Habit of having breakfast on weekends	Yes	20.4±2.7	20	65.6±6.2	64	14.9±5.8	13.7
	No	21.8±1.2	21.7	67.5±4.9	67.5	16.1±2.7	16.1
	p*						

The analysis was not performed due to the insufficient number of individuals under this group.

4.4.Food Consumption Frequency

In the section of this study which explored the frequency of the participants to consume a number of specific food items, it was found that 48% of the participants consume fruits 2-4 times a week; 31.4% of the participants consume nuts once a week; 53.9% of the participants never consume potato chips; 29.4 of the participants consume chocolate 2-4 times a week; 25.5% of the participants consume biscuits and derivatives once a week; 47.1% of the participants never consume popcorn; 26.5% of the participants consume milk and dairy products 2-4 times a week; 55.9% of the participants never consume meat and meat derivatives; 47.1% of the participants never consume vegetables and vegetable derivatives; and 61.8% of the participants never consume carbonated beverages (Table 12).

Table 12. Frequency of Consumption of Food Items I

		Number	Percentage
Fruits	Never	4	3.9
	1-2 times a month	8	7.8
	Once a week	23	22.5
	2-4 times a week	49	48.0
	5-6 times a week	12	11.8
	Every night	6	5.9
Nuts	Never	10	9.8
	1-2 times a month	22	21.6
	Once a week	32	31.4
	2-4 times a week	29	28.4
	5-6 times a week	8	7.8
	Every night	1	1.0
Potato Chips	Never	55	53.9
	1-2 times a month	39	38.2
	Once a week	4	3.9
	2-4 times a week	3	2.9
	Every night	1	1.0
Chocolate	Never	13	12.7
	1-2 times a month	24	23.5
	Once a week	18	17.6
	2-4 times a week	30	29.4
	5-6 times a week	10	9.8
	Every night	7	6.9
Biscuit and derivatives	Never	23	22.5
	1-2 times a month	25	24.5
	Once a week	26	25.5
	2-4 times a week	21	20.6
	5-6 times a week	6	5.9
	Every night	1	1.0

As reported by the participants, it was found that the consumption of milk and dairy products was the highest by 12.7% while the consumption of meat and meat derivatives was the lowest by 1% (Table 13).

Table 13. Frequency of Consumption of Food Items II

		Number	Percentage
Popcorn	Never	48	47.1
	1-2 times a month	41	40.2
	Once a week	8	7.8
	2-4 times a week	5	4.9
Milk and dairy products	Never	12	11.8
	1-2 times a month	11	10.8
	Once a week	14	13.7
	2-4 times a week	27	26.5
	5-6 times a week	25	24.5
	Every night	13	12.7
Meat and meat derivatives	Never	57	55.9
	1-2 times a month	7	6.9
	Once a week	4	3.9
	2-4 times a week	20	19.6
	5-6 times a week	13	12.7
	Every night	1	1.0
Bread and derivatives	Never	45	44.1
	1-2 times a month	12	11.8
	Once a week	9	8.8
	2-4 times a week	15	14.7
	5-6 times a week	19	18.6
	Every night	2	2.0
Vegetables	Never	48	47.1
	1-2 times a month	9	8.8
	Once a week	11	10.8
	2-4 times a week	21	20.6
	5-6 times a week	11	10.8
	Every night	2	2.0
Carbonated drinks	Never	63	61.8
	1-2 times a month	20	19.6
	Once a week	6	5.9
	2-4 times a week	10	9.8
	5-6 times a week	3	2.9

A statistically significant difference was found in the waist circumference averages in the chocolate consumption frequency groups (p=0.035).

It was found that participants who consume chocolate 2-4 Time a Week was significantly higher than that of those consume chocolate 5-6 Time a Week (p=0.004). There was no significant difference between the other groups (Table 14).

Table 14. BMI, Waist Circumference and Fat Mass with Respect to Food Consumption Frequency I

		BMI		Waist circumference (cm)		Fat mass (kg)	
		Av.±SD	Median	Av.±SD	Median	Av.±SD	Median
Fruits	Never	19.7±1.9	20.0	62.5±0.6	62.5	11.7±4.3	11.1
	1-2 times a Month	19.6±3.1	19.0	63.0±6.3	62.5	13.8±6.9	11.5
	Once a Week	20.3±1.9	20.0	64.5±3.5	64.0	14.5±4.3	14.2
	2-4 Times a Week	20.4±2.5	20.0	66.0±6.4	64.0	14.8±5.3	14.1
	5-6 Times a Week	21.7±4.0	20.9	69.3±9.4	66.0	18.4±9.1	15.7
	Every Night	20.4±2.9	19.4	64.8±4.1	65.5	14.6±5.1	13.9
	p	0.723		0.369		0.566	
Nuts	Never	21.2±2.9	20.4	67.6±5.9	64.0	16.5±6.4	14.5
	1-2 times a Month	20.8±3.4	19.9	66.1±7.7	65.0	15.5±7.1	14.5
	Once a Week	20.0±2.2	20.2	65.0±5.9	63.0	14.2±4.7	13.4
	2-4 Times a Week	20.4±2.6	19.6	65.8±6.1	64.0	15.0±6.1	13.0
	5-6 Times a Week	20.3±2.2	20.5	63.8±3.6	63.5	14.0±5.2	13.7
	Every Night*	21.1		65.0		14.8	
	p	0.849		0.577		0.873	
Potato Chips	Never	20.7±2.4	20.7	65.6±6.6	64.0	15.3±5.7	14.3
	1-2 times a Month	20.0±2.8	19.3	65.6±6.1	64.0	14.4±5.9	12.4
	Once a Week	22.3±2.8	21.4	69.0±4.1	67.5	18.5±7.2	15.8
	2-4 Times a Week	18.8±2.6	17.9	62.3±2.5	62.0	11.7±3.5	12.9
	Every Night*	18.9		64.0		8.7	
	p	0.063		0.297		0.248	
Chocolate	Never	20.4±1.7	20.7	66.9±6.9	64.0	15.3±5.3	14.8
	1-2 times a Month	19.9±2.0	19.7	63.9±3.8	63.0	13.1±4.8	12.3
	Once a Week	20.2±1.8	19.9	64.5±6.3	63.5	14.6±3.5	14.9
	2-4 Times a Week	21.5±3.5	20.9	68.0±7.2	67.0	17.3±7.4	14.7
	5-6 Times a Week	18.7±1.8	18.5	61.9±3.3	61.5	12.1±3.2	12.1
	Every Night	20.6±3.0	19.3	66.8±7.0	64.0	15.4±6.9	14.1
	p	0.128		0.038		0.144	
Biscuit and derivatives	Never	20.3±2.4	20.0	65.1±6.6	63.0	14.0±6.0	12.4
	1-2 times a Month	20.2±1.8	20.0	65.4±4.5	64.0	14.3±4.6	13.6
	Once a Week	20.8±3.3	20.4	66.0±8.1	65.5	15.9±6.7	15.5
	2-4 Times a Week	20.6±2.8	20.7	65.5±4.8	64.0	15.7±5.9	14.2
	5-6 Times a Week	20.0±3.2	19.1	67.4±7.4	64.0	14.2±6.1	11.7
	Every Night*	19.2		62.0		14.1	
	p	0.917		0.870		0.585	

*Not included to the analysis

A statistically significant difference was found in the BMI averages in the meat and meat derivatives consumption frequency groups (p=0.035). It was found that BMI average of the participants who consume meat and meat derivatives 5-6 Times a Week was significantly higher than that of those consume meat and meat derivatives 1-2 Time a Week (p=0.005). There was no significant difference between the other groups (Table 15).

Table 15. BMI, Waist Circumference and Fat Mass with Respect to Food Consumption Frequency II

		BMI		Waist circumference (cm)		Fat mass (kg)	
		Av.±SD	Median	Av.±SD	Median	Av.±SD	Median
Popcorn	Never	20.6±2.4	20.0	65.9±6.2	64.0	15.1±5.7	14.0
	1-2 times a Month	20.2±2.8	19.7	65.3±6.2	64.0	14.0±5.7	12.4
	Once a Week	21.1±2.7	20.5	65.3±5.9	64.0	17.0±6.0	16.0
	2-4 Times a Week	20.4±3.9	18.4	66.6±8.6	63.0	16.9±7.3	12.9
	p	0.605		0.938		0.315	
Milk and dairy products	Never	20.3±2.5	19.9	64.9±6.5	63.3	14.5±6.1	12.4
	1-2 times a Month	20.6±2.4	20.7	65.7±4.4	64.0	14.5±6.1	13.2
	Once a Week	20.7±2.1	20.4	65.7±4.3	66.0	15.4±4.5	14.4
	2-4 Times a Week	19.6±2.4	19.2	64.7±6.2	64.0	13.6±4.9	12.4
	5-6 Times a Week	21.6±3.0	21.0	67.7±8.1	66.0	16.8±6.8	15.7
	Every Night	19.7±2.7	19.1	64.0±4.7	63.0	14,2±6.2	13.0
	p	0.050		0.519		0.342	
Meat and meat derivatives	Never	20.6±2.3	20.0	65.1±4.9	64.0	15.1±5.4	13.6
	1-2 times a Month	18.3±1.2	17.9	63.6±3.3	64.0	11.5±3.3	11.9
	Once a Week	19.0±2.7	19.5	63.0±6.1	65.5	12,9±5.4	12.7
	2-4 Times a Week	20.4±3.6	19.8	67.1±9.8	63.0	15.4±7.5	14.5
	5-6 Times a Week	21.6±2.7	21.4	67.4±5.6	66.0	16.3±5.7	15.2
	Every Night*	18.7		65.0		13.0	
	p	0.035		0.551		0.347	
Bread and derivatives	Never	20.5±2.2	20.0	65.3±4.8	64.0	14.9±5.3	13.0
	1-2 times a Month	20.0±2.7	19.2	64.5±5.2	63.0	13.4±6.2	11.5
	Once a Week	21.4±1.8	21.4	68.0±6.8	66.0	17.4±3.5	17.0
	2-4 Times a Week	19.0±2.0	19.1	62.5±3.8	63.0	12.8±3.4	14.4
	5-6 Times a Week	21.4±3.7	20.8	68.8±9.2	66.0	16.9±8.1	15.7
	Every Night*	17.9±1.1	17.9	61.5±4.9	61.5	10.4±3.7	10.4
	p	0.063		0.129		0.119	

*Not included to the analysis

Table 16. BMI, Waist Circumference and Fat Mass with Respect to Food Consumption Frequency III

		BMI		Waist circumference (cm)		Fat mass (kg)	
		Av.±SD	Median	Av.±SD	Median	Av.±SD	Median
Vegetables	Never	20.5±2.4	19.9	64.9±4.8	63.8	15.0±5.7	13.1
	1-2 times a Month	20.0±1.5	20.4	64.9±6.4	63.0	14.0±3.9	13.6
	Once a Week	20.1±2.4	20.0	65.5±3.3	66.0	15.1±4.2	15.2
	2-4 Times a Week	20.4±2.3	20.0	66.0±6.8	64.0	14.2±4.9	14.0
	5-6 Times a Week	21.4±4.6	21.2	69.2±11.1	66.0	17.5±9.7	15.2
	Every Night*	17.9±1.1	17.9	63.5±2.1	63.5	10.5±3.6	10.5
	p	0.980		0.812		0.895	
Carbonated drinks	Never	20.4±2.3	20.2	65.1±5.1	64.0	14.8±5.3	13.8
	1-2 times a Month	20.2±2.5	19.4	66.5±6.9	64.5	14.5±5.1	13.3
	Once a Week	23.1±4.5	21.0	70.5±11.6	66.5	19.9±9.6	16.4
	2-4 Times a Week	20.0±3.5	19.4	65.3±7.0	64.0	14.6±7.0	13.0
	5-6 Times a Week*	18.5±1.3	17.9	60.7±2.9	59.0	12.1±4.6	10.8
	p	0.143		0.330		0.379	

*Not included to the analysis

A statistically significant and negative correlation was found in the BMI averages in the potato chips consumption frequency groups (p=0.042). There was no statistically significant relationship between the participants' food consumption frequencies and their BMI, waist circumference and fat mass levels (Table 17).

Table 17. BMI, Waist Circumference and Fat Mass with Respect to Food Consumption Frequency

	BMI		Waist circumference (cm)		Fat mass (kg)	
	rho	p	rho	p	rho	p
Fruits	-0.018	0.859	0.063	0.532	0.033	0.739
Nuts	0.008	0.933	-0.009	0.931	-0.009	0.929
Potato Chips	-0.201	0.042	0.032	0.753	-0.148	0.137
Chocolate	-0.136	0.172	-0.100	0.318	-0.167	0.094
Biscuit and derivatives	-0.021	0.834	0.072	0.473	0.029	0.771
Popcorn	-0.106	0.289	-0.057	0.568	-0.102	0.305
Milk and dairy products	0.020	0.845	0.022	0.828	0.005	0.964
Meat and meat derivatives	-0.120	0.230	0.046	0.644	-0.052	0.603
Bread and derivatives	-0.098	0.325	-0.037	0.713	-0.085	0.397
Vegetables	-0.037	0.710	0.039	0.696	-0.013	0.897
Carbonated drinks	-0.082	0.411	0.013	0.898	-0.017	0.865

4.5.Alcohol Consumption Frequency

4.5.1. Alcohol Consumption Frequency on Weekdays

According to the data obtained, the frequency of alcohol consumption was not more than “2-4 Times a Week” on weekdays. It was found that beer and wine were the most commonly preferred alcoholic beverages on weekdays by 2% (Table 18).

A statistically significant difference was not found in the BMI, waist circumference, fat mass averages in the alcohol consumption frequency groups for weekdays.

Table 18. Alcohol Consumption Frequency on Weekdays

		Number	Percentage
Beer	Never	54	52.9
	1-2 times a month	37	36.3
	Once a week	9	8.8
	2-4 times a week	2	2.0
Wine	Never	70	68.6
	1-2 times a month	25	24.5
	Once a week	5	4.9
	2-4 times a week	2	2.0
Vodka	Never	91	89.2
	1-2 times a month	9	8.8
	Once a week	2	2.0
Vodka cocktail (with energy drink of juice)	Never	90	88.2
	1-2 times a month	10	9.8
	Once a week	2	2.0
Raki	Never	88	86.3
	1-2 times a month	12	11.8
	Once a week	2	2.0
Whisky	Never	98	96.1
	1-2 times a month	3	2.9
	Once a week	1	1.0
Tequila	Never	94	92.2
	1-2 times a month	7	6.9
	Once a week	1	1.0
Gin	Never	99	97.1
	1-2 times a month	2	2.0
	2-4 times a week	1	1.0

Table 19. Alcohol Consumption Frequency on Weekdays

		BMI		Waist circumference (cm)		Fat mass (kg)	
		Av.±SD	Median	Av.±SD	Median	Av.±SD	Median
Beer	Never	20.5±2.8	20.0	66.3±7.0	64.0	14.8±6.0	13.4
	1-2 times a month	20.1±2.4	19.4	64.4±4.4	64.0	14.6±5.5	13.6
	Once a week	20.7±2.0	20.7	64.8±4.9	67.0	15.4±4.7	14.5
	2-4 times a week*	24.7±3.0	24.7	74.0±11.3	74.0	22.3±10.0	22.3
	p	0.657		0.612		0.809	
Wine	Never	20.7±2.7	20.6	66.2±6.5	64.0	15.4±6.0	14.3
	1-2 times a month	19.4±2.1	19.2	63.2±4.3	62.0	13.1±4.5	12.4
	Once a week	20.3±0.9	20.7	66.2±4.2	67.0	14.7±4.8	17.0
	2-4 times a week*	24.7±3.0	24.7	74.0±11.3	74.0	22.3±10.0	22.3
	p	0.092		0.065		0.205	
Vodka	Never	20.4±2.6	20.0	65.5±6.2	64.0	14.9±5.7	14.0
	1-2 times a month	19.9±2.6	20.0	65.0±4.5	66.0	13.7±5.2	11.2
	Once a week*	24.7±3.0	24.7	74.0±11.3	74.0	22.3±10.0	22.3
	p	0.609		0.880		0.430	
Vodka cocktail (with energy drink of juice)	Never	20.4±2.5	20.0	65.5±6.2	64.0	14.9±5.7	14.0
	1-2 times a month	20.1±3.1	19.8	64.9±4.3	65.0	13.9±5.6	11.6
	Once a week*	24.7±3.0	24.7	74.0±11.3	74.0	22.3±10.0	22.3
	p	0.558		0.876		0.411	
Raki	Never	20.3±2.5	19.7	65.6±6.2	64.0	14.6±5.6	13.7
	1-2 times a month	20.7±2.9	20.0	64.2±5.1	63.0	15.7±6.2	13.8
	Once a week*	24.7±3.0	24.7	74.0±11.3	74.0	22.3±10.0	22.3
	p	0.629		0.419		0.626	
Whisky	Never	20.4±2.7	20.0	65.7±6.3	64.0	15.0±5.9	13.7
	1-2 times a month*	20.6±1.2	20.7	62.3±5.1	61.0	13.2±2.6	14.5
	Once a week*	22.6		66.0		15.2	
	p	-		-		-	
Tequila	Never	20.5±2.6	20.0	65.7±6.3	64.0	15.0±5.8	14.0
	1-2 times a month	19.9±3.4	19.5	65.0±5.3	64.0	13.9±7.0	10.9
	Once a week	22.6		66.0	66.0	15.2	
	p	0.411		0.835		0.319	
Gin	Never	20.4±2.6	20.0	65.6±6.3	64.0	15.0±5.9	13.8
	1-2 times a month*	19.3±3.4	19.3	64.0±5.7	64.0	12.6±2.7	12.6
	2-4 times a week*	22.6		66.0	66.0	15.2	
	p	-		-		-	

*Not included to the analysis.

There was no statistically significant relationship between the participants' alcohol consumption frequencies and their BMI, waist circumference and fat mass levels (Table 20).

Table 20. BMI, Waist Circumference and Fat Mass with Respect to Alcohol Consumption Frequency on Weekdays

	BMI		**Waist circumference (cm)**		**Fat mass (kg)**	
	rho	p	rho	p	Rho	p
Beer	-0.034	0.735	-0.088	0.382	0.012	0.906
Wine	-0.170	0.088	-0.173	0.082	-0.141	0.156
Vodka	0.026	0.796	0.068	0.497	-0.019	0.849
Vodka cocktail (with energy drink of juice)	0.015	0.880	0.065	0.517	-0.026	0.792
Raki	0.107	0.285	-0.032	0.751	0.090	0.369
Whisky	0.100	0.317	-0.076	0.445	-0.002	0.986
Tequila	-0.041	0.680	-0.006	0.950	-0.081	0.417
Gin	0.021	0.834	-0.003	0.978	-0.019	0.852

4.5.2. Alcohol Consumption Frequency on Weekends

According to the data obtained, the frequency of alcohol consumption on weekends was not more than "2-4 Times a Week" on weekdays. It was found that beer was the most commonly preferred alcoholic beverage on weekends by 2.9% (Table 21).

Table 21. Alcohol Consumption Frequency on Weekends

		Number	Percentage
Beer	Never	39	38.2
	1-2 times a month	44	43.1
	Once a week	16	15.7
	2-4 times a week	3	2.9
Wine	Never	55	53.9
	1-2 times a month	39	38.2
	Once a week	6	5.9
	2-4 times a week	2	2.0
Vodka	Never	78	76.5
	1-2 times a month	22	21.6
	Once a week	2	2.0
Vodka cocktail (with energy drink of juice)	Never	69	67.6
	1-2 times a month	30	29.4
	Once a week	3	2.9
Raki	Never	79	77.5
	1-2 times a month	21	20.6
	Once a week	1	1.0
	2-4 times a week	1	1.0
Whisky	Never	94	92.2
	1-2 times a month	7	6.9
	2-4 times a week	1	1.0
Tequila	Never	79	77.5
	1-2 times a month	22	21.6
	Once a week	1	1.0
Gin	Never	94	92.2
	1-2 times a month	7	6.9
	2-4 times a week	1	1.0

Table 22. BMI, Waist Circumference and Fat Mass with Respect to Alcohol Consumption Frequency on Weekends I

		BMI		Waist circumference (cm)		Fat mass (kg)	
		Av.±SD	Median	Av.±SD	Median	Av.±SD	Median
Beer	Never	20.3±2.4	20.2	65.4±6.0	64.0	14.6±5.0	13.5
	1-2 times a month	20.4±3.0	19.5	65.9±6.5	64.0	14.9±6.5	13.6
	Once a week	20.9±2.5	20.4	65.8±6.6	65.5	16.2±6.2	14.8
	2-4 times a week*	20.8±2.4	21.8	63.3±3.8	65.0	13.2±2.9	14.4
	p	0.665		0.966		0.596	
Wine	Never	20.9±2.9	20.7	66.5±7.0	64.0	15.7±6.2	14.5
	1-2 times a month	19.7±2.1	19.3	64.0±4.2	63.0	13.6±4.8	12.4
	Once a week	19.9±1.2	20.4	65.0±4.8	67.0	13.9±4.7	14.1
	2-4 times a week*	24.7±3.0	24.7	74.0±11.3	74.0	22.3±10.0	22.3
	p	0.100		0.211		0.225	
Vodka	Never	20.4±2.6	20.0	65.6±6.4	64.0	14.9±5.7	13.9
	1-2 times a month	20.5±2.9	19.5	65.8±5.8	64.0	15.0±6.6	12.8
	Once a week*	22.2±0.6	22.2	65.5±0.7	65.5	14.8±0.6	14.8
	p	0.901		0.714		0.696	
Vodka cocktail (with energy drink of juice)	Never	20.3±2.5	20.0	65.5±6.7	64.0	14.8±5.6	13.8
	1-2 times a month	20.6±2.9	19.7	66.0±5.3	65.0	15.2±6.5	13.9
	Once a week*	20.6±2.7	21.8	65.0±1.0	65.0	13.8±1.7	14.4
	p	0.948		0.412		0.870	
Raki	Never	20.3±2.6	20.0	65.6±6.4	64.0	14.7±5.7	13.6
	1-2 times a month	20.7±2.8	20.0	65.5±6.0	64.0	15.5±6.4	14.3
	Once a week*	21.0		67.0		17.0±17.0	
	2-4 times a week*	22.6	.	66.0	.	15.2	
	p	0.632		0.980		0.694	
Whisky	Never	20.3±2.6	19.9	65.5±6.1	64	14.8±5.7	13.6
	1-2 times a month	21.7±2.9	20.7	66.7±8.4	68	16.8±7.4	14.8
	2-4 times a week*	22.6	.	66.0	.	15.2	
	p	0.194		0.904		0.434	
Tequila	Never	20.5±2.5	20	65.7±6.3	64	15.1±5.5	14.1
	1-2 times a month	20.2±3.1	19.2	65.3±6.0	63.5	14.4±7.1	11.4
	Once a week	22.6	.	66.0	.	15.2	
	p	0.275		0.671		0.180	
Gin	Never	20.4±2.6	20	65.4±6.1	64	14.8±5.7	13.7
	1-2 times a month	21.1±3.5	20.8	68.9±7.0	68	16.3±8,1	14.5
	2-4 times a week	22.6	.	66.0	.	15.2	.
	p	0.698		0.133		0.831	

A statistically significant and negative correlation was found in the BMI averages in the wine consumption frequency groups (p=0.044). There was no statistically significant relationship between the participants' other alcoholic beverage consumption frequencies and their BMI, waist circumference and fat mass levels (Table 23).

Table 23. BMI, Waist Circumference and Fat Mass with Respect to Alcohol Consumption Frequency on Weekends II

	BMI		**Waist circumference (cm)**		**Fat mass (kg)**	
	rho	p	rho	p	rho	p
Beer	-0.028	0.776	0.026	0.799	-0.021	0.838
Wine	-0.200	0.044	-0.164	0.099	-0.162	0.104
Vodka	0.016	0.874	0.046	0.647	-0.031	0.754
Vodka cocktail (with energy drink of juice)	0.014	0.892	0.089	0.375	-0.018	0.858
Raki	0.071	0.477	0.017	0.863	0.054	0.593
Whisky	0.158	0.113	0.026	0.793	0.088	0.382
Tequila	-0.091	0.362	-0.036	0.716	-0.127	0.204
Gin	0.073	0.466	0.157	0.116	0.034	0.732

4.6. Consumption Frequencies Among Classes

4.6.1. Food Consumption Frequency Among Classes

A statistically significant difference was found in the popcorn consumption frequency and the participants' grade (p=0.026). The frequency of popcorn consumption of 1st grade students was higher than that of 2nd and 3rd grade students.

There was no significant difference between the other food consumption frequencies and the students' grades (Table 25).

Table 24. Frequency of Consumption of Food Items I.a

		1st grade		2nd grade		3rd grade		
		n	%	n	%	n	%	p
Fruits	Never	2	4.7	0	0.0	2	4.4	0.081
	1-2 times a month	4	9.3	0	0.0	4	8.9	
	Once a week	7	16.3	7	50.0	9	20.0	
	2-4 times a week	26	60.5	5	35.7	18	40.0	
	5-6 times a week	4	9.3	2	14.3	6	13.3	
	Every night	0	0.0	0	0.0	6	13.3	
Nuts	Never	3	7.0	2	14.3	5	11.1	0.564
	1-2 times a month	5	11.6	3	21.4	14	31.1	
	Once a week	17	39.5	4	28.6	11	24.4	
	2-4 times a week	13	30.2	4	28.6	12	26.7	
	5-6 times a week	4	9.3	1	7.1	3	6.7	
	Every night	1	2.3	0	0.0	0	0.0	
Potato Chips	Never	20	46.5	7	50.0	28	62.2	0.769
	1-2 times a month	18	41.9	6	42.9	15	33.3	
	Once a week	2	4.7	1	7.1	1	2.2	
	2-4 times a week	2	4.7	0	0.0	1	2.2	
	Every night	1	2.3	0	0.0	0	0.0	
Chocolate	Never	3	7.0	5	35.7	5	11.1	0.271
	1-2 times a month	12	27.9	1	7.1	11	24.4	
	Once a week	7	16.3	4	28.6	7	15.6	
	2-4 times a week	11	25.6	4	28.6	15	33.3	
	5-6 times a week	6	14.0	0	0.0	4	8.9	
	Every night	4	9.3	0	0.0	3	6.7	
Biscuit and derivatives	Never	9	20.9	4	28.6	10	22.2	0.842
	1-2 times a month	8	18.6	4	28.6	13	28.9	
	Once a week	11	25.6	5	35.7	10	22.2	
	2-4 times a week	11	25.6	1	7.1	9	20.0	
	5-6 times a week	3	7.0	0	0.0	3	6.7	
	Every night	1	2.3	0	0.0	0	0.0	

Table 25. Frequency of Consumption of Food Items II.a

		1st grade		2nd grade		3rd grade		
		n	%	n	%	n	%	p
Popcorn	Never	13	30.2	10	71.4	25	55.6	0.026
	1-2 times a month	23	53.5	2	14.3	16	35.6	
	Once a week	3	7.0	2	14.3	3	6.7	
	2-4 times a week	4	9.3	0	0.0	1	2.2	
Milk and dairy products	Never	7	16.3	3	21.4	2	4.4	0.555
	1-2 times a month	5	11.6	0	0.0	6	13.3	
	Once a week	6	14.0	2	14.3	6	13.3	
	2-4 times a week	12	27.9	5	35.7	10	22.2	
	5-6 times a week	8	18.6	3	21.4	14	31.1	
	Every night	5	11.6	1	7.1	7	15.6	
Meat and meat derivatives	Never	24	55.8	9	64.3	24	53.3	0.061
	1-2 times a month	2	4.7	1	7.1	4	8.9	
	Once a week	3	7.0	0	0.0	1	2.2	
	2-4 times a week	13	30.2	2	14.3	5	11.1	
	5-6 times a week	1	2.3	2	14.3	10	22.2	
	Every night	0	0.0	0	0.0	1	2.2	
Bread and derivatives	Never	22	51.2	9	64.3	14	31.1	0.176
	1-2 times a month	3	7.0	0	0.0	9	20.0	
	Once a week	4	9.3	2	14.3	3	6.7	
	2-4 times a week	8	18.6	1	7.1	6	13.3	
	5-6 times a week	6	14.0	2	14.3	11	24.4	
	Every night	0	0.0	0	0.0	2	4.4	
Vegetables	Never	18	41.9	7	50.0	23	51.1	0.862
	1-2 times a month	5	11.6	1	7.1	3	6.7	
	Once a week	5	11.6	3	21.4	3	6.7	
	2-4 times a week	10	23.3	1	7.1	10	22.2	
	5-6 times a week	4	9.3	2	14.3	5	11.1	
	Every night	1	2.3	0	0.0	1	2.2	
Carbonated drinks	Never	24	55.8	9	64.3	30	66.7	0.677
	1-2 times a month	12	27.9	2	14.3	6	13.3	
	Once a week	2	4.7	2	14.3	2	4.4	
	2-4 times a week	4	9.3	1	7.1	5	11.1	
	5-6 times a week	1	2.3	0	0.0	2	4.4	

4.6.2. **Alcohol Consumption Frequency Among Classes on Weekdays**

There was no significant difference between alcohol consumption frequencies on weekdays and the students' grades (Table 26).

Table 26. Alcohol Consumption Frequency on Weekdays

		1st grade		2nd grade		3rd grade		
		n	%	n	%	n	%	p
Beer	Never	21	48.8	10	71.4	23	51.1	0.333
	1-2 times a month	18	41.9	2	14.3	17	37.8	
	Once a week	4	9.3	2	14.3	3	6.7	
	2-4 times a week	0	0.0	0	0.0	2	4.4	
Wine	Never	30	69.8	10	71.4	30	66.7	0.881
	1-2 times a month	11	25.6	4	28.6	10	22.2	
	Once a week	2	4.7	0	0.0	3	6.7	
	2-4 times a week	0	0.0	0	0.0	2	4.4	
Vodka	Never	38	88.4	12	85.7	41	91.1	0.331
	1-2 times a month	5	11.6	2	14.3	2	4.4	
	Once a week	0	0.0	0	0.0	2	4.4	
Vodka cocktail (with energy drink of juice)	Never	38	88.4	12	85.7	40	88.9	0.625
	1-2 times a month	5	11.6	2	14.3	3	6.7	
	Once a week	0	0.0	0	0.0	2	4.4	
Raki	Never	37	86.0	12	85.7	39	86.7	0.682
	1-2 times a month	6	14.0	2	14.3	4	8.9	
	Once a week	0	0.0	0	0.0	2	4.4	
Whisky	Never	40	93.0	14	100	44	97.8	0.199
	1-2 times a month	3	7.0	0	0.0	0	0.0	
	Once a week	0	0.0	0	0.0	1	2.2	
Tequila	Never	39	90.7	13	92.9	42	93.3	0.760
	1-2 times a month	4	9.3	1	7.1	2	4.4	
	Once a week	0	0.0	0	0.0	1	2.2	
Gin	Never	41	95.3	14	100	44	97.8	0.506
	1-2 times a month	2	4.7	0	0.0	0	0.0	
	2-4 times a week	0	0.0	0	0.0	1	2.2	

4.6.3. Alcohol Consumption Frequency Among Classes on Weekends

A statistically significant difference was found in the tequila consumption frequency on weekends and the participants' grade (p=0.010). It was found that tequila consumption frequency of 1st grade students is higher. There was no significant difference between the other alcoholic beverage consumption frequencies on weekdays and the students' grades (Table 27).

Table 27. Alcohol Consumption Frequency on Weekends

		1st grade		2nd grade		3rd grade		
		n	%	n	%	n	%	p
Beer	Never	15	34.9	9	64.3	15	33.3	0.238
	1-2 times a month	20	46,5	2	14.3	22	48.9	
	Once a week	7	16.3	3	21.4	6	13.3	
	2-4 times a week	1	2.3	0	0.0	2	4.4	
Wine	Never	22	51.2	11	78.6	22	48.9	0.457
	1-2 times a month	18	41.9	3	21.4	18	40.0	
	Once a week	3	7.0	0	0.0	3	6.7	
	2-4 times a week	0	0.0	0	0.0	2	4.4	
Vodka	Never	29	67.4	13	92.9	36	80.0	0.093
	1-2 times a month	14	32.6	1	7.1	7	15.6	
	Once a week	0	0.0	0	0.0	2	4.4	
Vodka cocktail (with energy drink of juice)	Never	25	58.1	12	85.7	32	71.1	0.291
	1-2 times a month	17	39.5	2	14.3	11	24.4	
	Once a week	1	2.3	0	0.0	2	4.4	
Raki	Never	32	74.4	13	92.9	34	75.6	0.597
	1-2 times a month	10	23.3	1	7.1	10	22.2	
	Once a week	1	2.3	0	0.0	0	0.0	
	2-4 times a week	0	0.0	0	0.0	1	2.2	
Whisky	Never	39	90.7	14	100	41	91.1	0.760
	1-2 times a month	4	9.3	0	0.0	3	6.7	
	2-4 times a week	0	0.0	0	0.0	1	2.2	
Tequila	Never	28	65.1	14	100	37	82.2	0.010
	1-2 times a month	15	34.9	0	0.0	7	15.6	
	Once a week	0	0.0	0	0.0	1	2.2	
Gin	Never	38	88.4	14	100	42	93.3	0.397
	1-2 times a month	5	11.6	0	0.0	2	4.4	
	2-4 times a week	0	0.0	0	0.0	1	2.2	

4.7.Consumption Frequency and Accommodation

4.7.1. Food Consumption Frequency and Accommodation

A statistically significant difference was found in the chocolate consumption frequency and the participants' accommodation type (p=0.010). The frequency of chocolate consumption of those who live in a dormitory was higher than the others. There was no significant difference between the other food consumption frequencies and the students' accommodation type (Table 28).

Table 28. Frequency of Consumption of Food Items I.b

		Family/Relative's home		**Student shared flat**		**Dormitory (campus)**		**Dormitory (private)**		
		n	%	n	%	n	%	n	%	p
Fruits	Never	1	3.1	1	2.3	1	4.5	1	20.0	0.191
	1-2 times a month	2	6.3	3	7.0	3	13.6	0	0.0	
	Once a week	9	28.1	9	20.9	5	22.7	0	0.0	
	2-4 times a week	14	43.8	25	58.1	7	31.8	3	60.0	
	5-6 times a week	6	18.8	2	4.7	4	18.2	0	0.0	
	Every night	0	0.0	3	7.0	2	9.1	1	20.0	
Nuts	Never	4	12.5	3	7.0	2	9.1	1	20.0	0.826
	1-2 times a month	4	12.5	11	25.6	7	31.8	0	0.0	
	Once a week	11	34.4	12	27.9	6	27.3	3	60.0	
	2-4 times a week	10	31.3	13	30.2	5	22.7	1	20.0	
	5-6 times a week	2	6.3	4	9.3	2	9.1	0	0.0	
	Every night	1	3.1	0	0.0	0	0.0	0	0.0	
Potato Chips	Never	16	50.0	26	60.5	10	45.5	3	60.0	0.140
	1-2 times a month	15	46.9	14	32.6	9	40.9	1	20.0	
	Once a week	1	3.1	0	0.0	3	13.6	0	0.0	
	2-4 times a week	0	0.0	2	4.7	0	0.0	1	20.0	
	Every night	0	0.0	1	2.3	0	0.0	0	0.0	
Chocolate	Never	10	31.3	3	7.0	0	0.0	0	0.0	0.010
	1-2 times a month	8	25.0	11	25.6	4	18.2	1	20.0	
	Once a week	3	9.4	10	23.3	5	22.7	0	0.0	
	2-4 times a week	4	12.5	13	30.2	11	50.0	2	40.0	
	5-6 times a week	3	9.4	4	9.3	2	9.1	1	20.0	
	Every night	4	12.5	2	4.7	0	0.0	1	20.0	
Biscuit and derivatives	Never	9	28.1	10	23.3	2	9.1	2	40.0	0.326
	1-2 times a month	6	18.8	13	30.2	6	27.3	0	0.0	
	Once a week	7	21.9	13	30.2	6	27.3	0	0.0	
	2-4 times a week	7	21.9	6	14.0	6	27.3	2	40.0	
	5-6 times a week	2	6.3	1	2.3	2	9.1	1	20.0	
	Every night	1	3.1	0	0.0	0	0.0	0	0.0	

Table 29. Frequency of Consumption of Food Items II.b

		Family/Relative's home		Student shared flat		Dormitory (campus)		Dormitory (private)		
		n	%	n	%	n	%	n	%	p
Popcorn	Never	15	46.9	23	53.5	9	40.9	1	20.0	0.051
	1-2 times a month	14	43.8	16	37.2	10	45.5	1	20.0	
	Once a week	3	9.4	3	7.0	2	9.1	0	0.0	
	2-4 times a week	0	0.0	1	2.3	1	4.5	3	60.0	
Milk and dairy products	Never	7	21.9	3	7.0	2	9.1	0	0.0	0.255
	1-2 times a month	3	9.4	5	11.6	3	13.6	0	0.0	
	Once a week	5	15.6	3	7.0	6	27.3	0	0.0	
	2-4 times a week	7	21.9	15	34.9	2	9.1	3	60.0	
	5-6 times a week	8	25.0	10	23.3	6	27.3	1	20.0	
	Every night	2	6.3	7	16.3	3	13.6	1	20.0	
Meat and meat derivatives	Never	23	71.9	21	48.8	10	45.5	3	60.0	0.740
	1-2 times a month	1	3.1	3	7.0	3	13.6	0	0.0	
	Once a week	0	0.0	2	4.7	2	9.1	0	0.0	
	2-4 times a week	5	15.6	10	23.3	4	18.2	1	20.0	
	5-6 times a week	3	9.4	6	14.0	3	13.6	1	20.0	
	Every night	0	0.0	1	2.3	0	0.0	0	0.0	
Bread and derivatives	Never	17	53.1	16	37.2	9	40.9	3	60.0	0.650
	1-2 times a month	4	12.5	6	14.0	2	9.1	0	0.0	
	Once a week	3	9.4	2	4.7	4	18.2	0	0.0	
	2-4 times a week	3	9.4	10	23.3	2	9.1	0	0.0	
	5-6 times a week	5	15.6	7	16.3	5	22.7	2	40.0	
	Every night	0	0.0	2	4.7	0	0.0	0	0.0	
Vegetables	Never	19	59.4	17	39.5	9	40.9	3	60.0	0.425
	1-2 times a month	3	9.4	4	9.3	2	9.1	0	0.0	
	Once a week	1	3.1	5	11.6	5	22.7	0	0.0	
	2-4 times a week	7	21.9	10	23.3	4	18.2	0	0.0	
	5-6 times a week	2	6.3	6	14.0	2	9.1	1	20.0	
	Every night	0	0.0	1	2.3	0	0.0	1	20.0	
Carbonated drinks	Never	21	65.6	27	62.8	11	50.0	4	80.0	0.110
	1-2 times a month	9	28.1	7	16.3	3	13.6	1	20.0	
	Once a week	0	0.0	1	2.3	5	22.7	0	0.0	
	2-4 times a week	2	6.3	5	11.6	3	13.6	0	0.0	
	5-6 times a week	0	0.0	3	7.0	0	0.0	0	0.0	

4.7.2. **Alcohol Consumption Frequency and Accomodation on Weekdays**

There was no significant difference between alcohol consumption frequencies on weekdays and the students' accommodation type (Table 30).

Table 30. Alcohol Consumption Frequency on Weekdays with Respect to Accommodation Type

		Family/Relative's home		**Student shared flat**		**Dormitory (campus)**		**Dormitory (private)**		
		n	%	n	%	n	%	n	%	p
Beer	Never	20	62.5	19	44.2	12	54.5	3	60.0	0.804
	1-2 times a month	10	31.3	17	39.5	8	36.4	2	40.0	
	Once a week	2	6.3	6	14.0	1	4.5	0	0.0	
	2-4 times a week	0	0.0	1	2.3	1	4.5	0	0.0	
Wine	Never	24	75.0	25	58.1	16	72.7	5	100	0.550
	1-2 times a month	6	18.8	15	34.9	4	18.2	0	0.0	
	Once a week	2	6.3	2	4.7	1	4.5	0	0.0	
	2-4 times a week	0	0.0	1	2.3	1	4.5	0	00	
Vodka	Never	28	87.5	39	90.7	19	86.4	5	100	0.867
	1-2 times a month	4	12.5	3	7.0	2	9.1	0	0.0	
	Once a week	0	0.0	1	2.3	1	4.15	0	0.0	
Vodka cocktail (with energy drink of juice)	Never	29	90.6	39	90.7	18	81.8	4	80.0	0.597
	1-2 times a month	3	9.4	3	7.0	3	13.6	1	20.0	
	Once a week	0	0.0	1	2.3	1	4.5	0	0.0	
Raki	Never	29	90.6	37	86.0	18	81.8	4	80.0	0.801
	1-2 times a month	3	9.4	5	11.6	3	13.6	1	20.0	
	Once a week	0	0.0	1	2.3	1	4.5	0	0.0	
Whisky	Never	31	96.9	41	95.3	21	95.5	5	100	0.608
	1-2 times a month	1	3.1	2	4.7	0	0.0	0	0.0	
	Once a week	0	0.0	0	0.0	1	4.5	0	0.0	
Tequila	Never	31	96.9	41	95.3	18	81.8	4	80.0	0.139
	1-2 times a month	1	3.1	2	4.7	3	13.6	1	20.0	
	Once a week	0	0.0	0	0.0	1	4.5	0	0.0	
Gin	Never	31	96.9	42	97.7	21	95.5	5	100	0.654
	1-2 times a month	1	3.1	1	2.3	0	0.0	0	0.0	
	2-4 times a week	0	0.0	0	0.0	1	4.5	0	0.0	

4.7.3. **Alcohol Consumption Frequency and Accommodation on Weekends**

There was no significant difference between alcohol consumption frequencies on weekends and the students' accommodation type (Table 31).

Table 31. Alcohol Consumption Frequency on Weekends with Respect to Accommodation Type

		Family/Relative's home		**Student shared flat**		**Dormitory (campus)**		**Dormitory (private)**		
		n	%	n	%	n	%	n	%	p
Beer	Never	14	43.8	13	30.2	9	40.9	3	60.0	0.853
	1-2 times a month	14	43.8	19	44.2	9	40.9	2	40.0	
	Once a week	4	12.5	9	20.9	3	13.6	0	0.0	
	2-4 times a week	0	0.0	2	4.7	1	4.5	0	0.0	
Wine	Never	20	62.5	18	41.9	13	59.1	4	80.0	0.618
	1-2 times a month	10	31.3	21	48.8	7	31.8	1	20.0	
	Once a week	2	6.3	3	7.0	1	4.5	0	0.0	
	2-4 times a week	0	0.0	1	2.3	1	4.5	0	0.0	
Vodka	Never	25	78.1	32	74.4	16	72.7	5	100	0.842
	1-2 times a month	7	21.9	10	23.3	5	22.7	0	0.0	
	Once a week	0	0.0	1	2.3	1	4.5	0	0.0	
Vodka cocktail (with energy drink of juice)	Never	22	68.8	28	65.1	16	72.7	3	60.0	0.522
	1-2 times a month	10	31.3	14	32.6	4	18.2	2	40.0	
	Once a week	0	0.0	1	2.3	2	9.1	0	0.0	
Raki	Never	27	84.4	31	72.1	17	77.3	4	80.0	0.328
	1-2 times a month	5	15.6	12	27.9	3	13.6	1	20.0	
	Once a week	0	0.0	0	0.0	1	4.5	0	0.0	
	2-4 times a week	0	0.0	0	0.0	1	4.5	0	0.0	
Whisky	Never	30	93.8	39	90.7	20	90.9	5	100	0.759
	1-2 times a month	2	6.3	4	9.3	1	4.5	0	0.0	
	2-4 times a week	0	0.0	0	0.0	1	4.5	0	0.0	
Tequila	Never	25	78.1	35	81.4	15	68.2	4	80.0	0.648
	1-2 times a month	7	21.9	8	18.6	6	27.3	1	20.0	
	Once a week	0	0.0	0	0.0	1	4.5	0	0.0	
Gin	Never	29	90.6	40	93.0	20	90.9	5	100	0.759
	1-2 times a month	3	9.4	3	7.0	1	4.5	0	0.0	
	2-4 times a week	0	0.0	0	0.0	1	4.5	0	0.0	

4.8.Consumption Frequency and Exercise

4.8.1. Food Consumption Frequency and Exercise

A statistically significant difference was found in the exercise groups and the participants' food consumption frequency. The chocolate consumption frequency of those who do not exercise was significantly higher (p=0.015). Considering the equal consumption frequencies of the participants who do not exercise, it was observed that they tend to consume more of almost every food item (Tables 32 and 33).

Table 32. Frequency of Food Consumption with Respect to Exercise Groups I

		Exercising		**Non-Exercising**		
		n	%	n	%	p
Fruits	Never	1	2.4	3	4.9	0.512
	1-2 times a month	4	9.8	4	6.6	
	Once a week	12	29.3	11	18.0	
	2-4 times a week	20	48.8	29	47.5	
	5-6 times a week	3	7.3	9	14.8	
	Every night	1	2.4	5	8.2	
Nuts	Never	7	17.1	3	4.9	0.419
	1-2 times a month	7	17.1	15	24.6	
	Once a week	12	29.3	20	32.8	
	2-4 times a week	12	29.3	17	27.9	
	5-6 times a week	3	7.3	5	8.2	
	Every night	0	0.0	1	1.6	
Potato Chips	Never	20	48.8	35	57.4	0.380
	1-2 times a month	19	46.3	20	32.8	
	Once a week	2	4.9	2	3.3	
	2-4 times a week	0	0.0	3	4.9	
	Every night	0	0.0	1	1.6	
Chocolate	Never	10	24.4	3	4.9	0.015
	1-2 times a month	12	29.3	12	19.7	
	Once a week	4	9.8	14	23.0	
	2-4 times a week	12	29.3	18	29.5	
	5-6 times a week	2	4.9	8	13.1	
	Every night	1	2.4	6	9.8	
Biscuit and derivatives	Never	12	29.3	11	18.0	0.686
	1-2 times a month	10	24.4	15	24.6	
	Once a week	10	24.4	16	26.2	
	2-4 times a week	8	19.5	13	21.3	
	5-6 times a week	1	2.4	5	8.2	
	Every night	0	0.0	1	1.6	

Table 33. Frequency of Food Consumption with Respect to Exercise Groups II

		Exercising		Non-Exercising		
		n	%	n	%	p
Popcorn	Never	21	51.2	27	44.3	0.633
	1-2 times a month	17	41.5	24	39.3	
	Once a week	2	4.9	6	9.8	
	2-4 times a week	1	2.4	4	6.6	
Milk and dairy products	Never	8	19.5	4	6.6	0.230
	1-2 times a month	5	12.2	6	9.8	
	Once a week	4	9.8	10	16.4	
	2-4 times a week	9	22.0	18	29.5	
	5-6 times a week	12	29.3	13	21.3	
	Every night	3	7.3	10	16.4	
Meat and meat derivatives	Never	24	58.5	33	54.1	0.815
	1-2 times a month	4	9.8	3	4.9	
	Once a week	2	4.9	2	3.3	
	2-4 times a week	7	17.1	13	21.3	
	5-6 times a week	4	9.8	9	14.8	
	Every night	0	0.0	1	1.6	
Bread and derivatives	Never	21	51.2	24	39.3	0.413
	1-2 times a month	6	14.6	6	9.8	
	Once a week	3	7.3	6	9.8	
	2-4 times a week	3	7.3	12	19.7	
	5-6 times a week	8	19.5	11	18.0	
	Every night	0	0.0	2	3.3	
Vegetables	Never	19	46.3	29	47.5	0.693
	1-2 times a month	4	9.8	5	8.2	
	Once a week	4	9.8	7	11.5	
	2-4 times a week	11	26.8	10	16.4	
	5-6 times a week	3	7.3	8	13.1	
	Every night	0	0.0	2	3.3	
Carbonated drinks	Never	25	61.0	38	62.3	0.566
	1-2 times a month	8	19.5	12	19.7	
	Once a week	1	2.4	5	8.2	
	2-4 times a week	6	14.6	4	6.6	
	5-6 times a week	1	2.4	2	3.3	

4.8.2. **Alcohol Consumption Frequency and Exercise on Weekdays**

There was no significant difference between alcohol consumption frequencies on weekdays and the students' exercise habits (Table 34).

Table 34. Alcohol Consumption Frequency on Weekdays with Respect to Exercise

		Exercising		**Non-Exercising**		
		n	%	n	%	p
Beer	Never	22	53.7	32	52.5	0.594
	1-2 times a month	14	34.1	23	37.7	
	Once a week	5	12.2	4	6.6	
	2-4 times a week	0	0.0	2	3.3	
Wine	Never	30	73.2	40	65.6	0.462
	1-2 times a month	8	19.5	17	27.9	
	Once a week	3	7.3	2	3.3	
	2-4 times a week	0	0.0	2	3.3	
Vodka	Never	36	87.8	55	90.2	0.404
	1-2 times a month	5	12.2	4	6.6	
	Once a week	0	0.0	2	3.3	
Vodka cocktail (with energy drink of juice)	Never	35	85.4	55	90.2	0.312
	1-2 times a month	6	14.6	4	6.6	
	Once a week	0	0.0	2	3.3	
Raki	Never	37	90.2	51	83.6	0.597
	1-2 times a month	4	9.8	8	13.1	
	Once a week	0	0.0	2	3.3	
Whisky	Never	39	95.1	59	96.7	0.746
	1-2 times a month	2	4.9	1	1.6	
	Once a week	0	0.0	1	1.6	
Tequila	Never	39	95.1	55	90.2	0.815
	1-2 times a month	2	4.9	5	8.2	
	Once a week	0	0.0	1	1.6	
Gin	Never	40	97.6	59	96.7	1.000
	1-2 times a month	1	2.4	1	1.6	
	2-4 times a week	0	0.0	1	1.6	

4.8.3. **Alcohol Consumption Frequency and Exercise on Weekends**

There was no significant difference between alcohol consumption frequencies on weekends and the students' exercise habits (Table 34). Considering the equal alcohol consumption frequencies of the participants who do not exercise in each alcoholic beverage category, it was observed that they tend to consume more of almost every alcoholic beverage (Table 35).

Table 35. Alcohol Consumption Frequency on Weekends with Respect to Exercise

		Exercising		**Non-Exercising**		
		n	%	n	%	p
Beer	Never	15	36.6	24	39.3	0.871
	1-2 times a month	17	41.5	27	44.3	
	Once a week	8	19.5	8	13.1	
	2-4 times a week	1	2.4	2	3.3	
Wine	Never	24	58.5	31	50.8	0.291
	1-2 times a month	13	31.7	26	42.6	
	Once a week	4	9.8	2	3.3	
	2-4 times a week	0	0.0	2	3.3	
Vodka	Never	31	75.6	47	77.0	0.547
	1-2 times a month	10	24.4	12	19.7	
	Once a week	0	0.0	2	3.3	
Vodka cocktail (with energy drink of juice)	Never	26	63.4	43	70.5	0.780
	1-2 times a month	14	34.1	16	26.2	
	Once a week	1	2.4	2	3.3	
Raki	Never	31	75.6	48	78.7	0.666
	1-2 times a month	9	22.0	12	19.7	
	Once a week	1	2.4	0	0.0	
	2-4 times a week	0	0.0	1	1.6	
Whisky	Never	38	92.7	56	91.8	1.000
	1-2 times a month	3	7.3	4	6.6	
	2-4 times a week	0	0.0	1	1.6	
Tequila	Never	32	78.0	47	77.0	1.000
	1-2 times a month	9	22.0	13	21.3	
	Once a week	0	0.0	1	1.6	
Gin	Never	38	92.7	56	91.8	1.000
	1-2 times a month	3	7.3	4	6.6	
	2-4 times a week	0	0.0	1	1.6	

5. DISCUSSION

The main purpose of this study is to explore the effects of the food items consumed between dinner time and bed time, sleep duration and sleep timing on the increased obesity risk. Previous studies investigated the impact of night eating on the obesity risk for individuals from every age group [5, 6, 17, 9].

Many studies in the literature on sleep duration, sleep timing and night eating habits focused on adult, children and elderly participants. The limited number of studies found in relation to adolescents and young adults was one of the main reasons behind the selection of the population for this study, university students. In addition, the population consists of the students of the Department of Nutrition and Dietetics. The reason behind this specific selection was that they are better able to control their diets in the light of the education they receive when compared to students from other departments. It was attempted to observe if the individuals who receive information about eating healthy were good at applying this information in their daily lives.

The study was conducted with the participation of female students studying in 1st, 2nd, and 3rd grades. The reason behind the exclusion of 4th grade students was that they are working as interns three days of the week which make it difficult to qualify them as students, and that they go through a change in their eating and sleep habits due to their changing lifestyle; in addition, it was harder to reach out to these students.

As the number of male students enrolled in this department is limited (n:13) the population was limited to female students in order to avoid any possible problems in the distribution of the results.

As students are exposed to difficult exam sessions, and the stress of delivering projects and homework within deadlines, it was believed that this age group might experience irregularities in their sleep and eating patterns.

As daily lifestyle may be subject to change especially during exam sessions, it was assumed that the consumption of convenient and ready-made food later at night would increase accordingly. In order to underline this effect, the survey included in this study was conducted during the exam session.

As the curriculum used in the Department of Nutrition and Dietetics has a difficulty level gradually gets harder from the 1st grade to the 3rd grade, participants were enrolled from each one of these grades with the purpose to see how the increased information level shapes their sleep and eating habits. An assessment of the intergrade differences showed that BMIs, waist circumference and fat mass measurements are significantly lower than that of 2nd and 3rd grade students. The reasons behind this finding were believed to be the fact that the Department of Nutrition and Dietetics has recently received increased attention, that it is commonly preferred by female students with the aspiration to have a healthy and fit body, that the students of Yeditepe University tend to place importance on their appearance due to their general socioeconomic backgrounds, and that students tend to disregard their eating and sleep routines with harder curriculum and increased responsibility. Increased information level in accordance with the instructions on nutrition does not seem to improve the level of adoption of this information in one's lifestyle.

Yeditepe University has a high number of students coming from other cities. Thus, students have a number of different accommodation options. Changing accommodation type may have a direct impact on students' sleep habits, while changing the availability and convenience of food. It was also predicted that the responsibility levels will change among the students who live alone in the dormitory, who live alone in an apartment or who share the apartment with another student. Therefore, this study was also designed to inquire the accommodation types of the students.

Although the findings were not statistically significant, it was found that students who live in school dormitory have higher BMI, waist circumference and fat mass scores when compared to other accommodation types. Students who live alone, who share an apartment and who live with family have better chances to access healthy food options. In private dormitories, on the other hand, students are often provided with a shared kitchen facility.

As the campus dormitory does not offer such facilities, students commonly prefer ready-made and high-calorie food as an alternative to healthy food served at the cafeteria.

Thus, it is believed that this is the reason behind higher scores obtained from students living in campus dormitory.

Nevertheless, the fact that students living in the campus do not make an extra effort to go to classes was also considered as another reason for the higher scores.

This study also investigates the physical activity statues as it can be a factor in reducing the obesity risk or prevalence of obesity. Studies in this field do not consider an exercise pattern of less than 3 days a week and less than 30 minutes a session as a physical activity [25]. Therefore, this study inquires the level of physical activity of the participants based on these levels. According to the results obtained from the survey, there was no significant difference between participants who exercise and who do not. This is explained by the fact that BMI, waist circumference and fat mass scores of all the participants are in a normal range and that they pursue a rather active lifestyle as required by their age group.

It is assumed that insufficient sleep and sleeping late at night are risk factors of obesity. Thus, this study explored the sleep duration of the participants and their sleep timing under four sleep start and end conditions. Previous studies have also used similar subgroup inquiries [9].

According to the results obtained, it was found that sleep duration on weekdays, sleeping late or early and waking up late or early and daytime sleep were not significantly correlated with their BMIs, waist circumference and fat mass. This finding may be explained with the fact that although the participants had different patterns of sleep start and end, the average duration of sleep was 7.1 hours which is not significantly below the duration recognized as insufficient [2,6]. Young adult participants often wake up early in order to maintain successful results at school.

It was found that changes in the sleep pattern on weekends do not result in a significant difference in the measurements of BMI, waist circumference and fat mass.

This can be explained with the increased social activity accompanying increased sleep duration (9 hours at an average) which translates into increased physical activity. Previous studies suggest that increased sleep duration on weekends does not improve the relationship between sleep and obesity risk [4].

Another aspect which differs depending on the sleep habits is the frequency of meals.

Eating habits may change depending on the sleep pattern of the student. For example, it is found that students who prefer to increase their sleep duration tend to skip breakfast or to go for ready-made high-calorie food. As the population of this study involves female students only, it was predicted that they would rather take their time in the morning to get ready for school, and skip breakfast in favor of convenient food. Although there was no significant difference in the data obtained from this study, it was found that BMI, waist circumference and fat mass measurements gave higher results in students who have breakfast on weekdays when compared to those skip breakfast. This result changed with almost all the participants having breakfast on weekends. Although their number is rather low, BMIs, waist circumference, and fat mass measurements of those who did not have breakfast on weekends were higher than those who have breakfast on weekends. It was predicted that there will be differences in the frequency of snacks and meals on weekdays and weekends due to changing social activity level and bedtime. However, the results of this study did not give any significant difference between the number of meals and snacks both on weekdays and weekends. This can be explained with the fact that participants who are engaged in school on weekdays are engaged in social activities on weekends which result in the same pattern for the time spent with meals.

Consumption of a number of specific food items is investigated in order to find a correlation between the participants' possible eating habits after dinner or night eating habits and obesity. Previous research also investigated specific food items and their consumption after 8 pm in connection with night eating and its effects on obesity [5, 7, 8, 26]. Even the consumption of food which is commonly deemed healthy may lead to obesity when they are consumed at late hours resulting in increased calorie intake. This can be explained with the changes in circadian rhythm and hormone activity [18].

According to the data obtained, only 'Potato Chips' and 'Meat and Meat Derivatives' consumption were found to have a negative but statistically significant impact on BMI scores. In addition, it was observed that 1st grade students tend to consume more popcorn than the other grades.

A review of the food preferences with respect to accommodation showed that students living in the campus dormitory consume significantly more chocolate than the others.

There was no significant difference with regards to consumption of other food items. There was also no significant difference between the food consumption frequencies and exercise habits of the students.

As this study focuses on university students, alcohol consumption was considered as another possible factor which may lead to obesity. Given the fact that consumption frequency may differ from weekdays to weekends, consumption of different alcoholic beverages was investigated for both timeframes. According to the data obtained, tequila consumption of 1st grade students is significantly higher than the other grades. Considering it is a beverage commonly preferred in nightclubs, it could be explained with the 1st grade students' enthusiasm about new university life. There was a negative but statistically significant relationship between wine consumption on weekends and BMI for all participants. There was no statistically significant relationship between students' alcohol consumption on weekdays and their BMI, waist circumference and fat mass measurements. This can be explained with reduced alcohol consumption on weekdays. There was no statistically significant relationship between the accommodation type and exercise habits off the students and their alcohol consumption both on weekdays and weekends.

In short, this study focuses on young adults which makes it distinguished from the previous research. When the data obtained is considered in general, there was no significant correlation between the sleep and eating habits of university students and their BMI, waist circumference and fat mass measurements.

Among the reasons behind this finding are the possibility of having a high basal metabolism rate due to physiologic features, increased physical activity level as a requirement of social and academic lifestyle, having the necessary information level especially in healthy eating as students of the Department of Nutrition and Dietetics, and increased attention to healthy living in connection with the aspiration to have good looks as the participants were all female students.

Moreover, a previous study on the same age group was only able to establish a statistically significant relationship between sleep duration, night eating and BMI in male participants. This study shows that there is no correlation between BMI, sleep duration and night eating in the light of studies conducted on female participants [9].

6. CONCLUSION

According to previous research on sleep and eating pattern and obesity, there is no statistically significant relationship between them. Based on this finding and focusing on young adults seeing the lack of research on this age group with regards to this question, this study found that sleep duration, sleep timing, frequency of meals and habit of skipping meals do not have an impact on BMI, waist circumference and fat mass measurements of university students.

It was observed that consuming potato chips after dinner and consuming meat and meat derivatives 5-6 times a week has a negative but significant relationship with BMI.

A statistically significant and negative correlation was found between BMI and wine consumed on weekends.

When compared with other grades, BMIs, waist circumference and fat mass measurements of the 1st grade students are to be significantly lower.

It was observed that exercise habits do not result in a significant difference in the parameters explored.

It was found that changes in the accommodation type do not result in a significant difference in the measurements of BMI, waist circumference and fat mass. It was found that students living in campus dormitory tend to consume more chocolate than others.

As reported by the previous research, increasing responsibility level of the students and having a more routine lifestyle may lead to a negative impact on the parameters used in this study in terms of sleep duration, sleep timing and night eating habits.

In order to have better results in future research, it will be a good idea to increase the number of participants included. In addition, a comparison of more than one departments may lead to different results. Nevertheless, it may be possible to define a statistically significant relationship between BMI and sleep and eating patterns with a comparison of the two genders.

When the data obtained is considered, there is no significant correlation between the sleep and night eating habits of university students with ages ranging between 18 and 24 and their BMI, waist circumference and fat mass measurements.

More studies are needed in this field if it is to establish the correlation between sleep and night eating habits and obesity in this age group.

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8. APPENDICES

8.1.Ethical Approval

BAHÇEŞEHİR ÜNİVERSİTESİ
KLİNİK ARAŞTIRMALAR ETİK KURULU

Üniversitemiz Klinik Araştırmalar ve Etik Kurulu'na ait 18 Mayıs 2016 Tarih ve 2016-04/09 Sayılı Karar Örneğidir.

KARAR:2016-04/09

Yeditepe Üniversitesi Yüksek Lisans Öğrencisi İlayda ÖZTÜRK''ün **"Üniversite Öğrencilerinin Uyku Düzeni, Gece Yemek Yeme ve Vücut Kitle İndeksi Arasındaki İlişki"** isimli tez araştırma başvuru dosyasının değerlendirilmesi görüşüldü.

Görüşmeler sonunda; Yeditepe Üniversitesi Yüksek Lisans Öğrencisi İlayda ÖZTÜRK''ün **"Üniversite Öğrencilerinin Uyku Düzeni, Gece Yemek Yeme ve Vücut Kitle İndeksi Arasındaki İlişki"** adlı, araştırmaları gerekçe, amaç, yaklaşım ve yöntemleri dikkate alınarak; incelenmiş ve uygun bulunmuş olup araştırmanın/çalışmanın başvuru dosyasında belirtilen merkezlerde gerçekleştirilmesinde etik ve bilimsel sakınca bulunmadığına karar verildi.

Prof.Dr. Nazire AFŞAR
Etik Kurul Başkanı

9. CURRICULUM VITAE

1. Kişisel Bilgiler

Adı	İlayda	**Soyadı**	ÖZTÜRK
Doğum Yeri	Fatih/İSTANBUL	**Doğum Tarihi**	09.02.1992
Uyruğu	T.C.	**TC Kimlik No**	42013461966
E-mail	ilaydahaj@gmail.com	**Tel**	05301105045

2. Öğrenim Durumu

Derece	**Alan**	**Mezun Olduğu Kurumun Adı**	**Mezuniyet Yılı**
Yüksek Lisans	Beslenme ve Diyetetik	**Yeditepe Üniversitesi**	2017
Lisans	Beslenme ve Diyetetik	**Yeditepe Üniversitesi**	2014
Lise	Fen Bilimleri	**Fatih Samiha Ayverdi Anadolu Lisesi**	2010

[#] Başarılmış birden fazla sınav varsa(KPDS, ÜDS, TOEFL; EELTS vs), tüm sonuçlar yazılmalıdır

Bildiği Yabancı Dilleri	**Yabancı Dil Sınav Notu ([#])**
İngilizce	Proficiency (63.00)
Sırpça	-

4. İş Deneyimi (Sondan geçmişe doğru sıralayın)

Görevi	Kurum	**Süre (Yıl - Yıl)**
Diyetisyen	İSTEK İstanbul Eğitim Hizmetleri A.Ş.	2016-
Burslu Yüksek Lisans Öğrencisi/Asistan	Yeditepe Üniversitesi	2015-2016

5. Bilgisayar Bilgisi

Program	**Kullanma becerisi**
Microsoft Office	İyi

[*] Çok iyi, iyi, orta, zayıf olarak değerlendirin

6. Diğer (Görev Aldığı Projeler/Sertifikaları/Ödülleri)

İstanbul Kalkındırma Ajansı-Pendik Belediyesi- Çocukluk Çağı Obezitesinin Önlenmesi Projesi (2015)
International Society of Sports Nutrition (ISSN)-Certified Sports Dietitian (CISSN)-Florida/USA (2016)
4th International Conference on Nutrition and Growth-CME/CPD Certificate-Amsterdam/Netherlands (2017)