T.C.
YEDITEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARMENT OF NUTRITION AND DIETETICS

EVALUATION OF THE EFFECTS OF SLEEP PATTERN AND QUALITY ON BODY MASS INDEX, WAIST CIRCUMFERENCE AND FOOD CHOICES

MASTER OF SCIENCE THESIS

HAZAL ÇATIRTAN

İstanbul-2017

T.C.
YEDITEPE UNIVERSİTY
INSTITUTE OF HEALTH SCIENCES
DEPARMENT OF NUTRITION AND DIETETICS

EVALUATION OF THE EFFECTS OF SLEEP PATTERN AND QUALITY ON BODY MASS INDEX, WAIST CIRCUMFERENCE AND FOOD CHOICES

MASTER OF SCIENCE THESIS

HAZAL ÇATIRTAN

SUPERVISOR
Assoc. Prof. Dr. Binnur OKAN BAKIR

İstanbul-2017

TEZ ONAYI FORMU

Kurum : Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü

Program : Beslenme ve Diyetetik

Tez Başlığı : Uyku Düzeni ve Kalitesinin Beden Kütle İndeksi, Bel Çevresi ve Besin Seçimlerine Etkisinin Değerlendirilmesi

Tez Sahibi : Hazal ÇATIRTAN

Sınav Tarihi : 3 Kasım 2017

Bu çalışma jurimiz tarafından kapsam ve kalite yönünden Yüksek Lisans Tezi olarak kabul edilmiştir.

	Unvanı, Adı-Soyadı (Kurumu)	İmza
Jüri Başkanı:	Yrd. Doç. Dr. Binnur OKAN BAKIR (Yeditepe Üniversitesi)	
Tez danışmanı:	Yrd. Doç. Dr. Binnur OKAN BAKIR (Yeditepe Üniversitesi)	
Üye:	Yrd. Doç. Dr. İskender KARALTI (Yeditepe Üniversitesi)	
Üye:	Yrd. Doç. Dr. Elif DİNÇERLER (Üsküdar Üniversitesi)	
Üye:		

ONAY

Bu tez Yeditepe Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliğinin ilgili maddeleri uyarınca yukarıdaki jüri tarafından uygun görülmüş ve Enstitü Yönetim Kurulu'nun 03/11/2017 tarih ve 2017/22-10 sayılı kararı ile onaylanmıştır.

Prof. Dr. Bayram YILMAZ
Sağlık Bilimleri Enstitüsü Müdürü

DECLARATION

I hereby declare that this thesis 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.

Date
Signature
Name
Surname

ACKNOWLEDGEMENTS

First of all, I would like to thank my family and all the friends who supported me in my thesis process.

Also, I thank my old working place that gives me the opportunity to conduct my work, Anadolu Medical Center Hospital, and thanks to my colleagues and at the same time my participants for their help.

And I offer my most sincere thanks and affection
to my supervisor Assoc. Prof. Dr. Binnur OKAN BAKIR who has contributed as much as my contribution to the thesis, always responding to my questions
and helping me with her ideas.

TABLE OF CONTENTS

Page Number

LIST OF TABLES

Page Number

LIST OF FIGURES

Page Number

LIST OF ABBREVIATIONS

ANS: Autonomic Nervous System

BMI: Body Mass Index

DNA: Deoxyribonucleic Acid

HDL: High-Density Lipoprotein

NREM: Non-Rapid Eye Movement

PNS: Parasympathetic Nervous System

PSQI: Pittsburgh Sleep Quality Index

REM: Rapid Eye Movement

SNS: Sympathetic Nervous System

WHO: World Health Organisation

WHR: Waist-to-Hip Ratio

SUMMARY

Çatırtan, H (2017). Effects Of Sleep Quality And Shift-Work on Body Mass Index, Waist Circumference and Food Choices In Adults. Yeditepe University, Institute of Health Science, Department of Nutrition and Dietetics. MSc thesis, Istanbul.

Sleep is a reversible condition in which the creature's response threshold increases to external stimuli. A good night's sleep is considered to be one of the most important components of health and quality of life at all ages. Systematic studies showed that short or long sleep duration are associated with hypertension, cardiovascular disease, stroke, type 2 diabetes mellitus and obesity. This study has been carried out in order to compare waist circumference, body mass index and food choices of individuals according to their sleep quality and the shift status. 202 individuals were participated in the study. A questionnaire was applied to participants and Pittsburgh Sleep Quality Index scores were evaluated and a sleep diary was filled. Waist circumferences were measured. All of the results were evaluated according to shift status and sleep quality. As result; according to shift status, non-shift workers' body mass index (BMI), weight and waist circumference were significantly higher than shift workers' and sex does not affect the relationship. The mean BMI values decreased and the waist circumference values increased as the shift frequency increased in women and in men, but in general the mean BMI and waist circumference values decreases as the shift frequency increased. Sleep quality was found to be significantly poor, especially for shift worker women and nurses. The participants with poor sleep quality and are non-shift worker have higher BMI values. Those with shift work and poor sleep quality have a lower tendency to have main meals and snacks regularly.

Keywords: nutrition, shift work, sleep quality, body mass index

TURKISH SUMMARY

Çatırtan, H (2017). Yetişkin Bireylerde Uyku Kalitesinin ve Vardiyalı Çalışmanın Beden Kütle İndeksi, Bel Çevresi Ve Besin Seçimlerine Etkisi. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü. Beslenme ve Diyetetik Bölümü, Master Tezi. İstanbul.

Uyku, canlının dış uyaranlara tepki eşiğinin arttığı tersine çevrilebilir bir durumdur. İyi bir gece uykusu, her yaşta sağlığın ve yaşam kalitesinin en önemli bileşenlerinden biri olarak sayılır. Sistematik çalışmalar, kısa veya uzun uyku süresinin hipertansiyon, kardiyovasküler hastalık, inme, tip 2 diyabet ve obezite ile ilişkili olduğunu göstermektedir. Bu çalışma, bireylerin uyku kalitesine ve vardiya durumuna göre bel çevresi, vücut kütle indeksi ve besin seçimlerini karşılaştırmak amacıyla yapılmıştır. Araştırmaya toplam 202 kişi katılmıştır. Katılımcılara anket uygulanmıştır. Pittsburgh Uyku Kalitesi İndeksi puanları değerlendirilmiş ve bir uyku günlüğü doldurulmuştur. Bel çevresi ölçüleri alınmıştır. Tüm sonuçlar, vardiya durumuna ve uyku kalitesine göre değerlendirilmiştir. Sonuç olarak; vardiya durumuna göre, vardiyalı olmayanların beden kütle indeksi, ağırlık ve bel çevresi, vardiyalı çalışanlardan anlamlı olarak yüksek bulunmuştur, cinsiyet bu ilişkiyi etkilememektedir. Vardiyaya kalma sıklığı arttıkça kadın ve erkeklerde ortalama beden kütle indeksi değeri azalırken, bel çevresi değerleri artmış, ancak genelde ise ortalama beden kütle indeksi değeri ve bel çevresi değerleri vardiya sıklığı arttıkça azalmıştır. Uyku kalitesinin özellikle vardiyalı çalışan kadınlar ve hemşireler için anlamlı olarak kötü olduğu bulunmuştur. Uyku kalitesi kötü olan ve vardiyalı olmayan katılımcıların beden kütle indeksi daha yüksek bulunmuştur. Vardiyalı çalışan ve uyku kalitesi kötü olan katılıcımların ana öğün yapma ve atıştırma alışkanlığının da daha az olduğu görülmüştür.

Anahtar kelimeler: beslenme, vardiya, uyku kalitesi, beden kütle indeksi

1. INTRODUCTION AND AIM

Sleep is a reversible condition in which the creature's response threshold increases to external stimuli (1). It is located at the bottom of the pyramid diagram called as "Maslow's Hierarchy of Needs" and a good night's sleep is considered to be one of the most important components of health and quality of life at all ages (2).

Systematic studies showed that short or long sleep duration are associated with hypertension, cardiovascular disease, stroke, type 2 diabetes mellitus and obesity (3–8). The fact that they both have negative health consequences leads to an increase in the need for regular and qualified sleep.

Although the effects of sleep on nutrition were studied in individuals with psychological problems in the 1970s, health-related effects of chronic sleep deprivation were first investigated by Spiegel et al. (9) and its relationship with nutrition started to take shape (9,10).

According to the International Classification of Sleep Disorders, there are 8 types of sleep disorders and nutrition is affected mostly by shift work sleep disorder (11). Disruption of sleep patterns, shortening of sleep duration, etc. in shift work affect circadian rhythms of individuals, disrupt hormonal and metabolic balance in the body, cause impairment of hypertension, insulin resistance and lipid profile. While irregular sleep schedules makes appetite control harder, it also triggers unhealthy behaviors such as increased food consumption at night (12,13). In addition, it has been shown that the weight gain, body mass index value and waist circumference rates of the night workers are higher (14,15).

Healthcare workers are also the most common examples for shift work system. This study has been carried out in order to compare waist circumference, body mass index and food choices of individuals who works in a private hospital according to their sleep quality and shift status.

2. GENERAL INFORMATION

2.1. Nutrition

Nutrition is the consumption of foods and utilization of nutrients and bioactive components in that foods which are necessary for the maintenance of life, growth and development, improvement, protection and development of health, increase of quality of life and maintenance of productivity. Healthy nutrition is the key point for protection of health and prevention of diseases (16).

Nutrient diversity, adequate and balanced diet are important factors in healthy nutrition. All nutrients need to be consumed at the right time and in appropriate amounts to ensure that all nutrients are well balanced (16,17).

If nutrients are not consumed at the level of the body's needs, "insufficient nutrition" occurs due to the lack of sufficient energy for body tissues. On the other hand, due to the excessive intake of nutrients and fat accumulation because of the overfeeding, energy needs being met by unhealthy foods, or improper cooking methods lead to "unbalanced nutrition" (16).

Daily nutritional requirements of minerals and vitamins which are used in energy-protein metabolisms, carbohydrate, protein and fat requirements must be met in order to provide optimum nutrition. It is suggested that in healthy diets, 45-60% of daily calories must be from carbohydrates, 20-35% from fat, and 10-20% from proteins (16).

2.1.1. Assessment of nutritional status

The healthy life of an individual and the community and their development in terms of economy depends on the health of the individuals who constitute it. In this direction, it is necessary to aim protecting, improving and developing health for all individuals, increasing the quality of life and adopting the forms of healthy life (healthy nutrition and physical activity habits) throughout life. In addition, preventing or eliminating nutrition problems (protein-energy deficiency, obesity etc.) that are present and impairing life quality and improving the lifestyle to prevent chronic diseases related to nutrition (coronary heart diseases, hypertension, some cancer types, diabetes etc.) and the improvement and development of environmental conditions are of great importance (18).

The identification of the nutritional status of an individual is an indication of the extent to which the nutritional requirements are met. The methods used for this purpose are as follows (18):

- Determination of food consumption (nutrient intake)
- Anthropometric methods
- Biochemical tests
- Psychosocial data.

2.1.1.1. Determination of food consumption (nutrient intake)

There are 4 methods to determine the food consumption of an individual. These are (18):

- 24-hour dietary recall method is determined by recalls or record keeping technique. 24-hour dietary recall is repeated period of time including 3, 5, 7 and more days.
- Measuring of food consumption score (may also include the amount of food consumption)
- Dietary history includes 24-hour dietary recall, food consumption score, other information, socio-economic level, education level, dietary habits, food purchasing, preparation, cooking and storage conditions, physical activity status etc.
- Observation of nutrient intake.

2.1.1.2. Factors affecting dietary habits and food choices

While dietary habits are affected by many factors such as genetics, sex, social, cultural, religious, ethnic, economic, emotional and psychological status, food choices can be affected by sensory differences such as taste and smell, the individual's perception of food, life style and health condition (19,20).

Figure 1 shows the factors affecting human food choice behavior.

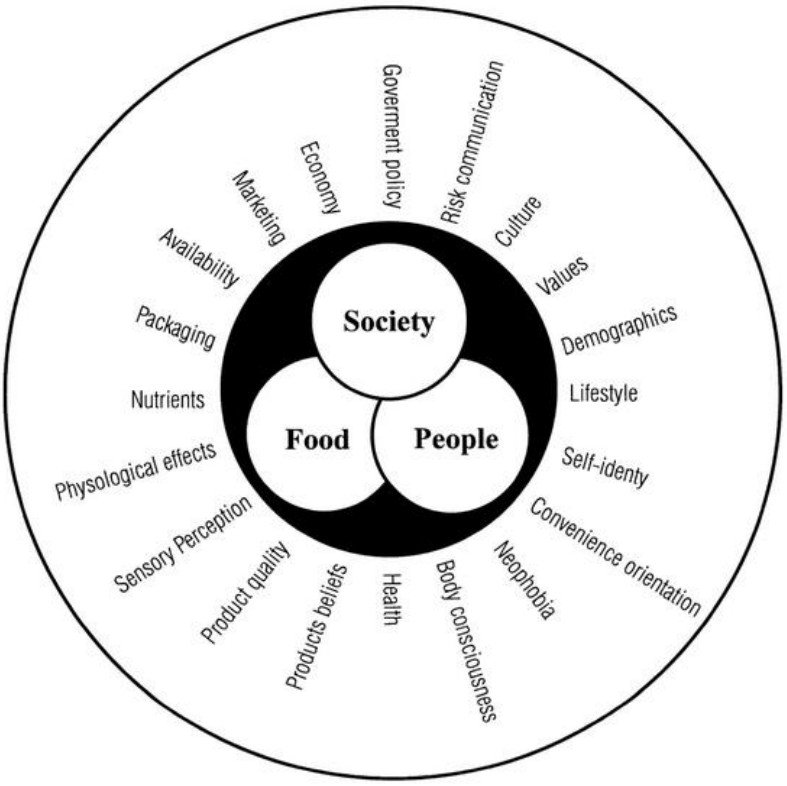

Figure 1. Factors Affecting Human Food Choice Behavior (20)

2.1.2. Anthropometric Measurements

Anthropometric measurements have great importance since it is an indicator for the amount and distribution of growth, fat-free body tissue and fat tissue in the body to determine the nutritional status. Measurements such as body weight, height, upper middle arm circumference, head circumference, waist circumference, hip circumference, skinfold thickness are frequently used methods. When anthropometric measurements are used regularly and consistently, the nutritional status of the individual can be assessed efficiently (18).

Frequently used methods can be examined under 3 headings (18):

- Body weight and height
- Body mass index (BMI)
- Determination of body fat

2.1.2.1. Body weight and height

Body weight measurement is often used as a measure of nutritional status.

Weight is the total mass of fat, muscle, water and bones in the body. Measurement of body weight is not accurate in situations such as increased (edema, acid accumulation) or decreased (diarrhea etc.) body water, tumor presence, organ enlargement (18)**.**

2.1.2.2. Body mass index (BMI)

It is a practical method used to detect underweight, overweight and obesity. It is calculated by dividing weight by the square of height (kg/m^2). Table 1 shows body mass index ranges (21).

Table 1. Body mass index ranges (21)

BMI: Body weight (kg) / Height (m2)	
BMI values (kg / m2)	Classification
<18.5	Under weight
18.5-24.9	Normal weight
25 -29.9	Pre-obesity
30 -34.9	Obesity Class 1
35-39.9	Obesity Class 2
≥40.0	Obesity Class 3

2.1.2.3. Determination of body fat

One of the best methods for detecting obesity is to determine the amount of fat in the body. The frequently used methods to determine amount of fat in the body are as follows (18):

- Measurement of skinfold thickness
- Detection of upper arm fat area
- Measurement of waist and hip circumference

- Detection of body composition

2.1.2.3.1. Determination of waist and hip circumference / ratio

In adults, waist circumference and waist-to-hip ratio (WHR) are used for risk assessment of chronic diseases (18).

The type of obesity that is determined as a result of the measurements may be android or gynoid. These obesity types have different health effects. According to the recent studies, android type (abdominal region) is a more important predictor of obesity risk. In particular, it is an important factor in the development of the insulin resistance, metabolic syndrome and cardiovascular disease (22,23).

To evaluate the obesity type and risk of disease, waist circumference, hip circumference and waist-to-hip ratio are used (18).

For the measurement of waist circumference, the region between the lowest rib bone and iliac crest is found first and then the circumference passing through the center is measured with a tape. Waist circumference measurement is also used alone and may be descriptive in determining the risk of chronic diseases. When evaluated according to the sex; for men; risk is increased at ≥94 cm and risk is high at ≥ 102. For women; risk is increased at ≥80 cm and risk is high at ≥88 (18).

For the measurement of the hip circumference, the healthcare professional should stand on the side of the individual and the circumference should be measured from the widest point (18).

Waist-to-hip ratio is known to be related to metabolic and cardiovascular diseases. If this ratio is > 0.85 in women and > 0.90 in men, the risk of metabolic and cardiovascular disease increases (24).

2.2. Sleep

Sleep is a reversible condition in which the creature's response threshold increases to external stimuli (25).

The process that begins with wakefulness continues with two types of sleep stages defined as rapid eye movement (REM) and non-rapid eye movement (NREM). While NREM sleep is driven by neurons in the medulla and basal forebrain region, REM sleep is driven by neurons in the pons and basal forebrain region and wakefulness

is driven by neurons in the brain stem, posterior hypothalamus and basal forebrain. NREM and REM sleep alternate and repeat cyclically through the night. The first REM sleep occurs approximately 90 minutes after sleep onset. The period from the sleep onset to the end of the first REM sleep is defined as a sleep cycle. This cycle lasts for 90-120 minutes and repeats 4-6 times in a night.The first REM period is usually shorter and takes about 5-15 minutes. In terms of duration, NREM gains weight in the first half of the night and REM sleep in the second half. It is known that even if a person slept for a short period, he/she is more rested when he/she awakes at the moment the cycle is completed (25).

The durations of NREM periods vary with age. The functions of first and second period of NREM sleep, which constitute half of sleep, are unknown. NREM sleep is the third period of deep sleep that provides physical rest. At the same time, this period is thought to accelerate cell renewal and repair in adults (25).

While the activity of parasympathetic nervous system is increased in the process from wakefulness to NREM sleep and from NREM sleep to REM sleep, sympathetic nervous system activity is decreased from wakefulness to NREM sleep and is increased from NREM sleep to REM sleep. Many systems from oxygen consumption to heart beat, kidney functions and stomach motility are affected by this process (26). While NREM sleep provides regeneration, energy conservation, resistance to aging process, immunologic, thermoregulation, prevention of corneal anoxynia, maintenance of neuronal integrity in the body tissues, REM provides the same in brain tissues (27).

An adult's requirement for sleep affecting many functions of the body is considered as 7-8 hours, however, this may vary according to individual and environmental factors such as age, sex, physical activity, medical history, emotional state, lifestyle habits (28). It has been shown in epidemiological studies that less than 6 hours or more than 9 hours of sleep are associated with increased mortality (29,30). When sleep status was assessed in Turkey, according to the Turkish Standards Institution Time Use Survey 2014-2015 (31), it was found that the average sleep time of the Turkish people is 8 hours 48 minutes per day, but the sleep duration of working individuals is shorter than the other groups (31).

Sleep has different aspects such as total sleep duration, sleep latency, sleep pattern, sleep quality and these are used to diagnose sleep disorders. The quality and

duration of sleep have an equal measure in terms of the quality of daily life. It also affects the daily order (30). The sleep quality is that the individual feels himself/herself fit, fresh and ready for a new day after he/she wakes up. Sleep quality includes quantitative aspects of sleep, such as sleep latency, sleep duration and number of waking up at night, as well as subjective aspects such as sleep depth and rest (28).

2.2.1. Factors affecting sleep quality

2.2.1.1. Sex

Although there are no objective indicators, women are more likely to say they have a sleeping problem than men (30,32).

2.2.1.2. Age

The structure of sleep changes with increasing age (33). There is a change in sleep onset latency and intermittent awakenings. The duration and quality of sleeping periods vary depending on age, childhood, adulthood, or old age. The duration of REM, from the basic two stages of REM and NREM sleep, does not change with age. In NREM Stage III and IV called as slow wave sleep, children sleep more NREM Stage III and IV sleep (slow wave sleep) than adults while older individuals sleep less NREM Stage III and IV sleep than adults. The number of rapid eye movements in the REM stage is reduced in the elderly people and sleep latency increases with age. Night's sleep lost due to the increased sleep latency leads to excessive daytime sleepiness in elderly people. In addition, changes in the central nervous system due to aging also affect the sleep quality of elderly individuals. Depending on the aging process, sleep quality may be disturbed due to the respiratory system complaints, sensory disturbances, urinary difficulties or a chronic diseases (34). It has been observed that aging increases sleep problems especially in men (30).

2.2.1.3. Weight

The weight of an individual is also one of the factors affecting sleep quality. Being overweight is associated with poor sleep quality (33). Obese adolescents experiences less sleep than non-obese adolescents (35). In a study’s results, overweight participants averaged more symptoms of sleep-disordered breathing, later sleep onset, shorter sleep time, and more disrupted sleep than controls (36).

2.2.1.4. Diseases

Internal diseases such as peptic ulcer, hypertension, chronic heart diseases, diabetes, respiratory system diseases and thyroid gland diseases cause increase in sleep onset latency, trouble in sleep continuity and therefore deterioration in sleep quality. The increase in sleep onset latency, decrease in bedtime and excessive daytime sleepiness in psychiatric patients (depression, anxiety, schizophrenia, dementia, stress, psychosis, mania, Alzheimer, etc.), disturbs sleep quality (34).

2.2.1.5. Psychological state

The presence of social and familial problems is one of the main factors determining the sleep quality of an individual (37,38).

2.2.1.6. Nutrition

Consumption of some foods and drinks affects sleep quality. Foods and drinks with high fat content, high caffeine content (chocolate, caffeinated sugar-sweetened beverages, tea, coffee, etc.) and high protein content make the sleep onset process difficult due to the presence of tryptophan (34).

2.2.1.7. Smoking, Alcohol and Caffeine Use

It has been reported that smoking can cause sleep onset difficulties and nighttime awakenings due to the stimulus effect of nicotine, sleep deprivation and breathing problems during sleep (39). It has been found that excessive alcohol use cause sleeping late at night and taking less sleep (40). The use of alcohol also causes sleeping in a short time, but also prolongs the duration of sleep and causes to wake up late. Excess consumption of caffeine-containing stimulants (cigarettes, coffee, chocolate, tea, etc.) separately from alcohol can also lead to sleep interruptions and waking up in a short time by prolonging the sleep onset latency (34).

2.2.1.8. Physical activity

There are studies showing that physical activity facilitates the individual to fall into sleep, provides deeper sleep and allows him/her to wake up fresh and energetic in the morning (32,41,42). The studies have shown that physical activity has different effects on sleep quality depending on the time of physical activity (43,44).

2.2.1.9. Environmental stimuli

It has been found that one of the most important environmental factors that decreases sleep quality is noise. It has been observed that it creates short sleep deprivation. This causes a decrease in sleep efficiency, latency and quality. It is known that temperature, light and stress also have similar effects (30).

2.2.1.10. Lifestyle

People's working hours, meal times, work or living environment, and morning-evening-intermediate-type rhythms affect the duration and quality of sleep. It is known that morning person sleeps earlier, sleeps more easily, and his/her sleep quality is better (45).

2.3. Circadian Rhythm

The order and rhythm that exist in the world and universe has caused development of a biological rythm in the lives of the world's living beings (46). All biological activities in living organisms occur in this biological rhythm. Feeding, sleeping, mating, migrating movements in animals or photosynthesis in plants can be shown as an example of biological rhythm (47).

Biological rhythms constitute 4 basic classifications according to cycle times (48):

a) **Ultradien rhythm:** These are the rhythms that have a cycle shorter than 24 hours. REM sleep (mean 90 minutes) or growth hormone release (mean 180 minutes) can be shown as examples.

b) **Circadian rhythm:** These are the rhythms that have a 24 hours cycle. Examples include events such as sleep-wake cycle, melatonin secretion, body heat regulation and plasma cortisol level adjustment.

c) **Infradian rhythm:** They have cycles longer than 24 hours. Menstruation is an example for infradian rhythm.

d) **Circannular rhythm:** They have cycles for about a year. Human and mammalian births, migration and winter sleep of animals can be shown as an example.

Circadian rhythms are found in the majority of living creatures and are necessary for life. This rhythm is regulated by the suprachiasmatic nucleus in the anterior part of the hypothalamus (49).

"Circadian" is defined as rhythm per day. It involves physiological, biochemical and molecular events in the body (50). Nutrition, fat and carbohydrate metabolism, as well as the adjustment of the body temperature are under the control of circadian rhythm since they change in a daily basis (14,50). Examples of circadian rhythm events include also adrenal corticosterone and pituitary hormone release, neuropeptide and neurotransmitter levels, sympathetic activation, energy metabolism (e.g., lipolysis, gluconeogenesis, insulin sensitivity, basal metabolic rate), melatonin secretion and plasma cortisol level adjustment (34,51).

Circadian clock regulates the release of enzymes and hormones in metabolism, as well as has important effects on cell division, DNA damage and repair mechanisms, apoptosis and cancer. Metabolism affects the circadian clock with food consumption, meal timing and nutrient feedback (52).

The most important rhythm for humans is the sleep-wake cycle because the regulation of most behaviors and physiological activities depend on whether the organism is asleep or awake (51). Humans are living creatures that live in the daytime and sleep in the night, unlike animals. The cycle is based on our daily life and our nighttime sleep unless there are adaptations to situations such as working hours or travel (50). Circadian biological rhythm covers a 24-hour period. The sleep-wake period also cycles within a 24-hour period and if not affected by external factors, occurs every day in a similar way (26). The biological clock set for the light-dark cycle can also generate cycles that exceed 24 hours in an adaptive manner to changing conditions (50).

The evolution of a circadian system suggests that the ability of an organism to coordinate itself with the environment (external synchronization) and to maintain temporal organization of endogenous processes (internal synchronization) confers optimal health and survival potential (51). Depending on the circadian rhythm impairment, problems may also occur in the sleep-wake cycle and alter the organism’s internal and external synchronization. "Circadian Rhythm Sleep-Wake Disorders" is one of the 8 groups in the International Classification of Sleep Disorders. This group

involves problems such as shift work disorder, jet lag disturbance, delayed sleep wake phase disorder (11,25).

2.3.1. Sleep Quality and Relationship between Circadian Rhythm and Disease and Nutrition

To maintain homeostasis, the brain has two avenues of communication: hormones and neurons. A crucial part of the neural communication is driven by a special system called as autonomic nervous system (ANS). It innervates cardiac muscle, smooth muscle and various endocrine and exocrine glands,and the regulation of blood pressure, gastrointestinal responses to food, regulation the blood levels of several hormones and thermoregulation are other homeostatic functions influenced by the ANS. The ANS produces a variety of responses by two anatomically and functionally distinct divisions, the sympathetic nervous sytem (SNS) and the parasympathetic nervous sytem (PNS). Each system is dominant under certain conditions and in different periods of the day. SNS predominates in mentally and physically active part of the day (for human; light period), whereas PNS predominates during quiet, resting conditions (for human; dark period). Shifting of these two systems is strictly dependent on the sun light and works synchronously with central clock located in the hypothalamus. In turn, central clock uses both branches of ANS to tune organs of the body by different hormones like cortisol (53,54).

Circadian rhythm is known to be effective in releasing many hormones since it affects metabolism. Cortisol is one of these hormones. It is the lowest in the early hours of the night and the highest in the morning. Glucose and insulin are secreted in a certain circadian rhythm throughout the day and reach different levels. In humans, levels of leptin hormone are high when the appetite decreases at nights, while it is low during the day when the appetite increases. Even though the ghrelin levels are high in the early hours of sleep, they show a decrease before waking up in the morning (55). Some studies have shown that shortening of the REM stage, which affects sleep quality, is responsible for slow metabolism and obesity (56–58).

Sleep and circadian rhythm are also of great importance in the regulation of energy metabolism, because they affect the secretion of many hormones. For this reason, they are closely related to the occurrence of common health problems such as obesity, diabetes, insulin resistance, metabolic syndrome, low HDL cholesterol (59,60)

and the poor quality of sleep is also associated with the rise of blood pressure (61). Even it is observed in small national studies, circadian rhythm and deterioration of sleep quality have been associated with cardiovascular diseases, gastrointestinal complaints, pregnancy problems, metabolic syndrome and even cancer (62–66).

Of particular interest is the potential influence of exposure to light-at-night and sleep disruption, on endocrine function and the regulation of hormones that are important in the etiology of some types of cancer. Persons who engage in night shift work are subject to the influence of both factors, and may exhibit altered hormone profiles, most importantly decreased melatonin production and disrupted melatonin rhythm as a result that could increase the risk of hormone-related diseases, including breast and prostate cancer (54).

A decline in sleep quality measures may be associated with an increased risk of osteopenia and sarcopenia. All measures of sleep quality were consistently associated with musculoskeletal health because of the changes in the release of catecholamines and cortisol (67).

Poor sleep quality (especially in the context of insomnia) has been identified as a major risk factor for poor mental health. Poor sleep quality is correlated highly with subclinical depressive symptoms (68).

Hormon regulation or nervous system function changes as sleep quality or body's rhythm changes.There are studies and results about sleep quality and circadian rhythmes' effects on nutrition due to the relationship of hormones and nerves between nutrition. Many hormones such as insulin, glucagon, adiponectin, corticosterone, leptin, and ghrelin are under the control of circadian oscillation (69), also lipid metabolism exhibits circadian regulation, with elevated plasma concentrations of triacylglycerol during the biological night and an elevated postprandial response following a night-time meal compared with the same meal consumed during the day (70) and in adults and children and laboratory studies in young adults indicating that sleep restriction results in metabolic and endocrine alterations, including decreased glucose tolerance, decreased insulin sensitivity, increased evening concentrations of cortisol, increased levels of ghrelin, decreased levels of leptin and increased hunger and appetite (71).

According to some studies, people with poor sleep quality have more energy, fat and carbohydrate intake (15,72).

Snacking habits, increased meal consumption, and energy content and high food consumption are also associated with poor sleep quality (73).

It has been observed that people with poor sleep quality skips breakfast, consumes vegetables and fish less, consumes ready-to-eat foods, sweetened drinks and energy drinks more (74).

The nocturnal sleeping pattern is found to be associated with high BMI, unhealthy snacks, late coffee consumption, and inadequate vegetable-fruit and milk consumption (75,76).

There are some studies showing that carbohydrate-rich nutrition affects circadian rhythm, warmth and heartbeat of the body, that the energy from meat, candy, alcohol and oil is higher in diets of late-night sleepers, and that individuals waking up early consume more vegetables and legumes (77,78).

In another perspective, foods may affect the sleep pattern and quality. For example, diets with high carbohydrate and high energy increases the time of postprandial sleep, REM sleep time decreases after meals with high carbohydrate-low fat. Studies also show that individuals who prefer mostly high carbohydrate drinks and foods found to be more prone to sleep (79,80). Tryptophane aminoacid may be related to sleep, because some studies says that sleep time of people with insomnia increased after tryptophane supplement use due to the increase in melatonin levels (81,82). Diets with high protein and tryptophane may increase the deep sleep time (NREM sleep – stage 3-4) and it is possible to see omega type fatty acids' effects on neural systems and sleep modulator substances (80).

To sum up, sleep quality affects the food choices of people, foods affect sleep quality and patterns. This is a two sided situation but the effect of sleep quality on food choices may be more clear.

3. MATERIALS AND METHOD

3.1. Place and Time of the Research

This research was carried out in Istanbul between December 2016 and February 2017 on a total of 202 individuals who work at Anadolu Medical Center Hospital. For this study, the "Ethics Committee Approval" dated 24/11/2016 from the Ethics Committee of Anadolu Medical Center Hospital was taken (Appendices 7.1). A written consent form (Appendices 7.2) was obtained from the participants as to their voluntary participation in the work.

3.2. Including/Excluding Criterias and Participants of the Research

People who works at Anadolu Medical Center Hospital, voluntarily participated and individuals aged 18-65 years were included. They were seperated as day worker (non-shift worker) and day-night worker (shift worker). The individuals who are working in day-night shift more than 3 months were chosen as shift workers. Pregnant women and individuals with chronic diseases needed nutritional intervention were excluded.

250 individuals were reached and 226 of them volunteered. 19 of 226 individuals had chronic diseases and 5 of 226 individuals were pregnant so they were excluded. A total of 202 individuals were participated in the study, 111 of them were shift workers and 91 of them were non-shift workers.

3.3. Data Collection

3.3.1. Survey

A questionnaire consisting of a total of 24 questions was applied to participants (Appendices 7.3). Personal and demographic information, information about eating habits and patterns, information about exercise, and information about relationship between emotional status, sleep and nutrition were assessed in the questionnaire. The questionnaire form was filled by Hazal, the researcher and clinical dietitian, by use of face to face interviews with the individuals participating in the research.

3.3.2. Anthropometric measurements

3.3.2.1. Weight and height measurements

Participants' body weights were measured using Inbody 230 brand bioelectrical impedance analyzer. During the measurement, the feet were placed naked and dry, corresponding to the electrodes on the device. It has been paid attention that there is no extra weight on the participants in the measurement like belt, wallet etc. 0,5-1 kilograms were decreased from the total weight according to the clothes' of participants to get naked weight.

Height of participants was measured using the Seca brand electronic length meter. Care has been taken to ensure that the patient's feet are side-by-side and that the head is in the plane of Frankfurt (90 degrees between head and neck) while measuring height.

3.3.2.2. Body mass index (BMI)

BMI of participants were calculated by using weight and height of participants with the formula of BMI: [Weight (kg) / Height $(m)^2$]. The results were assessed according to WHO's BMI Classification (21).

Table 2 shows WHO's BMI Classification (21).

Table 2. WHO's BMI classification (21)

BMI: Body weight (kg) / Height (m2)	
BMI values (kg / m2)	**Classification**
<18.5	Under weight
18.5-24.9	Normal weight
25 -29.9	Pre-obesity
30 -34.9	Obesity Class 1
35-39.9	Obesity Class 2
≥40.0	Obesity Class 3

3.3.2.3. Waist circumference

The individuals stood still, gathered their feet and opened their arms parallel to the ground. The region between the lowest rib bone and iliac crest was found and then the waist circumference passing through the center was measured with a tape. For every individual the measurement was made naked.

3.3.3. Pittsburgh sleep quality index (PSQI)

PSQI had demonstrated by Buysse et al. (83) with the sufficient internal consistency (Cronbach's alpha = 0.80), test-retest reliability and validity in 1989. The validity and reliability study of PSQI in Turkey were assessed by Ağargün et al. (84) in 1996 (84).

PSQI is a self-reported scale assessing sleep quality and impairment over a period of one month. There are 24 questions in PSQI and 19 of them are self-repoted. Other 5 questions are answered by the roommate or husband/wife and do not participate in scoring (55). It consists of 7 components, which are subjective sleep quality (component 1), sleep latency (component 2), sleep duration (component 3), usual sleep activity (component 4), sleep disturbance (component 5), use of sleep drugs (component 6) and daytime dysfunction (component 7). Every component has different scoring techniques. The sum of the seven component scores gives the total global PSQI score. The response of each component is scored between 0 and 3 according to the frequency of symptoms. The total global score has a value between 0-21. High values indicate a poor sleep quality and a high level of sleep disturbance. A total global PSQI score over 5 indicates clinically poor sleep quality (55,85).

The several studies show the PSQI has been an effective instrument to measure sleep quality in nurses' working day and night shift (86). In this study, the questionairre was applied participants with the survey due to the past one month and just self-reported questions were asked (Appendices 7.4).

3.3.4. Sleep diary

A sleep diary is used to record the sleep-wake pattern in a daily basis. It aims to measure the pattern and quality of individuals’ sleep, and factors that may affect their sleep (87).

For the diagnosis of circadien rhythm sleep disorders, sleep diary is held for 7-14 days is used usually with an actigraphy. It helps to indicate the impaired sleep structure (88).

In this study, a sleep diary held for 7 days was used to support other findings and be informed about participants' sleep patterns, habits and stress levels (Appendices 7.5).

3.4. Statistical Evaluation of Datas

For the evaluation of findings, SPSS v22.0 was used. Additionally, chi-square analysis, independent group comparisons (independent t test), Anova - Wilks Lambda tests were used.

Descriptive statistics such as frequency, arithmetic mean, standard deviation, minimum, maximum, frequency, percentage were used in analyzing the data. Our data set was based on parametric statistical analysis. Independent t-test was used in the comparison of the two groups with respect to the chi-square relationship analysis, and Anova-Wilks lambda result was used in the comparison of the two groups.

Significance was accepted as $p < 0.05$ and $p < 0.01$ as very significant.

4. RESULTS

4.1. Demographic Datas

Demographic datas of the participants are given in Table 3.

202 healthy individuals were participated in the study. 77,7% of them were women and 22,3% were men. Average age of participants was 34,4 ±7,87 years and the youngest participants was 20 and the oldest was 58 years old. 19,3% of participants were 18-24 years, 51,5% were 25-34 years, 23,3% were 35-44 years, 4,9% were 45-54 years and 1% were 55 years of age and over.

Half of the participants were married and half were single.

According to their educational status, 3% of the participants were graduated from primary school, 3% were secondary school, 17,8% were high school, 54,4% were university, 21,3% were post-graduate and 0,5% were doctorate.

51,5% of participants were nurses, 2% were dietitians, 6,4% were doctors, 4% were pharmacists and technicians, 1% were physiotherapists, 4,9% were waiters/waitresses, 2% were food technicians, 0,5% were securities, 4,4% were patient care technicians, 9,5% were front desk personnels, 0,5% were sports trainers, 4,4% were cleaning staffs, 2,5% were interpreters, 1,5% were valets and 4.9% were from administration.

Table 3. Demographic datas of the participants

SEX	PARTICIPANTS (n: 202)		PERCENTAGE (%)
Women	157		77,7%
Men	45		22,3%
AGE	WOMEN (n: 157)	MEN (n: 45)	
18-24	31	8	19,3%
25-34	83	21	51,5%
35-44	38	9	23,3%
45-54	4	6	4,9%
55+	1	1	1%
MARITAL STATUS			
Married	74	27	50%
Single	83	18	50%
EDUCATIONAL STATUS			
Primary school	5	1	3%
Secondary school	3	3	3%
High school	24	12	17,8%
University	88	22	54,4%
Post-graduate	36	7	21,3%
Doctorate	1	-	0,5%
OCCUPATIONAL GROUPS			
Dietitian	3	1	2%
Doctor	4	9	6,4%
Pharmacist-technician	5	3	4%
Physiotherapist	-	2	1%
Waiter/waitress	4	6	4,9%
Food technician	3	1	2%
Security	-	1	0,5%
Patient care technician	3	6	4,4%
Front desk personnels	16	3	9,5%
Nurse	98	6	51,5%
Sports trainer	1	-	0,5%
Cleaning staff	9	-	4,4%
Interpreter	5	-	2,5%
Valet	-	3	1,5%
Administration	6	4	4,9%

4.2. Shift-work Status

Distribution of the participants according to shift status are given in the Table 4.

55% of participants were shift workers and 45% were non-shift workers.

Table 4. Distribution of participants according to shift status

	N: 202	PERCENTAGE (%)
SHIFT WORKER	111	55%
NON-SHIFT WORKER	91	45%

Distribution of sexes according to shift status are given in the Table 5.

82% of shift workers were women and 18% were men. 72,5 % of non-shift workers were women and 27,5% were men.

Table 5. Distribution of sexes according to shift status

	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)
WOMEN	91 (82)	66 (72,5)
MEN	20 (18)	25 (27,5)

Distribution of shift status according to occupations is given in Table 6.

73,9% of shift workers were nurse and 26,1% were from other occupations. Non-shift workers showed similar distribution according to occupations.

Table 6. Distribution of shift status according to occupations

	SHIFT WORKER (n: 111)	NON-SHIFT WORKER (n: 91)
OCCUPATIONAL GROUPS		
Dietitian	-	4
Doctor	5	8
Pharmacist-technician	1	7
Physiotherapist	-	2
Waiter/Waitress	2	8
Food technician	1	3
Security	1	-
Patient care technician	8	1
Front desk personnels	8	11
Nurse	82	22
Sports trainer	-	1
Cleaning staff	2	7
Interpreter	-	5
Valet	-	3
Administration	1	9

Distribution of non-shift workers according to educational status is given in Figure 2.

When the educational status of non-shift workers (n=92) was evaluated; it was found that 11% of the non-shift worker participants gratuated from primary school, 20% from high school, 42% from university, 25% from master's degree and 2% from other educational status.

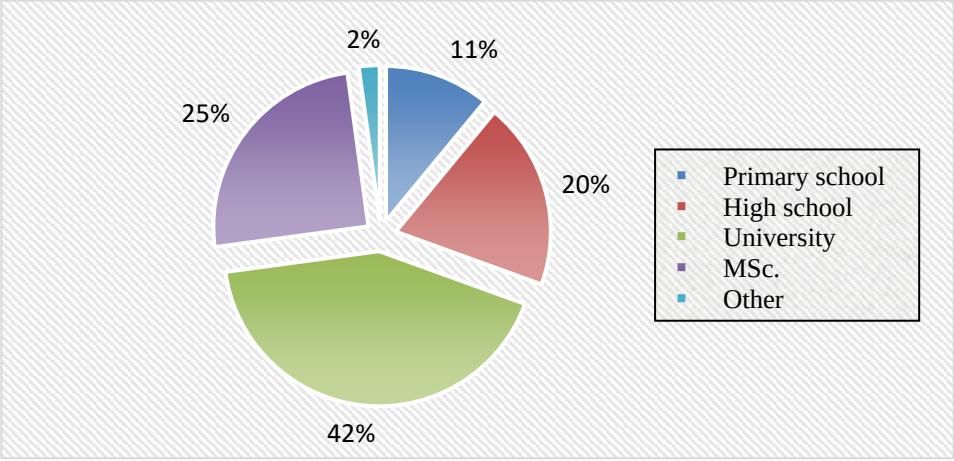

Figure 2. Distribution of Non-Shift Workers According to Educational Status

Distribution of non-shift workers according to educational status is given in Figure 3.

When the educational status of shift workers (n=110) was evaluated; it was found that 1% of the shift worker participants gratuated from primary school, 16% from high school, 64% from university, 18% from master's degree and 1% from other educational status.

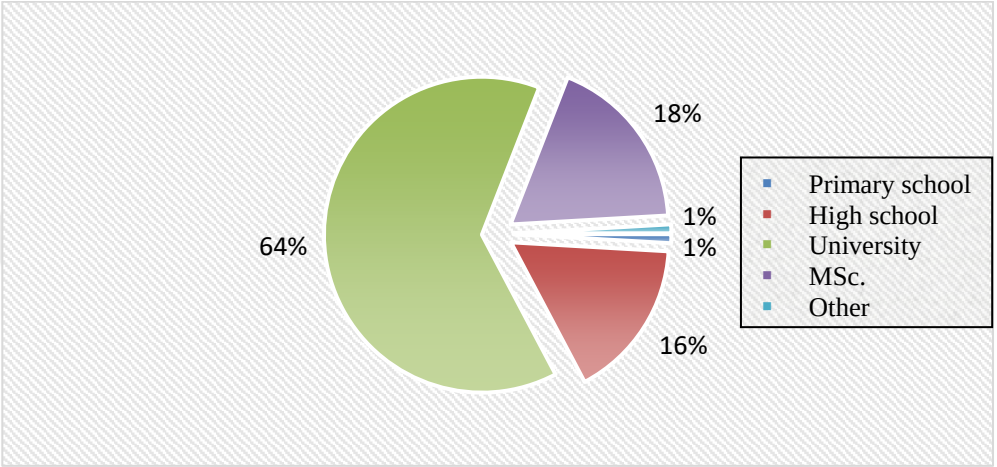

Figure 3. Distribution of Shift Workers According to Educational Status

4.3. Anthropometric Data of the Participants

Mean BMI, waist circumference and weight according to sexes are given in Table 7.

Men's mean BMI value was 26,38 ± 4,08 kg/m^2, mean weight was 82,22 ± 15,47 kg and mean waist circumference was 93,26 ± 11,44 cm. Women's mean BMI value was 23,25 ± 4,42 kg/m^2, mean weight was 61,52 ± 12,27 kg and mean waist circumference was 78,06 ± 10,61 cm.

There was a very significant difference between BMI's of men and women (p: 0,000; p <0,05). The mean BMI of men were seen significantly higher than women. Men had a tendency to be overweight but women had BMI values within normal ranges. For both group weight and waist circumference values were within normal ranges.

Table 7. Mean BMI, waist circumference and weight according to sexes

	BMI	WEIGHT	WAIST CIRCUMFERENCE
WOMEN (n: 157)	23,25 ± 4,42	61,52 ± 12,27	78,06 ± 10,61
MEN (n: 45)	26,38 ± 4,08	82,22 ± 15,47	93,26 ± 11,44
t	-4,268	-9,386	-8,322
p*	0,000*	a**	a**

*p<0,05 is accepted as statistically significant.

**a is not evaluated.

BMI, waist circumference and weight according to shift status are given in Table 8 and arithmetic mean of BMI, weight and waist circumference according to variables are given in Table 9.

Shift worker women's mean BMI was 23,01 ± 4,02 kg/m^2, mean weight was 61,22 ± 11,55 kg and mean waist circumference was 76,76 ± 9,40 cm. Non-shift worker women's mean BMI was 23,57 ± 4,92 kg/m^2, mean weight was 61,93 ± 13,28 kg and mean waist circumference was 79,85 ± 11,92 cm.

Shift worker men's mean BMI was 25,26 ± 3,12 kg/m^2, mean weight was 77,63 ± 12,68 kg and mean waist circumference was 89,29 ± 8,34 cm. Non-shift worker men's mean BMI was 27,2 ± 4,55 kg/m^2, mean weight was 85,57 ± 16,67 kg and mean waist circumference was 96,15 ± 12,64 cm.

As shown in the tables and evaluated according to "Pillai's Trace" and "Wilks' Lambda" multivariate tests, sex and shift factors p values were found significant ($p<0.05$). Sex and shift status have a statistically significant effect on dependent variables separately. It means that men's BMI was significantly higher than women's. According to shift status; non-shift workers' BMI, weight and waist circumference were significantly higher than shift workers' ($p <0.05$).

Shift work and sex interaction had not been found effective on dependent variables when examined together (p: 0,233, p> 0,05).

When assesing differences between and within groups, there was no statistical difference found within groups in terms of BMI, weight and waist circumference values on sex and shift levels (p: 0,355, p: 0,106, p: 0,301, p> 0,05). This means that the BMI, weight and waist circumference values were not statistically different according to shift status and sex together.

Table 8. BMI, waist circumference and weight according to shift status

	WOMEN (n: 157)		MEN (n: 45)	
	SHIFT WORKER (n: 91)	NON-SHIFT WORKER (n: 66)	SHIFT WORKER (n: 20)	NON-SHIFT WORKER (n: 25)
BMI	23,01 ± 4,02	23,57 ± 4,92	25,26 ± 3,12	27,2 ± 4,55
WEIGHT	61,22 ± 11,55	61,93 ± 13,28	77,63 ± 12,68	85,57 ± 16,67
WAIST CIRCUMFERENCE	76,76 ± 9,40	79,85 ± 11,92	89,29 ± 8,34	96,15 ± 12,64
F	1,437			
p*	0,233			

*p<0,05 is accepted as statistically significant.

Table 9. Arithmetic mean of BMI, weight and waist circumference according to variables

	Sex	Shift status	Participants (n)	Arth.Mean.±S.S.
BMI	Women	Non-shift worker	66	23,57 ± 4,92
		Shift worker	91	23,01 ± 4,02
		Total	157	23,25 ± 4,42
	Men	Non-shift worker	26	27,2 ± 4,55
		Shift worker	19	25,26 ± 3,12
		Total	45	26,38 ± 4,08
	Total	Non-shift worker	92	24,6 ± 5,07
		Shift worker	110	23,4 ± 3,96
		Total	202	23,94 ± 4,53
Weight	Women	Non-shift worker	66	61,93 ± 13,28
		Shift worker	91	61,22 ± 11,55
		Total	157	61,52 ± 12,27
	Men	Non-shift worker	26	85,57 ± 16,67
		Shift worker	19	77,63 ± 12,68
		Total	45	82,22 ± 15,47
	Total	Non-shift worker	92	68,61 ± 17,8
		Shift worker	110	64,05 ± 13,25
		Total	202	66,13 ± 15,61
Waist circumference	Women	Non-shift worker	66	79,85 ± 11,92
		Shift worker	91	76,76 ± 9,4
		Total	157	78,06 ± 10,61
	Men	Non-shift worker	26	96,15 ± 12,64
		Shift worker	19	89,29 ± 8,34
		Total	45	93,26 ± 11,44
	Total	Non-shift worker	92	84,46 ± 14,14
		Shift worker	110	78,93 ± 10,35
		Total	202	81,45 ± 12,5

Relationship between shift frequency and BMI and waist circumference in women is given in Table 10.

As seen in the Table 10, when the values of BMI and waist circumference according to shift frequency in women were examined, it is observed that the mean BMI and waist circumference values showed different tendencies according to shift frequency.

Female participants staying night shift once a month and 8-10 days in a month have higher BMI values than others. Female participants staying night shift once a month and 8-10 and 15 days in a month have higher waist circumferences than others.

Table 10. Relationship between shift frequency and BMI-waist circumference in women

	BMI (kg/m^2) (mean)	WAIST CIRCUMFERENCE (cm) (mean)
15 days in a month (n: 3)	20,8	79,3
12 days in a month (n: 5)	22,8	76,3
8-10 days in a month (n: 74)	23,3	77,2
4 days in a month (n: 5)	20,7	70,4
2 days in a month (n: 1)	16,6	63
1 day in a month (n: 3)	24,6	77,3

Relationship between shift frequency and BMI-waist circumference in men is given in Table 11.

As seen in the Table 11, when the values of BMI and waist circumference according to shift frequency in men were examined; it had been observed that the mean BMI and waist circumference values decrease as the shift frequency increases.

Male participants staying night shift once and twice a month have higher BMI values than others. Male participants staying night shift once and twice a month have higher waist circumferences than others.

Table 11. Relationship between shift frequency and BMI-waist circumference in men

	BMI (kg/m²) (mean)	WAIST CIRCUMFERENCE (cm) (mean)
15 days in a month (n: 4)	24,8	84,5
8-10 days in a month (n: 10)	24,96	89,45
4 days in a month (n: 2)	25,3	92,5
2 days in a month (n: 1)	27,7	94
1 day in a month (n: 3)	30,2	101,3

Weight of participants according to stated stress levels is given in Table 12.

Participants' stress levels had been assessed with self-reporting by using sleep diary. Participants were asked to score their stress levels between 0-10 points for each day and the statistical evaluation is made based on their mean stress level for week. Stress level points were classified like pain scale classificaiton. Mean stress levels between 0-3 points considered as no stress, 4-6 points as moderate stress and 7-10 points as high stress level like in pain scale.

As a result, mean weight of the participants according to the stress levels were 63,38 ± 14,38 kg for "no stress" group, while those with moderate stress were 66,91 ± 15,54 kg and those with high stress levels were 67,66 ± 16,99 kg. Hight stress group's mean weight was found to be higher but the mean weight status of the participants did not differ significantly according to the stress levels (p: 0,300; p> 0,05).

Table 12. Weight of participants according to stated stress levels

Stress levels	Participants (n)	Arth.Mean.±S.S.	Range	F	P*
No Stress (0-3 points)	55	63,38 ± 14,38	46-115	1,212	0,300
Moderate stress (4-6 points)	99	66,91 ± 15,54	43-118		
Hight stress (7-10 points)	48	67,66 ± 16,99	45-130		

*p<0,05 is accepted as statistically significant.

4.4. Dietary Habits Data of the Participants

The participants were asked to indicate that if they have a regular main meal consumption habit or not. According to the answers, evaluation of main meal consumption habits according to shift status and sex are given in Table 13.

Both non-shift worker female and male participants indicated that they have a regular main meal consumption but there was no significant relationship found between shift status and habit of regular main meal consumption within women (p:0,147; p>0,05) and men (p:0,384; p>0,05).

There was a significant relationship between the shift status of the participants and the habits of consuming main meal regularly when the analyze was done by evaluating sexes together (p: 0,000, p <0,05). 38% of those who consume their main meals regularly were shift workers and 62% were non-shift workers. Of those who do not consume their main meals regularly, 79% were shift workers and 21% were non-shift workers. And those who say sometimes he/she was skipping meals were 64% of the shift workers and 36% of the non-shift workers. As a result, most of the shift workers were unable to consume their main meals regularly.

There was no difference found between men or women who work on shifts or without shifts and the habits of eating main meals regularly (p: 0,249, p> 0,05).

Table 13. Evaluation of main meal consumption habits according to shift status and sex

	WOMEN (n: 157)		MEN (n: 45)	
	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)
YES	29(39,0)	45(61,0)	11(37,0)	19(63,0)
NO	41(82,0)	9(18,0)	3(50,0)	3(50,0)
SOMETIMES	21(64,0)	12(36,0)	6(67,0)	3(33,0)
p	0,147		0,384	
General p	0,249			

*p<0,05 is accepted as statistically significant.

The participants, who gave the answer “no” or “sometimes” were asked which meal they skip. According to their answers, relationship between skipped meals and shift status is given in Table 14.

There was no significant relationship found between skipped meals and shift status of participants in the study (p: 0,250, p> 0,05). However, shift workers were more likely to skip meals than non-shift workers. Also, 77% of the shift workers stated that they skipped breakfast, 76% lunch and 59% dinner.

Table 14. Relationship between skipped meals and shift status

SKIPPED MEALS	SHIFT STATUS				χ^2	p*
	NON-SHIFT WORKER (n/%)		SHIFT WORKER (n/%)			
BREAKFAST	10	23,0	34	77,0	2,775	0,250
LUNCH	8	24,0	26	76,0		
DINNER	9	41,0	13	59,0		

*p<0,05 is accepted as statistically significant.

The participants were asked to indicate that if they have a regular snack consumption habit or not. According to the answers, evaluation of snack consumption habits according to shift status and sex are given in Table 15.

Both non-shift worker male and female participants indicated that they have a regular snack consumption habit but there was no significant relationship found between shift status and habit of regular snack consumption within women (p:0,503; p>0,05) and men (p:0,632; p>0,05).

There was a significant relationship between the shift status of people participating in the study and the habits of regular snack consumption when the analyze was done by evaluating sexes together (p: 0,008, p <0,05). Of those who consume snacks regularly, 44% were shift workers and 56% were non-shift workers. Of those who do not consume snacks regularly, 65% were shift workers and 35% were non-shift workers. Among shift workers, the habit of consuming snacks was not regular. Non-shift workers, on the other hand, were consuming snacks better than shift workers.

Also, there was no difference found between men or women who work on shifts or without shifts and the habits of regular snack consumption (p:0,367; p>0,05).

Table 15. Evaluation of snack consumption habits according to shift status and sex

	WOMEN (n: 157)		MEN (n: 45)	
	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)
YES	34(47,0)	38(53,0)	8(33,0)	16(67,0)
NO	57(67,0)	28(33,0)	12(57,0)	9(43,0)
p	0,503		0,632	
p	0,367			

*p<0,05 is accepted as statistically significant.

Participants were asked why they skipped meals and reasons for meal skipping according to sex and shift status are given in Table 16.

The reasons for meal skipping were evaluated according to sex and shift status; it was found that women participants were more likely to skip meals than men. In addition, shift worker women participants had more meals skipped than shift worker male participants.

Shift worker women participants stated that they were more likely to skip meals because of their work load, not feeling hungry, and not finding proper meals for them. Men working on shifts and without shifts also stated that they skipped meals because of work load and not feeling hungry.

The other reasons for meal skipping were habits of the participants, not to enjoy eating at lunch or after 8 o'clock, sleeping after shifts, not feeling hungry because of exhaustion and not finding time for preparation.

Table 16. Reasons for meal skipping according to sex and shift status

	WOMEN		MEN	
	SHIFT WORKER	NON-SHIFT WORKER	SHIFT WORKER	NON-SHIFT WORKER
	N (%)	N (%)	N (%)	N (%)
I do not have time because of the work load.	34(56,0)	12(52,0)	5(56,0)	5(83,0)
I skip meals because I do not feel hungry.	18(30,0)	8(35,0)	5(56,0)	2(33,0)
I can not find food that suits me.	13(21,0)	4(17,0)	1(11,0)	-
I find it unnecessary to make 3 main meals.	5(8,0)	1(4,0)	1(11,0)	-
I want to lose weight.	3(5,0)	4(17,0)	1(11,0)	-
I skip meal because of what I hear on the media.	-	-	-	-
Other	17(28,0)	1(4,0)	-	1(16,0)

The shift worker participants were asked to indicate their food choices and they were allowed to choose more than one options. Food choices of participants according to sex during shifts are given in Table 17.

In the food choices of the participants; women consume more variable foods than men. When food choices were evaluated; it has been found that women stated that they consume foods such as caffeinated drinks, crackers, biscuits, fresh-dried fruits, nuts and seeds mostly. On the other hand, men stated that they consume foods such as fresh-dried fruits, dairy products, nuts and seeds.

Table 17. Food choices of participants according to sex during shifts

	WOMEN N (%)	MEN N (%)
Fresh and dried fruits	46(56,0)	10(56,0)
Nuts and seeds	44(54,0)	11(61,0)
Dairy products	32(39,0)	14(78,0)
Sandwich, rusk, toast etc.	31(38,0)	5(28,0(
Cracker, biscuit etc.	52(63,0)	6(33,0)
Pastry, bagel, patty etc.	30(37,0)	3(17,0)
Chocolate, wafer etc.	39(48,0)	4(22,0)
Fast-food	28(34,16)	5(28,0)
Caffeinated drinks	70(85,0)	4(22,0)
Other	-	-

These shift worker participants were also asked to indicate about where they supply their foods, they mentioned that they are bringing their foods with themselves or buying from the institution. The places where participants supply their nutritional needs is given in Table 18.

It was found that the institution facilitates mostly the consumption of breakfast, dairy products, pastry, bagel, patty and fast food. The other foods like fruits, nuts, seeds, cracker, biscuit, chocolate and caffeinated drinks were supplied by participants' own possibilities.

Table 18. The places where participants supply their nutritional needs

	INSTITUTION (N)	SELF (N)
Fresh and dried fruits	15	40
Nuts and seeds	13	41
Dairy products	33	12
Sandwich, rusk, toast etc.	20	19
Cracker, biscuit etc.	6	49
Pastry, bagel, patty etc.	28	5
Chocolate, wafer etc.	6	37
Fast-food	24	10
Breakfast	67	5
Caffeinated drinks	23	50

4.5. Physical Activity Data

Participants were asked about if they do physical activity regularly or not. 30 minutes and more per day for pilates and 45 minutes and more per day for other sports were accounted as regular physical activity if they are done for 2 or more days in a week. Based on their answers, regular physical activity habits according to sex and shift status are given in Table 19.

It was found that shift worker women's number who has regular physical activity habit was more than non-shift workers'. When men were evaluated, it was found that non-shift worker men's number who have regular physical activity habit was more than shift workers'. Most of the shift workers seemed not to have a regular physical activity habits within women. For men, the numbers were nearly the same. But there was no significant relationship found between sex and physical activity habits, and between shift status and physical activity eventually (p: 0,227, p>0,05; p: 0.867, p> 0.05).

Table 19. Regular physical activity habits according to sex and shift status

	WOMEN (44.0%)		MEN (56.0%)	
	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)
YES	20(62,5)	12(37,5)	5(38,0)	8(62,0)
NO	71(57,0)	54(43,0)	15(47,0)	17(53,0)
Shift work p	0,867			
Sex p	0,227			

*p<0,05 is accepted as statistically significant.

Participants' preferred physical activities and duration were also asked. Male participants' physical activity habits is given in Table 20.

When the physical activity habits of the shift worker and non-shift worker men were evaluated, men without shifts seem to be more interested in physical activity. As a

result, it was found that non-shift worker men do average 70.00 ± 42.43 min of fitness, 87.14 ± 61.39 minutes of walking , and 35.00 ± 14.14 min. pilates per week.

Table 20. Male participants' physical activity habits

	MEN			
	SHIFT WORKER		NON-SHIFT WORKER	
	MIN-MAX	MEAN+-SS	MIN-MAX	MEAN+-SS
FITNESS				
N	(1 PARTICIPANT)		(2 PARTICIPANTS)	
WEEK (DAY)	4		3-7	
TIME (MİNUTE)	120	30	10-120	70,00±42,43
WALK				
N	(1 PARTICIPANT)		(7 PARTICIPANTS)	
WEEK (DAY)	7		1-3	
TIME (MİNUTE)	60	8,57	20-180	87,14±61,30
PILATES				
N	(1 PARTICIPANT)		(2 PARTICIPANTS)	
WEEK (DAY)	4		2-4	
TIME (MİNUTE)	60	15	25-45	35,00±14,14
CYCLING				
N	(1 PARTICIPANT)		(1 PARTICIPANT)	
WEEK (DAY)	2		1	
TIME (MİNUTE)	120	60	60	60
FOOTBALL				
N	(1 PARTICIPANT)			
WEEK (DAY)	1		-	
TIME (MİNUTE)	120	120	-	

Female participants' physical activity habits is given in Table 21.

When the physical activity habits of the shift worker and non-shift worker women were evaluated; shift worker women seemed to be more interested in physical activities such as fitness, walking and pilates than non-shift worker women. As a result, it was found that shift worker women do average 75,00±21,21 min of fitness, 101,18±50,61 minutes of walking , and 40,00±15,81 min. pilates per week.

Women also seemed to have longer physical activity periods than men, especially in terms of walking time.

Table 21. Female participants' physical activity habits

	WOMEN			
	SHIFT WORKER		NON-SHIFT WORKER	
	MIN-MAX	MEAN+-SS	MIN-MAX	MEAN+-SS
FITNESS				
N	(2 PARTICIPANTS)		(2 PARTICIPANTS)	
WEEK (DAY)	3-4		2-3	
TIME (MİNUTE)	60-90	75,00±21,21	30-90	60,00±42,43
WALK				
N	(17 PARTICIPANTS)		(6 PARTICIPANTS)	
WEEK (DAY)	1-7		2-7	
TIME (MİNUTE)	20-180	101,18±50,61	10-60	35,00±18,71
PILATES				
N	(5 PARTICIPANTS)		(3 PARTICIPANTS)	
WEEK (DAY)	2-4		2-7	
TIME (MİNUTE)	20-60	40,00±15,81	30-60	50,00±17,32
DANCE				
N	(2 PARTICIPANTS)			
WEEK (DAY)	2		-	
TIME (MİNUTE)	60-120	90,00±42,43	-	
SWIMMING				
N	(1 PARTICIPANT)		(1 PARTICIPANT)	
WEEK (DAY)	2		2	
TIME (MİNUTE)	120	60	60	60,0
YOGA				
N			(1 PARTICIPANT)	
WEEK (DAY)	-		1	
TIME (MİNUTE)	-		90	90,0
CYCLING				
N			(1 PARTICIPANT)	
WEEK (DAY)	-		4	
TIME (MİNUTE)	-		15	15,0

4.6. Datas associated with emotional state

Participants were asked to evaluate their usual emotional state. Distribution of male participants according to emotinal state is given in Table 22.

Male participants indicated that most of them (44.4%) usually feel happy, while 28,9% of male participants feel tired, 13,3% unhappy, 8.9% stressed and 4,5% thoughtful.

Table 22. Distribution of male participants according to emotinal state

	MALE PARTICIPANTS (N: 45)	PERCENTAGE (%)
HAPPY	20	44,4
UNHAPPY	6	13,3
TIRED	13	28,9
STRESSED	4	8,9
THOUGHTFUL	2	4,5

Distribution of female participants according to emotinal state is given in Table 23.

Female participants indicated that most of them usually feel tired (38,9%) and happy (33,1%), while 10,8% stressed, 8.9% unhappy and 8,3% thoughtful.

Table 23. Distribution of female participants according to emotinal state

	FEMALE PARTICIPANTS (N: 157)	PERCENTAGE (%)
HAPPY	52	33,1
UNHAPPY	14	8,9
TIRED	61	38,9
STRESSED	17	10,8
THOUGHTFUL	13	8,3

Distribution of shift worker and non-shift worker men according to emotinal state is given in Table 24.

For men, shift workers indicated that most of them usually feel tired (46,7%), while 26,7% happy, 20% unhappy and 6,6% stressed. Non-shift workers indicated that most of them usually feel happy (44%), while 24% tired, 12% unhappy, 12% stressed and 8% thoughtful.

Table 24. Distribution of shift worker and non-shift worker men according to emotinal state

MEN	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)
HAPPY	4 (26,7)	11 (44)
UNHAPPY	3 (20)	3 (12)
TIRED	7 (46,7)	6 (24)
STRESSED	1 (6,6)	3 (12)
THOUGHTFUL	-	2 (8)

Distribution of shift worker and non-shift worker men according to emotinal state is given in Table 25.

For women, shift workers indicated that most of them usually feel tired (41,8%), while 31,9% happy, 9,9% unhappy, 8,8% stressed and 7,6 thoughtful. Non-shift workers indicated that most of them usually feel tired (34,8%) and happy (34,8%), while 13,6% stressed, 9,1% thoughtful and 7,7% unhappy.

Table 25. Distribution of shift worker and non-shift worker women according to emotinal state

WOMEN	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)
HAPPY	29 (31,9)	23 (34,8)
UNHAPPY	9 (9,9)	5 (7,7)
TIRED	38 (41,8)	23 (34,8)
STRESSED	8 (8,8)	9 (13,6)
THOUGHTFUL	7 (7,6)	6 (9,1)

Participants were asked if their emotional state affects their nutrition or not. According to their answers relationship between emotional state and nutrition in shift worker men is given in Table 26.

44% of happy participants, 33% of unhappy participants, 14% of tired participants indicated that it affects their nutrition while 56% of happy participants, 33% of unhappy participants, 57% of tired participants indicated that it does not affect their nutrition. As a result, it was found that the changes in emotional state of shift worker men do not affect nutritional status in any way.

Table 26. Relationship between emotional state and nutrition in shift worker men

	AFFECT N (%)	NOT SURE N (%)	DO NOT AFFECT N (%)
HAPPY (n: 9)	4(44,0)	-	5(56,0)
UNHAPPY (n: 3)	1(33,0)	1(33,0)	1(33,0)
TIRED (n: 7)	1(14,0)	2(29,0)	4(57,0)
STRESSED (n: 1)	-	1(100,0)	-
THOUGHTFUL	-	-	-

Relationship between emotional state and nutrition in non-shift worker men is given in Table 27.

When emotional state and nutritional relationship were evaluated in non-shift worker men, it was found that the nutritional state changes as emotional states change. They stated that 36% of them are affected when they were happy, 67% when they were unhappy, 83% when they were tired, 67% when they were stressed and 50% when they were thoughtful. As a result, it was found that the changes in emotional state of non-shift worker men affect nutritional status in any way.

Table 27. Relationship between emotional state and nutrition in non-shift worker men

	AFFECT	NOT SURE	DO NOT AFFECT
	N (%)	N (%)	N (%)
HAPPY (n: 11)	4(36,0)	2(18,0)	5(46,0)
UNHAPPY (n: 3)	2(67,0)	0	1(33,0)
TIRED (n: 6)	5(83,0)	1(17,0)	-
STRESSED (n: 3)	2(67,0)	-	1(33,0)
THOUGHTFUL (n: 2)	1(50,0)	-	1(50,0)

Relationship between emotional state and sleep in shift worker men is given in Table 28.

According to answers, it was found that the sleep state changes as emotional states change. They stated that 33% of them are affected when they were happy, 67% when they were unhappy and 57% when they were tired. As a result, it was found that the changes in emotional state of shift worker men do not affect their sleep mostly.

Table 28. Relationship between emotional state and sleep in shift worker men

	AFFECT	NOT SURE	DO NOT AFFECT
	N (%)	N (%)	N (%)
HAPPY (n: 9)	3(33,0)	-	6(67,0)
UNHAPPY (n: 3)	2(67,0)	1(33,0)	0
TIRED (n: 7)	4(57,0)	1(14,0)	2(29,0)
STRESSED (n: 1)	-	1(100,0)	-
THOUGHTFUL	-	-	-

Relationship between emotional state and sleep in non-shift worker men is given in Table 29.

When emotional state and sleep state relation were evaluated in non-shift worker men, it was found that the sleep state changes as emotional states change. They stated that 36% of them are affected when they were happy, 67% when they were unhappy, 67% when they were tired, 67% when they were stressed and 50% when they were thoughtful. As a result, it was found that the changes in emotional state of non-shift worker men affect their sleep mostly.

Table 29. Relationship between emotional state and sleep in non-shift worker men

	AFFECT	NOT SURE	DO NOT AFFECT
	N (%)	N (%)	N (%)
HAPPY (n: 11)	4(36,0)	-	7(64,0)
UNHAPPY (n: 3)	2(67,0)	-	1(33,0)
TIRED (n: 6)	4(67,0)	-	2(33,0)
STRESSED (n: 3)	2(67,0)	-	1(33,0)
THOUGHTFUL (n: 2)	1(50,0)	-	1(50,0)

Relationship between emotional state and nutrition in shift worker women is given in Table 30.

When the relationship between emotional state and nutrition was evaluated in shift worker women, it was found that the nutritional status changes as emotional states change. They stated that 48% of them are affected when they were happy, 67% when

they were unhappy, 58% when they were tired and all of them when they were stressed and 86% when they were thoughtful. As a result, it was found that the changes in emotional state of shift worker women affect their nutrition mostly.

Table 30. Relationship between emotional state and nutrition in shift worker women

	AFFECT	NOT SURE	DO NOT AFFECT
	N (%)	N (%)	N (%)
HAPPY (n: 29)	14(48,0)	1(3,0)	14(49,0)
UNHAPPY (n: 9)	6(67,0)	1(11,0)	2(22,0)
TIRED (n: 38)	22(58,0)	4(10,0)	12(32,0)
STRESSED (n: 8)	8(100,0)	-	-
THOUGHTFUL (n: 7)	6(86,0)	1(14,0)	-

Relationship between emotional state and nutrition in non-shift worker women is given in Table 31.

When the relationship between emotional state and nutrition was evaluated in non-shift worker women, it was found that the nutritional status changes as emotional states change. They stated that 43% of them are affected when they were happy, 60% when they were unhappy, 48% when they were tired, 44% when they were stressed and 50% when they were thoughtful. As a result, it was found that the changes in emotional state of non-shift worker women affect their nutrition mostly.

Table 31. Relationship between emotional state and nutrition in non-shift worker women

	AFFECT	NOT SURE	DO NOT AFFECT
	N (%)	N (%)	N (%)
HAPPY (n: 23)	10(43,0)	2(9,0)	11(48,0)
UNHAPPY (n: 5)	3(60,0)	-	2(40,0)
TIRED (n: 23)	11(48,0)	2(9,0)	10(43,0)
STRESSED (n: 9)	4(44,0)	3(33,0)	2(22,0)
THOUGHTFUL (n: 6)	3(50,0)	-	3(50,0)

Relationship between emotional state and sleep in shift worker women is given in Table 32.

When the relationship between emotional state and sleep was evaluated in shift worker women, it was found that the sleep state changes as emotional states change. They stated that 41% of them are affected when they were happy, 89% when they were unhappy, 74% when they were tired, 62.5% when they were stressed and 71% when they were thoughtful. As a result, it was found that the changes in emotional state of shift worker women affect their sleep mostly.

Table 32. Relationship between emotional state and sleep in shift worker women

	AFFECT	NOT SURE	DO NOT AFFECT
	N (%)	N (%)	N (%)
HAPPY (n: 29)	12(41,0)	-	17(59,0)
UNHAPPY (n: 9)	8(89,0)	-	1(11,0)
TIRED (n: 38)	28(74,0)	1(2,0)	9(24,0)
STRESSED (n: 8)	5(62,5)	-	3(37,5)
THOUGHTFUL (n: 7)	5(71,0)	2(29,0)	-

Relationship between emotional state and sleep in non-shift worker women is given in Table 33.

When the relationship between emotional state and sleep were evaluated in non-shift worker women, it was found that the sleep state changes as emotional states change.They stated that 22% of them are affected when they were happy, 40% when they were unhappy, 87% when they were tired, 56% when they were stressed and 33% when they were thoughtful. As a result, it was found that the changes in emotional state of non-shift worker women affect their sleep mostly.

Table 33. Relationship between emotional state and sleep in non-shift worker women

	AFFECT	NOT SURE	DO NOT AFFECT
	N (%)	N (%)	N (%)
HAPPY (n: 23)	5(22,0)	1(4,0)	17(74,0)
UNHAPPY (n: 5)	2(40,0)	3(60,0)	-
TIRED (n: 23)	20(87,0)	1(4,0)	2(9,0)
STRESSED (n: 9)	5(56,0)	3(33,0)	1(11,0)
THOUGHTFUL (n: 6)	2(33,0)	-	4(67,0)

4.7. Association of Datas with Sleep Quailty

Sleep quality of participants was evaluated by PSQI. When PSQI is 5 or less than 5, the sleep quality of participant considered to be good. But when PSQI is more than 5, the sleep quality of participant is accepted as poor (83).

Distribution of sex and shift status according to sleep quality is given in Table 34.

The sleep quality of participants in the study varied by sex ($p = 0.015$; $p < 0.05$). 70% (n: 51) of the participants with good sleep quality (PSQI ≤ 5) were female and 30% were male (n: 22). 86% of the participants with poor sleep quality (PSQI > 5) were female (n: 106) and 14% were male (n: 23). As a result, the sleep quality of women participants found different and better than men's.

When the shift status was evaluated within the groups; there was a significant relationship between sleep quality and shift status in women (p: 0,009, p <0,05). Sleep quality was good (PSQI ≤ 5) in 43% of shift workers and 57% of non-shift workers. In addition, 65% of those with poor sleep quality (PSQI > 5) were found to be shift workers and 35% non-shift workers. So, it can be said that non-shift workers has significantly better sleep quality.

Half of the shift worker male participants had good sleep quality and half of them had poor sleep quality. Also, approximately half of the non-shift worker male participants had good sleep quality and half of them had poor sleep quality. As a result,

there was no relationship found between sleep quality and the shift status of male participants (p: 0.936, p> 0.05).

Table 34. Distribution of sex and shift status according to sleep quality

	WOMEN (n: 157)		MEN (n: 45)	
	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)	SHIFT WORKER N (%)	NON-SHIFT WORKER N (%)
PSQI ≤ 5	22(43,0)	29(57,0)	10(45,0)	12(55,0)
PSQI > 5	69(65,0)	37(35,0)	10(43,0)	13(57,0)
P	0,009*		0,936	
p*	0,367			

*p<0,05 is accepted as statistically significant.

Sleep quality distribution according to occupations is given in Table 35.

When the relationship between sleep qualities and occupations were evaluated, sleep quality of shift worker participants showed significant difference according to occupations (χ2: 18,716, p: 0.016, p <0.05). Sleep quality of shift worker nurses was worse than non-shift worker nurses'. For participants who were non-shift workers, sleep qualities did not differ according to professions (χ2: 10,332, p: 0,243, p> 0,05). In general, sleep quality did not differ according to occupations (χ2: 13,154, p: 0,107, p> 0,05).

Table 35. Sleep quality distribution according to occupations

	Shift worker (n: 111)		Non-shift worker (n: 91)	
OCCUPATIONAL GROUPS	**PSQI ≤ 5 (n: 31)**	**PSQI > 5 (n: 80)**	**PSQI ≤ 5 (n: 41)**	**PSQI > 5 (n: 50)**
Dietitian	-	-	2	2
Doctor	3	2	4	4
Pharmacist-technician	-	1	3	4
Physiotherapist	-	-	2	-
Waiter/waitress	1	1	1	7
Food technician	1	-	-	3
Security	1	-	-	-
Patient care technician	6	2	-	1
Patient consultant	2	6	3	8
Nurse	17	65	12	10
Sports trainer	-	-	1	
Cleaning staff	-	2	5	2
Interpreter	-	-	4	1
Valet	-	-	-	3
Administration	-	1	4	5
p	0,016		0,243	
General p*	0,107			

*p<0,05 is accepted as statistically significant.

Participants' regular main meal and snack consumption habits were evaluated. Regular main meal and snack consumption habits of shift worker women according to sleep quality is given in Table 36.

When the regular meal habits of shift worker women were evaluated according to their sleep quality; there was no significant relationship found between sleep quality and regular consumption of main meals (p: 0,215, p> 0,05). That showed us that altough the number of shift worker women with poor sleep quality who mostly do not have a regular main meal habit was higher, there were no significant differences between the main meal consumption habits of women with good or poor sleep quality. When regular snack consumption habits were evaluated according to the sleep quality of shift worker women, there was no significant relationship found between sleep quality and regular snack consumption ($\chi 2$: 0,422, p: 0,516, p> 0,05). Altough the number of shift worker women with poor sleep quality who mostly do not have a regular snack consumption

habit was higher, there were no significant differences between the snack consumptions of women with good or poor sleep quality.

Table 36. Regular main meal and snack consumption habits of shift worker women according to sleep quality

WOMEN SHIFT WORKER (n: 91)	MAIN MEAL		SNACK	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
YES	8(30,0)	19(70,0)	10(28,0)	26(72,0)
SOMETIMES	7(33,0)	14(67,0)	-	-
NO	7(19,0)	36(81,0)	12(22,0)	43(78,0)
p*	0,215		0,516	

*p<0,05 is accepted as statistically significant.

Regular main meal and snack consumption habits of non-shift worker women according to sleep quality is given in Table 37.

When the regular meal habits of non-shift worker women were evaluated according to their sleep quality; there was no significant relationship found between sleep quality and regular consumption of main meals (p: 0,085; p> 0,05). Number of women who has regular main meal consumption was almost the same for good and poor sleep quality so there were no significant differences between the main meal consumption patterns of women who work without shifts with good or poor sleep quality.When non-shift worker women were assessed for their regular snack consumption habits according to their sleep quality, there was no significant relationship found between sleep quality and snack consumption (p: 0,727; p> 0,05). Altough the number of non-shift worker women with poor sleep quality who has regular snack consumption was higher, there was no significant difference found between the snack consumptions of non-shift worker women with good or poor sleep quality.

Table 37. Regular main meal and snack consumption habits of non-shift worker women according to sleep quality

WOMEN NON-SHIFT WORKER (n: 66)	MAIN MEAL		SNACK	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
YES	20(47,0)	23(53,0)	16(42,0)	22(58,0)
SOMETIMES	3(25,0)	9(75,0)	-	-
NO	6(54,0)	5(46,0)	13(46,0)	15(54,0)
p*	0,085		0,727	

*p<0,05 is accepted as statistically significant.

Regular main meal and snack consumption habits of shift worker men according to sleep quality is given in Table 38.

When the regular meal habits of shift worker men were evaluated according to their sleep quality; it was found that there was no significant relationship found between sleep quality and regular consumption of main meals (p: 0.751, p> 0.05). Number of men who has or does not have regular main meal consumption was almost the same for good and poor sleep quality so there were no significant differences found between the main meal consumption patterns of shift worker men with good or poor sleep quality. When regular snack consumption habits were evaluated according to the sleep quality of shift worker men, no relationship was found between sleep quality and snack consumption (p: 0.845, p> 0.05). Number of men who has or does not have regular snack consumption was almost the same for good and poor sleep quality so there were no significant differences found between men who have good or poor sleep quality.

Table 38. Regular main meal and snack consumption habits of shift worker men according to sleep quality

MEN SHIFT WORKER (n: 20)	MAIN MEAL		SNACK	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
YES	6(54,0)	5(46,0)	4(50,0)	4(50,0)
SOMETIMES	3(60,0)	2(40,0)	-	-
NO	1(25,0)	3(75,0)	6(50,0)	6(50,0)
p*	0,751		0,845	

*p<0,05 is accepted as statistically significant.

Regular main meal and snack consumption habits of non-shift worker men according to sleep quality is given in Table 39.

When the regular main meal habits of non-shift worker men were evaluated according to their sleep quality; there was no significant relationship found between sleep quality and consumption of main meals (p: 0,056, p> 0,05). That showed us that altough the number of non-shift worker men with poor sleep quality who mostly have a regular main meal habit was higher, there were no significant differences between the main meal consumption habits of men with good or poor sleep quality. When regular snack consumption habits were evaluated according to the sleep quality of non-shift worker men, no relationship was found between sleep quality and snack consumption ($\chi 2$: 0,248, p: 0,619, p> 0,05). The number of men with good and poor sleep quality who has regular snack consumption was same and higher, but there were no significant differences found between men who have good or poor sleep quality.

Table 39. Regular main meal and snack consumption habits of non-shift worker men according to sleep quality

MEN NON-SHIFT WORKER (n: 25)	MAIN MEAL		SNACK	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
YES	8(42,0)	11(58,0)	8(50,0)	8(50,0)
SOMETIMES	2(67,0)	1(33,0)	-	-
NO	2(67,0)	1(33,0)	4(44,0)	5(56,0)
p*	0,056		0,619	

*p<0,05 is accepted as statistically significant.

Regular main meal and snack consumption habits of shift worker participants according to sleep quality is also evaluated and given in Table 40.

There was no significant relationship found between sleep qualities and regular main meal and snack consumption habits for participants working as shift workers (p: 0,103, p> 0,05). Altough the number of shift workers with poor sleep quality who do not have a regular main meal consumption habit was higher, it was found that good or poor sleep qualities do not affect the main meal consumption habits significantly. Also, there was no significant relationship between sleep quality and snack consumption of

shift worker participants (p: 0,489, p> 0,05). Altough the number of shift workers with poor sleep quality who does not have a regular snack consumption habit was higher, it was found that good or poor sleep qualities did not affect the snack consumption habits significantly.

Table 40. Regular main meal and snack consumption habits of shift worker participants according to sleep quality

WOMEN-MEN SHIFT WORK (n: 111)	MAIN MEAL		SNACK	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
YES	14(58,0)	24(42,0)	14(32,0)	30(68,0)
SOMETIMES	10(38,0)	16(62,0)	-	-
NO	8(17,0)	39(83,0)	18(27,0)	49(73,0)
p*	0,103		0,489	

*p<0,05 is accepted as statistically significant.

Regular main meal and snack consumption habits of non-shift worker participants according to sleep quality is given in Table 41.

There was no relationship found between sleep qualities and regular main meal and snack consumption habits for participants working as non-shift workers (p: 0,398, p> 0,05). Altough the number of non-shiftworkers with good and poor sleep quality who has a regular main meal consumption habit was almost the same and higher, it was found that good or poor sleep qualities did not affect the main meal consumption habits significantly. Also, there was no relationship between sleep quality and snack consumption of non-shift-worker participants (p: 0,978, p> 0,05). Altough the number of non-shift workers with good and poor sleep quality who has a regular snack consumption habit was close to each other and higher, it was found that good or poor sleep qualities did not affect the snack consumption habits significantly.

In general, there was no relationship between sleep quality and regular main meal and snack consumption habits of either shift nor non-shift worker participants (p: 0,249, p> 0,05). Similarly, there was no significant relationship with snack consumption habits (p: 0.382, p> 0.05).

Table 41. Regular main meal and snack consumption habits of non-shift worker participants according to sleep quality

NON-SHIFT WORK (n: 91)	MAIN MEAL		SNACK	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
YES	28(45,0)	34(55,0)	24(44,0)	30(56,0)
SOMETIMES	5(33,0)	10(67,0)	-	-
NO	8(57,0)	6(43,0)	17(46,0)	20(54,0)
p	0,398		0,978	
General p*	0,249		0,382	

*p<0,05 is accepted as statistically significant.

The participants, who skip meals, were evaluated with their sleep quality. Relationship between skipped meals and sleep quality is given in Table 42.

There was no significant relationship found between skipped meals and sleep quality among the participants in the study (p: 0,760, p> 0,05). However, those who had poor sleep quality were more likely to skip meals according to the participants with good sleep quality. In addition, 70% of the participants with poor sleep quality reported that they skip breakfast, 76% of them lunch and 68% of them dinner.

Table 42. Relationship between skipped meals and sleep quality

SKIPPED MEALS	PSQI				χ^2	p
	>5 (n/%)		≤5 (n/%)			
BREAKFAST	31	70,0	13	30,0	0,548	0,760
LUNCH	26	76,0	8	24,0		
DINNER	15	68,0	7	32,0		

*p<0,05 is accepted as statistically significant.

BMI and waist circumference were evaluated based on sleep quality.

Evaluation of BMI and waist circumference of men according to sleep quality is given in Table 43 and evaluation of BMI and waist circumference of non-shift worker men according to sleep quality is given in Table 44.

For male participants with good sleep quality, mean BMI of shift workers was 25,26 ± 3,28 kg/m^2 and mean waist circumference was 95,25 ± 9,27 cm, while mean BMI of non-shift workers was 27,03 ± 3,68 kg/m^2 and mean waist circumference was 89,56 ± 8,22 cm. For male participants with poor sleep quality, mean BMI of shift workers was 25,27 ± 3,14 kg/m^2 and mean waist circumference was 96,93 ± 15,27 cm, while mean BMI of non-shift workers was 27,35 ± 5,32 kg/m^2 and mean waist circumference was 89,05 ± 8,88 cm. As a result, it was found that mean waist circumference was higher for shift worker participants and especially for ones with poor sleep quality. BMI was higher for non-shift worker participants, especially for ones with poor sleep quality. But there was no significant difference found in BMI and waist circumference according to men's shift status and sleep qualities (non-shift worker: p: 0,862; p: 0,743; p> 0,05; shift worker: p: 0,992; p: 0,899; p> 0,05).

Table 43. Evaluation of BMI and waist circumference of shift worker men according to sleep quality

	SHIFT WORKER			
	PSQI ≤ 5 (n: 10)	**PSQI > 5 (n: 10)**	**t**	**p***
BMI	25,26 ± 3,28	25,27 ± 3,14	0,010	0,992
WAIST CIRCUMFERENCE	95,25 ± 9,27	96,93 ± 15,27	-0,128	0,899

*p<0,05 is accepted as statistically significant.

Table 44. Evaluation of BMI and waist circumference of non-shift worker men according to sleep quality

NON-SHIFT WORKER				
	PSQI ≤ 5 (n: 12)	PSQI > 5 (n: 13)	t	p*
BMI	27,03 ± 3,68	27,35 ± 5,32	0,176	0,862
WAIST CIRCUMFERENCE	89,56 ± 8,22	89,05 ± 8,88	0,331	0,743

*p<0,05 is accepted as statistically significant.

Evaluation of BMI and waist circumference of shift worker women according to sleep quality is given in Table 45 and evaluation of BMI and waist circumference of non-shift worker women according to sleep quality is given in Table 46.

For female participants with good sleep quality, mean BMI of shift workers was 22,9 ± 3,58 kg/m^2 and mean waist circumference was 77,2 ± 9,86 cm, while mean BMI of non-shift workers was 23,14 ± 3,05 kg/m^2 and mean waist circumference was 78,91 ± 9,99 cm. For female participants with poor sleep quality, mean BMI of shift workers was 23,05 ± 4,18 kg/m^2 and mean waist circumference was 76,62 ± 9,32 cm, while mean BMI of non-shift workers was 23,91 ± 6,02 kg/m^2 and mean waist circumference was 80,58 ± 13,33 cm. As a result, it was found that mean waist circumference was higher for non-shift worker participants and especially for ones with poor sleep quality. BMI was higher for non-shift worker participants, especially for ones with poor sleep quality. But there was no significant difference found in BMI and waist circumference according to women's shift status and sleep qualities (non-shift worker: p: 0,507, p: 0,577, p> 0,05; shift worker: p: 0,879, p: 0,802, p> 0,05).

Table 45. Evaluation of BMI and waist circumference of shift worker women according to sleep quality

SHIFT WORKER				
	PSQI ≤ 5 (n: 22)	PSQI > 5 (n: 69)	t	p*
BMI	22,9 ± 3,58	23,05 ± 4,18	0,152	0,879
WAIST CIRCUMFERENCE	77,2 ± 9,86	76,62 ± 9,32	-0,251	0,802

*p<0,05 is accepted as statistically significant.

Table 46. Evaluation of BMI and waist circumference of non-shift worker women according to sleep quality

	NON-SHIFT WORKER			
	PSQI ≤ 5 (n: 29)	PSQI > 5 (n: 37)	t	p*
BMI	23,14 ± 3,05	23,91 ± 6,02	0,668	0,507
WAIST CIRCUMFERENCE	78,91 ± 9,99	80,58 ± 13,33	0,561	0,577

*p<0,05 is accepted as statistically significant.

Participants were asked about what they eat for snack, in shifts and before sleep. According to answers, food choices of women according to sleep quality are given in Table 47.

When food choices were evaluated according to the sleep quality of women, shift worker women with poor sleep quality had more variable food choices than shift worker women with good sleep quality. Food choices were mostly based on caffeinated drinks, crackers, biscuits, nuts and seeds.

For women without shifts, food choices were close to each other according to their sleep quality.

Table 47. Food choices of women according to sleep quality

	SHIFT WORKER (n: 91)		NON-SHIFT WORKER (n: 66)	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
Fresh and dried fruits	14(70,0)	38(57,0)	19(33,0)	19(41,0)
Nuts and seeds	13(65,0)	36(54,0)	8(14,0)	10(22,0)
Dairy products	12(60,0)	30(45,0)	9(16,0)	10(22,0)
Sandwich, rusk, toast etc.	9(45,0)	21(31,0)	2(3,0)	2(4,0)
Cracker, biscuit etc.	15(75,0)	42(63,0)	7(12,0)	8(17,0)
Pastry, bagel, patty etc.	8(40,0)	24(36,0)	-	1(2,0)
Chocolate, wafer etc.	9(45,0)	32(48,0)	4(7,0)	5(11,0)
Fast-food	6(30,0)	22(33,0)	-	-
Caffeinated drinks	14(70,0)	53(79,0)	5(9,0)	10(22,0)
Other	-	-	-	

According to answers, food choices of men according to sleep quality are given in Table 48.

When food choices are evaluated according to the sleep quality of men, shift worker men with poor sleep quality have more variable food choices than shift worker men with good sleep quality. Food choices were mostly based on caffeinated beverages, fast-food and pastry, bagels, pies.

For men without shifts, food choices were close to each other according to their sleep quality.

Table 48. Food choices of men according to sleep quality

	SHIFT WORKER (n: 20)		NON-SHIFT WORKER (n: 25)	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
Fresh and dried fruits	5(21,0)	4(40,0)	8(28,0)	8(24,0)
Nuts and seeds	4(16,0)	4(40,0)	5(18,0)	5(15,0)
Dairy products	3(12,0)	1(10,0)	5(18,0)	1(3,0)
Sandwich, rusk, toast etc.	3(12,0)	2(20,0)	3(11,0)	6(18,0)
Cracker, biscuit etc.	3(12,0)	2(20,0)	3(11,0)	6(18,0)
Pastry, bagel, patty etc.	5(21,0)	6(60,0)	3(11,0)	2(6,0)
Chocolate, wafer etc.	4(16,0)	4(40,0)	1(3,5)	1(3,0)
Fast-food	4(16,0)	6(60,0)	2(7,0)	-
Caffeinated drinks	6(25,0)	9(90,0)	4(14,0)	6(18,0)
Other	-	-	-	1

Participants were asked to evaluate their usual emotional state and the relationship between sleep quality and emotional state in women is given in Table 49.

There was a significant relationship between women's shift status and emotional state (p: 0,000; p <0,05). Women working in shifts mentioned that they felt tired, while women without shifts felt happy most of the time. There was a significant relationship between sleep quality and emotional state of shift worker women (p: 0,025, p <0,05). While 56% of shift worker women with good sleep quality mentioned that they were happy, and just 24% of shift worker women with poor sleep quality mentioned that they were happy. On the other hand, while 18% of shift worker women with good sleep

quality mentioned that they were tired, 49% of shift worker women with poor sleep quality mentioned that they were generally tired.

There was also a significant relationship between non-shift worker women's sleep quality and emotional state (p: 0,010; p <0,05). While 59% of non-shift worker women with good sleep quality mentioned that they were happy, 3% were unhappy, 24% were tired and 14% were stressful or thoughtful, non-shift workers with poor sleep quality mentioned that 16% of them were happy, 11% were unhappy , 43% were tired, 19% were stressful and 11% were thoughtful.

Table 49. Relationship between sleep quality and emotional state in women

	SHIFT WORKER (58,0%)		NON-SHIFT WORKER (42,0%)	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
HAPPY	12(56,0)	17(24,0)	17(59,0)	6(16,0)
UNHAPPY	1(4,0)	8(11,0)	1(3,0)	4(11,0)
TIRED	4(18,0)	34(49,0)	7(24,0)	16(43,0)
STRESSED	3(13,0)	5(7,0)	2(7,0)	7(19,0)
THOUGHTFUL	2(9,0)	5(7,0)	2(7,0)	4(11,0)
p	0,025*		0,010*	
General p*	0,000*			

*p<0,05 is accepted as statistically significant.

Relationship between sleep quality and emotional state in men is given in Table 50.

Emotional states of shift worker and non-shift worker men were found similar. As a result, there was no significant relationship found between men's shift status and emotional state (p: 0.057, p> 0.05).

On the other hand, good sleepers' and poor sleepers' numbers according to emotional state were found similar. So that, there was no significant relationship found between emotional states and sleep quality of shift worker and non-shift worker men. (Shift worker: p: 0,057, p> 0,05; Non shift worker: p: 0,380, p> 0,05).

Table 50. Relationship between sleep quality and emotional state in men

	SHIFT WORKER		NON-SHIFT WORKER	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
HAPPY	6(60,0)	3(30,0)	8(67,0)	3(23,0)
UNHAPPY	2(20,0)	1(10,0)	-	3(23,0)
TIRED	2(20,0)	5(50,0)	3(25,0)	3(23,0)
STRESSED	-	1(10,0)	-	3(23,0)
THOUGHTFUL	-	-	1(7,0)	1(8,0)
p*	0,057		0,380	
General p*	0,057			

*p<0,05 is accepted as statistically significant.

Participants were asked to indicate that if they are doing physical activity or not. Answers were evaluated and regular physical activity habits according to sleep quality in shift worker women is given in Table 51.

There was a significant relationship between sleep quality and physical activity status of shift worker women (p: 0.014, p <0.05). 48% of physically active shift worker women had good sleep quality and 52% had poor sleep quality. Those who did not have physical activity stated that 17% of them had good sleep quality and 83% had poor sleep quality. The shift worker women who is not physically active had poorer sleep quality than who is physically active.

Table 51. Regular physical activity habits according to sleep quality in shiftworker women

SHIFT WORKER WOMEN (n: 91)	PHYSICAL ACTIVITY STATUS	
	PSQI ≤ 5 N (%)	PSQI > 5 N (%)
YES	10(48,0)	11(52,0)
NO	12(17,0)	58(83,0)
p*	0,014*	

*p<0,05 is accepted as statistically significant.

Regular physical activity habits according to sleep quality in non-shift worker women is given in Table 52.

There was no relationship found between sleep quality and physical activity status of women workers without shift (p: 0.861, p> 0.05), but the number of non-shift worker women with poor sleep quality was higher for group that not physically active.

Table 52. Regular physical activity habits according to sleep quality in non-shift worker women

NON-SHIFT WORKER WOMEN (n: 66)	PHYSICAL ACTIVITY STATUS	
	PSQI ≤ 5 N (%)	PSQI ≤ 5 N (%)
YES	6(50,0)	6(50,0)
NO	23(43,0)	31(57,0)
p*	0,861	

*p<0,05 is accepted as statistically significant.

Regular physical activity habits according to sleep quality in shift worker men is given in Table 53.

There was no significant relationship found between sleep quality and physical activity status of men workers with shift (p: 0,510, p> 0,05).

Table 53. Regular physical activity habits according to sleep quality in shift worker men

SHIFTWORKER MEN(n: 20)	PHYSICAL ACTIVITY STATUS	
	PSQI ≤ 5 N (%)	PSQI ≤ 5 N (%)
YES	3 (60,0)	2(40,0)
NO	7(47,0)	8(53,0)
p*	0,510	

*p<0,05 is accepted as statistically significant.

Regular physical activity habits according to sleep quality in non-shift worker men is given in Table 54.

There was no significant relationship found between sleep quality and physical activity status of men workers without shift (p: 0,265, p> 0,05).

Table 54. Regular physical activity habits according to sleep quality in non-shift worker men

NON-SHIFTWORKER MEN (n: 25)	PHYSICAL ACTIVITY STATUS	
	PSQI ≤ 5 N (%)	PSQI ≤ 5 N (%)
YES	5(62,5)	3(37,5)
NO	7(41,0)	10(59,0)
p*	0,265	

*p<0,05 is accepted as statistically significant.

Stress level points of participants were obtained from sleep diary. Mean stress level points were calculated and evaluated.

Stress level points of participants according to sleep quality is given in Table 55.

The daily stress levels of the participants in the study did not differ between the sleep qualities of the participants (p: 0,554, p> 0,05). In other words, the average daily stress level of participants with good sleep quality was 5.28 ± 2.60 points, while the daily average stress level of participants with poor sleep quality was close to 5.48 ± 1.92 points.The points seemed higher for participants with poor sleep quality but there was not a significant relationship.

Table 55. Stress level points of participants according to sleep quality

		STRESS LEVELS		
PSQI	Participants (n)	Arth.Mean.±S.S.	t	p*
>5	130	5,48 ± 1,92	0,594	0,554
≤5	72	5,28 ± 2,60		

*p<0,05 is accepted as statistically significant.

5. DISCUSSION

In a systematic review with 108 articles which was conducted in 2016, it was revealed that short sleepers (a duration less than 6 hours) were likely to have a point estimate of an absolute increase of 37% for diabetes mellitus, 17% for hypertension, 16% for cardiovascular disease, 26% for coronary heart disease and 38% for obesity (7). For another review which includes cohorts and cross-sectional studies, it was found that the published literature supported the presence of an association between sleep duration and weight gain unless there were some confounding factors and results (89). In another review conducted in 2010, it was shown that being overweight and obese was more prevalent in shift workers than day workers, also shift work was associated with BMI independent of age or time in shift work and a longer exposure predicts a higher BMI (14).

This study has been carried out at Anadolu Medical Center Hospital in order to compare body mass index, waist circumference and food choices according to the sleep quality of the shift and non-shift workers in the hospital. Participants' BMI, waist circumference, weight, sleep quality, emotional state, food choices and stress levels were evaluated and analyzed.

202 healthy individuals were participated in this study. 77,7% of them were women and 22,3% were men. 55% of participants were shiftworker and 45% were non-shiftworker. 73,9% of shiftworkers were nurse and 26,1% were from other occupations.

The waist circumference of men and women were in normal ranges. Men's BMI was significantly higher than women's and they were mostly in the group of overweight. According to shift status; non-shiftworkers' BMI, weight and waist circumference were significantly higher than shiftworkers' without sex differences. BMI, weight and waist circumference values were not statistically different when shift status and sex were evaluated together. In a study which was conducted to see the negative effects of night work load, sex was found positively and significantly related to BMI and night shift worker females had lower BMI values than males (90). In another study which was hold in a private hospital with outpatients, a statistically significant difference between the BMI group distributions according to sex was found. While the frequency of women being underweight and normal was significantly higher than men,

the frequency of men being overweight and obese was significantly higher than women (55). Unlike the results of this study and other studies, in a study which evaluates physical activity, sleep quality, metabolic activity and stress levels in health care workers, BMI and WHR did not show significant differences within the groups and between subgroups. The median BMI and the median WHR in all subpopulation was within the range of healthy individuals, WHR result resembles this study's results. For BMI, a tendency towards overweight was found for all subgroups, whereas the non-shiftworker subgroup had the highest median BMI of all subgroups as in this study (62). As in this study, it was found that working in the night shift leads to a greater increase in BMI compared to working during the day. But the mean BMI of night workers was 25.5 kg/m^2 and day workers was 25.0 kg/m^2, being the opposite of this results, there were no statistically significant difference found (91). As in this study, a study which was conducted in Korea also found that non-shift workers had a higher prevalence of being overweight and obese than shift workers (92). In a study with pediatric nurses with shifts, there was no statistically significant difference of elevated BMI (>30) found between night shift and day shift respondents unlike this study (86).

In women, it was observed that the mean BMI values decreased and the waist circumference values increased as the shift frequency increases. In men; it was observed that the mean BMI and waist circumference values decreases as the shift frequency increases. Shift frequency had been evaluated as days but most of the studies evaluated shift frequency as years. According to a study which was conducted in Korea, the overall prevalence of overweight/obesity (18.6%) and obesity (7.4%) increased significantly as shift work duration increased. The participants with the longest duration of shift work were found 1.63 times more likely to be overweight or obese than those with the shortest duration (92). In another study evaluating the relationship between the years of exposure to night work and body mass index (BMI) among registered nurses, the years of exposure to night work was found associated between BMI. When the exposure time increases, the BMI increases. The effect of night work was greater among women than men (93). In a study with male shift-workers, similar results were found with this study. Results suggested that risk of obesity in shift workers was not related to length of exposure to shift work as years (94). In a cross-sectional study evaluating negative effects of night shift, number of nights worked the last year was statistically significant and positively related to increased BMI values (90). A study which evaluated the shift frequency as night numbers like this study, the positive and statistically

significant associations for cumulative night shift work exposure expressed as the total number of night shifts (or of night shift hours) and BMI, weight circumference and hip circumference. Increased shift-work exposure and increased night shift work was found consistently associated with obesity in women reporting eight or more night shifts per month. A higher frequency of night shifts was also found significantly associated with abdominal obesity (95).

Hight stress group's mean weight was found to be higher but the mean weight status of the participants did not differ significantly according to the stress levels. In 2004, Lac and Chamoux found that the level of stress in shift workers was higher than in non-shift workers. Also, it was found that work stress, as indicated by job strain and low job control in the study, increases the likelihood of weight gain among men with a higher BMI, but seems to predict weight loss among lean men who have no need for weight reduction. There was some evidence of a prospective association between work stress and increased BMI in women (96). In The Whitehall II study with a total of 7965 British civil servants (5547 men and 2418 women) aged 35–55, for men, no association between stressors and subsequent BMI was found. In women, higher job demands were weakly associated with higher BMI at follow-up (97).

There was no significant relationship found between shift status and habit of regular main meal consumption within women. There was no significant relationship found between shift status and habit of regular main meal consumption within men. In a study which determines the nutritional status of nurses in night shift, it was found that women were mostly consuming 3 meals a day (48.5%) and was followed by 2 meals a day with 28.5% and 4 meals with 19% (52). In the study with outpatients, there was no statistically significant difference found between the frequency of regular consumption of main meals according to sex (55).

There was a significant relationship between the shift status of the participants and the habits of consuming main meal regularly. Most of the shift workers were unable to regularly consume their main meals. There was no significant relationship found between skipped meals and shift status of participants in the study but shift workers were more likely to skip meals than non-shift workers. Breakfast and lunch were the most skipped meals. A study which was conducted in Korea found that about 36.5% of subjects skipped breakfast, while 1.3% and 1.0% skipped lunch and dinner, respectively. The prevalence of skipping breakfast was higher in shift workers compared to non-shift workers (92). In a study with shift worker call center employees

also found similar results as this study. According to the study 31% of individuals with 4 shifts, 24% of individuals with 3 shifts, and 6.67% in workers without shifts stated that they skip meals. 76% of individuals with 3 shifts and 69% of individuals with 4 shifts stated that there were deviations on the meal times. Shift workers were skipping mostly the lunch. The rate of those who skip breakfast in the morning was higher in non-shift workers (98). The study with night worker nurses, it was found that the majority of participants skip breakfast in the morning (52) like in the literature.

It was found that women participants were more likely to skip meals than men. In addition, shiftworker women participants had more skipped meals than shiftworker men participants. No results were reached in the database for shift workers' meal skipping habits according to sex but in the study with outpatients, of the women participating in the study, 36% had skipped breakfast, 32% lunch, and 32% dinner; 65% of men were found skipping breakfast, 30% lunch, and 5% dinner. There was no statistically significant difference found between the distributions of skipped meals according to sex. The frequency of breakfast skipping was significantly higher for men than women. The frequency of skipping dinner was significantly higher for women than men (55).

Shift worker women participants were stated that they were more likely to skip meals because of their work intensity, not feeling hungry, and not finding proper meals for them. Men working on shifts and without shifts also stated that they skipped meals because of work intensity and not feeling hungry. When the reasons for skipping the meals were examined in a study with night worker nurses, it was found that the general reason for meal skipping was the irregular working hours. Other reasons for meal skipping were not having time for meals and desire to lose weight (52). In another study with outpatients, the reasons for meal skipping were found as work load, not feeling hungry, not finging proper foods for themselves, not finding necessary to have all meals and desire to lose wieght. In the same study it was found that 32% of women and 84% of men in the study were skipping meals because of the work load and that was a significant finding (55). In a study which evaluates meal skipping habits of shift and non-shift workers, it was found that the reason for meal skipping is not having time for shift workers; not having appetite in non-shift workers (98).

There was no significant relationship found between shift status and habit of regular snack consumption within women. There was also no significant relationship

found between shift status and habit of regular snack consumption habit within men. But there was a significant relationship between the shift status of all individuals participating in the study and the regular snack consumption habit. Among shift workers, the snack consumption habit was not regular. Non-shift workers, on the other hand, was able to consume snacks better than shift workers. When the snack consumption habit of outpatients were evaluated, there was no statistically significant difference found between the distributions of snack consumption habits according to sex as in this study (55). But in a study with 126 female nurses employed in teaching hospitals in Warsaw, frequency of having second breakfast (snack after breakfast) or afternoon snack on a working day was less for nurses working in a two-shift system, this relation was significant for second breakfast (99).

In the food choices of the shift worker participants; women consumed more variable foods than men. When food choices were evaluated; women stated that they consumed foods such as caffeinated drinks, crackers, biscuits and others, fresh-dried fruits, nuts and seeds mostly. On the other hand, men stated that they consumed foods such as fresh-dried fruits, dairy products, nuts and seeds. Biscuits were the most preffered food for all working systems but especially for non-shift workers. Differences in food choices may be the result of educational status. In this study, in non-shift worker group there were less university and master's graduated participants than shift-worker group and this educational status difference may be a reason for unhealthy food choices. In a study with shift worker call center employees, cake, desserts and pastry were found as mostly preferred foods for shift workers. Toast, sandwich etc was in second place for non-shift workers; chocolate, wafer and nuts were also preferred for all workers. Coffee was mostly chosen in night shifts (98). In a cross-sectional Italian study, rotating shift workers were found that they had the worst quality of food intake (100). When the food choices of participants were evaluated in a study with outpatients, it was found that 60,5% of them prefer fresh/dried fruits, 34,9% nuts, 27,9% dairy products, 32,6% sandwich, toast, 23,3% cracker, biscuit and others , 11,6% pastry, bagel and 25,6% chocolate, wafer and others. Women mostly prefered dried/raw fruits. Men mostly prefered dairy products and dried/fresh fruits. In detailed evaluation, only consumption of pastry, bagel and others found significantly different. Most of the participants (both men and women) had high consumption of caffeinated drinks (55). In a study which evaluated diets of shift-working healthcare personnel according to macronutrients, no

significant differences were found for percentage of protein intake. Analysis of fat consumption revealed a higher percental intake among the office staff without shifts and this difference was significantly different from both the shift working and non-shift working nurses. On the other hand, percental carbohydrate intake was less in the office group compared to shift working nurses. The percental intake of sugar, representing partially snacking, showed a tendency towards less consumption in the subgroup (62).

It was seen that the institution facilitates mostly the consumption of breakfast, dairy products, pastry, bagel, patty and fast food. The need of other foods like fruits, nuts, seeds, cracker, biscuit, chocolate and caffeinated drinks were met by participants' own possibilities. In a study which evaluated influences on dietary choices during day and night shift in shift workers, participants reported that irrespective of shift, the main meal consumed at work might include: communal meals cooked at the workplace, takeaway food purchased during shifts, or food brought from home. They also consumed takeaway foods more often on night shift. The majority of work snacks were brought from home. Irrespective of shift schedule, these were mainly fruit, nuts, and yoghurt. Some participants said that they were more likely to eat chocolates and ice cream, supplied at the workplace, after dinner (at night shift) than when they were on a day shift (101).

Shift worker women's number who had regular physical activity habit was more than non-shift workers'. Non-shiftworker men's number who had regular physical activity habit was more than shift workers. But there was no significant relationship between sex and physical activity habits, and between shift status and physical activity eventually. Women also seem to have longer physical activity periods than men and for both group, walking was the most popular physical activity. In a study which had been carried out with night shift worker women, 31% of women were found as physically active (52). In a study with shift-working healthcare personnel, overall average activity in metabolic equivalents of task was not significantly different between the shift- and non- shift working group as in this study. There was a tendency towards less physical activity in the non-shift working nursing staff compared to employees from the non-shift working office staff. Shift-working individuals were significantly more active than non-shift workers like in this study. Employees on shift rotation walked relatively more than individuals on non-shift work (62). In a Brazilian study with shift workers, regarding the association between work shift and physical activity, overall, night shift workers had higher prevalence of physical activity compared to the day shift workers.

Increased physical activity was found significantly associated with work shift particularly among females (102) but in a cross-sectional study, males were found to be exercising significantly more than females (90). As oppose to this study's results, a study which was conducted in Korea found that current shift workers were less likely to exercise regularly than non-shift workers (92). A cross-sectional study which was conducted in Italy mentioned that rotating shift workers significantly more active during leisure-time (100) but a study with Canadian nurses mentioned that nurses working a regular daytime schedule have greater utilisation of fitness facilities (103).

Male participants mostly indicated that 44.4% of them usually felt happy, while 28,9% of male participants felt tired, 13,3% unhappy, 8.9% stressed and 4,5% thoughtful. Also, shift worker men indicated that most of them usually feel tired (46,7%), while 26,7% happy, 20% unhappy and 6,6% stressed. Non-shift worker men indicated that most of them usually feel happy (44%), while 24% tired, 12% unhappy, 12% stressed and 8% thoughtful. On the other hand, female participants mostly indicated that 38,9% of them usually felt tired, while 33,1% of female participants felt happy, 10,8% stressed, 8.9% unhappy and 8,3% thoughtful. Shift worker women indicated that most of them usually feel tired (41,8%), while 31,9% happy, 9,9% unhappy, 8,8% stressed and 7,6 thoughtful. Non-shift worker women indicated that most of them usually feel tired (34,8%) and happy (34,8%), while 13,6% stressed, 9,1% thoughtful and 7,7% unhappy. In a prospective and observational study on night shift workers, the percentage of workers with anxiety was significantly higher after night work. There were also higher tension, annoyance, feeling upset, anguished, nervous, restless, down-hearted and stunned after working on a night shift rather than sleeping at this time. On the other hand, having worked on a night shift was also found associated with greater feelings of happiness and being at ease (104). The response of "I feel fatigue and exhaustion" was found highest for night shift workers in a study with call center employees (98).

The changes in emotional state of shiftworker men did not affect nutritional status in any way but the nutritional status changed as emotional state changes in non-shiftworker men. They stated that 36% of them were affected when they were happy, 67% when they were unhappy, 83% when they were tired, 67% when they were stressed and 50% when they were thoughtful. No data was reached in literature about emotional state and nutritional status relationship for men.

On the other hand, for women it was found that the nutritional state changes as emotional states change in shift worker women. They stated that 48% of them were affected when they were happy, 67% when they were unhappy, 58% when they were tired and all of them when they were stressed and 86% when they were thoughtful. The nutritional status changed as emotional state changes in non-shift worker women. They stated that 43% of them were affected when they were happy, 60% when they were unhappy, 48% when they were tired, 44% when they were stressed and 50% when they were thoughtful. In a study with 126 female nurses employed in teaching hospitals in Warsaw, similar results were found with this study. It was found that diet of nurses working in a two-shift system was affected by stress more than the diet of nurses working in a single-shift system (99).

The sleep state changed as emotional state changes in shiftworker men. They stated that 33% of them were affected when they were happy, 67% when they were unhappy and 57% when they were tired. The sleep state changed as emotional state changes in non-shiftworker men. They stated that 36% of them were affected when they were happy, 67% when they were unhappy, 67% when they were tired, 67% when they were stressed and 50% when they were thoughtful. The sleep state changed as emotional state changes in shift worker women. They stated that 41% of them were affected when they were happy, 89% when they were unhappy, 74% when they were tired, 62.5% when they were stressed and 71% when they were thoughtful. The sleep state changed as emotional state changes in non-shift worker women. They stated that 22% of them were affected when they were happy, 40% when they were unhappy, 87% when they were tired, 56% when they were stressed and 33% when they were thoughtful. In a study with patients of obesity clinic, individuals were asked whether they felt changes on their sleeping times according to their emotional states and patients reported that fatigue (43.6%), sadness (69.1%) and stress (77.7%) were adversely affects their sleep (59).

The sleep quality of women participants was found better than men's in this study. According to the shift work status, a significant relationship was found between sleep quality and shift status in women. Non-shift workers have significantly better sleep quality. There was no relationship found between sleep quality and the shift status of male participants. In a study which investigates the effects of shift working, PSQI showed no significant differences in the group- and subgroup-analyses. Individuals on a

shift-work schedule more often reported an impaired sleep quality as in this study (62). Another study which explored the relationship between shift work, quality of sleep, and BMI of nurses, unlike this results, there was no significant difference found in global sleep quality score between the shift groups. There was no sex difference in global sleep quality score (86). In a study without shift worker group, the frequency of poor sleep quality within women was found to be significantly higher than men as oppose to this study's results (55).

When the relationship between sleep qualities and occupations was evaluated, sleep quality of shift-worker participants showed significant difference according to occupations ($p < 0.05$). Sleep quality of shift worker nurses have worse sleep quality than non-shift worker nurses'. In a study which evaluated the sleep qualities of nurses, mean PSQI score was found 7.66±0.33 for 70.97% of nurses (2). In the study which Karagözoğlu and Bingöl (105) investigated the relationship between sleep quality and job satisfaction levels of nurses, the mean total PSQI score of the nurses was found 7.28 ± 3.56 (105). And in another study which was conducted with nurses, sleep quality of 50.5% of participants were found to be poor (85).

Altough the number of shiftworker women with poor sleep quality who mostly did not have a regular main meal habit was higher, there were no significant differences between the main meal consumption habits of women with good or poor sleep quality. Altough the number of shiftworker women with poor sleep quality who mostly did not have a regular snack consumption habit was higher, there were no significant differences between the snack consumption habit of women with good or poor sleep quality.

Number of women who had regular main meal consumption habit was almost the same for good and poor sleep quality so there were no significant difference found between the main meal consumption patterns of women who work without shifts with good or poor sleep quality. Altough the number of non-shiftworker women with poor sleep quality who had regular snack consumption habit was higher, no significant difference was found between the snack consumption habit of non-shiftworker women with good or poor sleep quality.

Number of men who had or did not have regular main meal consumption habit was almost the same for good and poor sleep quality so there were no significant

difference found between the main meal consumption patterns of shift worker men with good or poor sleep quality. Number of men who had or did not have regular snack consumption haibt was almost the same for good and poor sleep quality so there were no significant difference found between men who have good or poor sleep quality.

Altough the number of non-shiftworker men with poor sleep quality who mostly had a regular main meal habit was higher, there were no significant difference between the main meal consumption habit of men with good or poor sleep quality. The number of men with good and poor sleep quality who had regular snack consumption habit was same and higher, but there were no significant difference found between men who have good or poor sleep quality.

Altough the number of shiftworkers with poor sleep quality who did not have a regular main meal consumption habit was higher, it was found that good or poor sleep qualities did not affect the main meal consumption habit significantly. Altough the number of shiftworkers with poor sleep quality who did not have a regular snack consumption habit was higher, it was found that good or poor sleep qualities did not affect the snack consumption habit significantly.

Altough the number of non-shiftworkers with good and poor sleep quality who had a regular main meal consumption habit was almost the same and higher, it was found that good or poor sleep qualities did not affect the main meal consumption habits significantly. Altough the number of non-shiftworkers with good and poor sleep quality who had a regular snack consumption habit was similar and higher, it was found that good or poor sleep qualities did not affect the snack consumption habit significantly. No detailed data about eating habits, shift work and sleep quality was reached in literature.

In a study which was conducted in Japan with 360 medical students, it was observed that better sleep quality was found among those who ate meals 3 times daily or more compared to that among with those who habitually skipped meals (106). But in this study, there was no relationship between sleep quality and regular main meal and snack consumption habits of neither shift nor non-shift worker participants. Similarly, there was no significant relationship with snack consumption habits. Also, there was no significant relationship found between skipped meals and sleep quality among the participants in the study but those who have poor sleep quality were more likely to skip meals than the participants with good sleep quality. Lunch was the most skipped meal.

It was found that mean waist circumference was higher for shift worker participants and especially for ones with poor sleep quality. BMI values were higher for non-shift worker participants and especially for ones with poor sleep quality. But there was no significant difference found in BMI and waist circumference according to men's shift status and sleep qualities as a result. Mean waist circumference was higher for non-shift worker participants and especially for ones with poor sleep quality. BMI values were higher for non-shift worker participants and especially for ones with poor sleep quality. But there was no significant difference found in BMI values and waist circumference according to women's shift status and sleep qualities as a result. It seemed that poor sleep quality affected the BMI values and waist circumference negatively even if there was not a significant relationship. In a study which explored the relationship between shift work, quality of sleep, and BMI of nurses, BMI was found to increase as sleep quality decreased with a 3.77 difference in mean BMI between respondents reporting a very good quality of sleep compared to those reporting a very bad quality of sleep (86). In a study with community-dwelling older Spanish women, the group with sleep disorders showed significantly greater values of BMI and waist circumference than those with good sleep quality. There were low, but significant correlations between the disordered sleep score and body composition parameters such as body weight, BMI and waist circumference as in this study (107). In another study which examined the association between sleep quality and different measures of obesity in a population-based sample of adults, in terms of anthropometry, the two groups (poor and good sleep quality) did not differ in BMI and waist circumference (108). In a study with students, it was found that who had poor sleep quality also had lower mean BMI, upper middle arm circumference, triceps skin fold thickness, waist circumference and hip circumference (15). In a study which evaluated the effects of sleep quality on anthropometric measurements, there was no significant difference found between the BMI values of men and women (55).

When the food preferences of night shift workers were evaluated, shift worker women with poor sleep quality were found to have more variable food choices than shift worker women with good sleep quality. Food choices were based on caffeinated drinks, crackers, biscuits, nuts and seeds mostly. As similar to women, shift worker men with poor sleep quality also had more variable food choices than shift worker men with good sleep quality. Food choices were based on caffeinated beverages, fast food and

pastry, pretzels, pies mostly. In a study which was conducted in Brazil with 3 different shifts, it was found that the night shift workers obtained significantly less energy from bread and more energy from added fats, fruits and vegetables than morning and afternoon shift workers. High energy density foods such as pastries, sweets and sodas contributed a large percentage of the daily energy intake especially for night shift workers (109).

Women working in shifts had a more tired emotional state, while women without shifts felt happy most of the time. While 56% of shift worker women with good sleep quality mentioned that they were happy, and just 24% of shift worker women with poor sleep quality mentioned that they were happy. On the other hand, while 18% of shift worker women with good sleep quality mentioned that they were tired, 49% of shift worker women with poor sleep quality mentioned that they were generally tired.

There was also a significant relationship between non-shift worker women's sleep quality and emotional state. While 59% of non-shift worker women with good sleep quality mentioned that they were happy, 3% were unhappy, 24% were tired and 14% were stressful or thoughtful, non-shift workers with poor sleep quality mentioned that 16% of them were happy, 11% were unhappy , 43% were tired, 19% were stressful and 11% were thoughtful.

When men's relationship between their shift status and emotinal state, there was no significant relationship found. There was also no significant relationship found between emotional state and sleep quality of shift worker and non-shift worker men. No detailed data about shift work, emotional state and sleep quality were reached in literature.

There was a significant relationship between sleep quality and physical activity status of shift-worker women. 48% of physically active shift worker women had good sleep quality and 52% had poor sleep quality. Those who did not have physical activity stated that 17% of them had good sleep quality and 83% had poor sleep quality. Shift worker women participants had significantly better sleep quality. There was no relationship found between sleep quality and physical activity status of women workers without shift, but number of non-shift worker women with poor sleep quality was higher for group that not physically active. But for men, there was no relationship found between sleep quality and physical activity status of men for both shift workers and non-shift workers. In a study with community-dwelling older Spanish women, women

with better physical condition had lower risk of suffering from sleep disturbance by 92% compared to women with lower physical condition (107). Similar to this study results, there was no significant difference found between PSQI and frequency of physical activity according to sexes in a study which evaluateds the effects of sleep quality on anthropometric measurements (55).

The daily stress levels of the participants in this study did not differ between the sleep qualities of the participants. In other words, the average daily stress level of participants with good sleep quality was 5.28 ± 2.60 points, while the daily average stress level of participants with poor sleep quality was close to 5.48 ± 1.92 points.The points seemed higher for participants with poor sleep quality but it was not a significant relationship. In a study which examined the stress and sleep quality of nurses working in different shifts, it was found that nurses working in day-shift were more stressed and had poor sleep quality (110).

To sum up, firstly according to shift status; non-shiftworkers' BMI, weight and waist circumference were significantly higher than shiftworkers' and sex did not affect the relationship in this study. This may be related to higher physical activity levels of shift workers. Literature has different results about these relationships so it was not possible to declare accurate results. In women, it was observed that the mean BMI values decreased and the waist circumference values increased as the shift frequency increased. In men, it was observed that the mean BMI and waist circumference values decreased as the shift frequency increased. Women's BMI and men's both BMI and waist circumference results were not consistent with the literature, the reason may be the lack of detailed information because in this study participants who work as shiftworker more than 3 months were chosen for the study but the exact months or years of working as a shiftworker did not be asked. High stress levels can be affect the weight of individuals, shift workers were more stressed than others and it can be related with high BMI or waist circumference in some point. Also, according to this results shift workers do not have a regular main meal or snack consumption habit. They tended to skip meals. On the other hand, shift workers mentioned thatthey prefered foods with high caloric density. All these results support the literature.

Unless literature has differential results, in this study shift workers found more physically active than others.

Women and men were found mostly happy or tired. Most of the participants' eating habits were influenced by sleeping patterns. However, there was not enough detailed information on how to get affected. Information about little-to-many eating according to sleep patterns could not be obtained from enough people. So that it was not possible to consider results as significant.

Sleep quality was also found to be significantly poor, especially for shift worker women. There are different results in the literature but in this study, participants who were shift workers with poor sleep quality had high waist circumference. The participants who were shift workers with poor sleep quality had higher BMI values. Those with shift work and poor sleep quality had a lower tendency to make main meals and snacks regularly, but there was no significant relationship found between the groups. Much more variable foods were consumed, especially for those with poor sleep quality and food preferences had been found to be unhealthy. It can be linked to the higher levels of BMI. Women working in shifts had more tired emotional state, while women without shifts felt happy most of the time. 52% of physically active women had poor sleep quality. But between physically active or passive women, the passive women mostly have poor sleep quality. But for men, there was no relationship found between sleep quality and physical activity status for both shift workers and non-shift workers. Literature has similar results but it may not be possible to fully assess the relationship between sleep quality and physical activity if activity affects sleep quality or sleep quality affects activity levels and performance, since the hours of physical activity were not asked in the study.

While some results support the literature, some of them found different, because of that more research were needed to present effects of sleep quality and shift-work on BMI, waist circumference and food choices in adults.

6. REFERENCES

1. Jones BE, Kryger ME, Roth T, Dement WC. *Principles and Practice of Sleep Medicine*. Philadelphia: Elsevier; 2005.
2. Gunaydin N. The quality of sleep and effects on general mental health of nurses who works in a state hospital. *J Psychiatr Nurs*. 2014;5(1):33-40. doi:10.5505/phd.2014.63935.
3. Guo X, Zheng L, Wang J. Epidemiological evidence for the link between sleep duration and high blood pressure: a systematic reviewand meta-analysis. *Sleep Med*. 2013;14:324–32.
4. Wang Y, Mei H, Jiang Y. Relationship between duration of sleep and hypertension in adults: a meta-analysis. *J Clin Sleep Med*. 2015;11:1047–56.
5. Cappuccio F, Cooper D, Delia L. Sleep duration predicts cardiovascular outcomes: a systematic review and meta-analysis of prospective studies. *Eur Hear J*. 2011;32:1484–92.
6. Leng Y, Cappuccio F, Wainwright N. Sleep duration and risk of fatal and nonfatal stroke: a prospective study and meta-analysis. *Neurology*. 2015;84:1072–9.
7. Itani O, Jike M, Watanabe N, Kaneita Y. Short sleep duration and health outcomes: a systematic review, meta- analysis, and meta-regression. *Sleep Med*. 2016. doi:10.1016/j.sleep.2016.08.006.
8. Devine JK, Wolf JM. Integrating nap and night-time sleep into sleep patterns reveals differential links to health-relevant outcomes. *J Sleep Res*. 2016;25(2):225-233. doi:10.1111/jsr.12369.
9. Spiegel K, Leproult R, Van Cauter E. Impact of sleep debt on metabolic and endocrine function. *Lancet*. 1999;354(9188):1435-1440. doi:10.1016/S0140-6736(99)01376-8.
10. Crisp A, Stonehill E, Fenton G. An aspect of the biological basis of the mind-body apparatus: the relationship between sleep, nutritional state and mood in disorders of weight. *Psychother Psychosom*. 1970;18:161-175. doi:10.1159/000286075.
11. American Academy of Sleep Medicine. *International Classification of Sleep Disorders 2nd ed.:Diagnostic and Coding Manual*. 2nd ed. Westchester, Illinois:

American Academy of Sleep Medicine; 2005.

12. Suwazono Y, Dochi M, Sakata K, Okubo Y, Oishi M. A longitudinal study on the effect of shift work on weight gain in male Japanese workers. *Obesity*. 2008;16:1887–1893.
13. Lowden A, Moreno C, Holmback U, Lennernas M, Tucker P. Eating and shift work – effects on habits, metabolism and performance. *Scand J Work Env Heal*. 2010;36:150–162.
14. Antunes LC, Levandovski R, Dantas G, Caumo W, Hidalgo MP. Obesity and shift work: Chronobiological aspects. *Nutr Res Rev*. 2010;23(1):155-168. doi:10.1017/S0954422410000016.
15. Türközü D, Aksoydan E. Uyku süresi ve kalitesinin beslenme ve vücut bileşimine etkisi. *Sted*. 2015;24(1):10-17.
16. T.C. Sağlık Bakanlığı. *Türkiye Beslenme Rehberi 2015*. Vol 2015. Ankara: T.C. Sağlık Bakanlığı; 2016.
17. T.C. Sağlık Bakanlığı. *Türkiye'ye Özgü Beslenme Rehberi*.; 2004.
18. Pekcan G. *Beslenme Durumunun Saptanması*. Ankara: T.C. Sağlık Bakanlığı; 2008.
19. Çetin EC. *Yetişkin tüketicilerin besin tercihleri ve sağlıklı beslenmeye yönelik tutumları üzerine cinsiyet faktörünün etkisi.* Ankara, Ankara Üniversitesi, 2007.
20. Frewer LJ, Risvik E, Schifferstein H, eds. *Food, People and Society: A European Perspective of Consumers' Food Choices*. 1st ed. Springer; 2001.
21. World Health Organization. Body mass index - BMI.
22. Samsell L, Regier M, Walton C, Cottrell L. Importance of android/gynoid fat ratio in predicting metabolic and cardiovascular disease risk in normal weight as well as overweight and obese children. 2014;2014. doi:10.1155/2014/846578.
23. Mogul H, Freeman R, Nguyen K, Scherer P. Carbohydrate Modified Diet and Insulin Sensitizers Reduced Android to Gynoid Fat Ratio at 12 Months in EMPOWIR (Enhance the Metabolic Profile of Women with Insulin Resistance): A Double Blind, Placebo Controlled Randomized Trial of Normoglycemic Women wit. In: *Endocrine Society's 98th Annual Meeting and Expo,*. Boston; 2016.
24. World Health Organization. Waist Circumference and Waist-Hip Ratio: Report of a WHO Expert Consultation. *World Heal Organ*. 2008;(December):8-11. doi:10.1038/ejcn.2009.139.

25. Algın Dİ, Akdağ G, Erdinç O. Kaliteli uyku ve uyku bozuklukları. *Osmangazi Tıp Derg*. 2016;38(1):29-34.
26. Le L-A, Preedy VR, Patel VB. *Handbook of Nutrition, Diet and Sleep*. Vol 3.; 2013. doi:doi:10.3920/978-90-8686-763-9.
27. Öge, E. Baykan B. *Nöroloji*. İstanbul.: Nobel Tıp Kitabevleri; 2011.
28. Franko K. Sleep characteristics and sleep deprivation in infants, children and adolescents. In: *WHO Technical Meeting on Sleep and Health.* Bonn, Germany: WHO Regional Office for Europe, European Centre for Environment and Health Bonn Office; 2004:38-61.
29. National Heart Lung and Blood Institute. *Healthy Sleep.* Vol 216.; 1930. doi:10.1016/S0140-6736(01)09093-6.
30. WHO. WHO technical meeting on sleep and health. In: ; 2004:22-24. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:WHO+technical+meeting+on+sleep+and+health#0.
31. TÜİK. Zaman Kullanım Araştırması, 2014-2015. http://www.tuik.gov.tr/PreHaberBultenleri.do?id=18627. Published 2015. Accessed February 25, 2017.
32. Lang C, Brand S, Karina A, Holsboer-trachsler E, Pühse U, Gerber M. Increased self-reported and objectively assessed physical activity predict sleep quality among adolescents. *Physiol Behav*. 2013;120:46-53. doi:10.1016/j.physbeh.2013.07.001.
33. Colten H, Altevogt BBM, Colten. H. *Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem.*; 2006. doi:10.1097/01.CHI.0000270812.55636.3b.
34. Çelik HU. *Biyolojik ritimde uyku alışkanlıkları ile beslenme durumları ve antropometrik ölçümler arasındaki ilişkinin belirlenmesi.* İstanbul, Okan Üniversitesi, 2015.
35. Gupta NK, Mueller WH, Chan W, Meininger JC. Is obesity associated with poor sleep quality in adolescents? *Am J Hum Biol*. 2002;14:762-768. doi:10.1002/ajhb.10093.
36. Beebe DW, Lewin D, Zeller M, et al. Sleep in overweight adolescents : Shorter sleep , poorer sleep quality , sleepiness , and sleep-disordered breathing. *J Pediatr Psychol*. 2007;32(1):69-79.
37. Şenol V, Soyuer F, Akça R, Argün M. Adolesanlarda uyku kalitesi ve etkileyen

faktörler. *Kocatepe Tıp Derg*. 2012;14:93-102.

38. Xu Z, Su H, Zou Y, Chen J. Sleep quality of Chinese adolescents: distribution and its associated factors. *J Paediatr Child Health*. 2011;5:1-8.
39. Wetter DW, Young TB. The relation between cigarette smoking and sleep disturbance. *Prev Med*. 1994;23(3):328-334.
40. Singleton RA, Wolfson AR. Alcohol consumption, sleep, and academic performance among college students. *J Stud Alcohol Drugs*. 2009;70(3):355-363.
41. Vuori I, Urponen H, Hasan J, Partinen M. Epidemiology of exercise effects on sleep. *Acta Physiol Scand*. 1988;574:3-7.
42. Loprinzi PD, Cardinal BJ. Association between objectively-measured physical activity and sleep , NHANES 2005-2006. *Ment Health Phys Act*. 2011;4:65-69. doi:10.1016/j.mhpa.2011.08.001.
43. Youngstedt S, O'Connor P, Dishman R. The effects of acute exercise on sleep: a quantitative synthesis. *Sleep*. 1997;20:203-214.
44. Veqar Z, EjazHussain M. Sleep quality improvement and exercise: A review. *Int J Sci Res Publ*. 2012;8(2):1-8.
45. Şenol V, Soyuer F, Şenol P. Huzurevinde kalan yaşlıların uyku kalitesinin Pittsburg, Epworth ve sabahçıl-akşamcıl anketi ölçekleri ile değerlendirilmesi. *Turkish J Geriatr*. 2013;16(1):60-68.
46. Çalıyurt O. Duygudurum bozuklukları ve biyolojik ritim. *Duygudurum Dizisi*. 2001;5:209-214.
47. Selvi Y, Beşiroğlu L, Aydın A. Kronobiyoloji ve duygudurum bozuklukları. *Psikiyatr Güncel Yaklaşımlar*. 2011;3(3):368-386.
48. Schulz P, Steimer T. Neurobiology of circadian systems. *CNS Drugs*. 2009;2:3-13.
49. Gonnissen HKJ, Hulshof T. Chronobiology ,endocrinology and energy- and food-reward homeostasis. *Obes Rev*. 2013;14:405-416. doi:10.1111/obr.12019.
50. Burns J, Haase E, Yadav G. Circadian rhythms. Salem Press Encyclopedia Of Health. Research Starters, Ipswich, MA. Accessed April 25, 2017.
51. Laposky AD, Bass J, Kohsaka A, Turek FW. Sleep and circadian rhythms: Key components in the regulation of energy metabolism. *FEBS Lett*. 2008;582(1):142-151. doi:10.1016/j.febslet.2007.06.079.
52. Gökçe P. *Gece vardiyasında çalışan hemşirelerde beslenme durumunun saptanması.* İstanbul, Okan Üniversitesi, 2016.

53. Buijs R, van Eden C, Goncharuk V, Kalsbeek A. The biological clock tunes the organs of the body: timing by hormones and the autonomic nervous system. *J Endocrinol*. 2003;177(1):17-26.
54. Korkmaz A, Tamura H. Night-shift , risk of chronic disesases and melatonin rhythm. *TAF Prev Med Bull*. 2008;7(6):529-534.
55. Öçal Ö. *Acıbadem Maslak Hastanesi beslenme ve diyet polikliniğine başvuran yetişkin bireylerde besin tüketiminin Pittsburgh Uyku Kalitesi Ölçeği ile ilişkisi.* Ankara, Başkent Üniversitesi, 2015.
56. Theorell-Haglow J, Berne C, Janson C. Associations between short sleep duration and central obesity in women. *Sleep*. 2010;33:593-598.
57. Horne J. REM sleep, energy balance and "optimal foraging." *Neurosci Biobehav Rev*. 2009;33:466-474.
58. Liu X, Forbes E, Ryan N. Rapid eye movement sleep in relation to overweight in children and adolescents. *Arch Gen Psychiatry*. 2008;65:929-932.
59. Deniz MŞ. *Uyku süresi ile enerji harcaması ve besin alımı arasındaki ilişkinin belirlenmesi.* Ankara, Başkent Üniversitesi, 2014.
60. Choi YS, Jeong YJ, Lee J, et al. Poor-quality sleep is associated with metabolic syndrome in Korean adults. *Tohoku J Exp Med*. 2013;231(4):281-291. doi:10.1620/tjem.231.281.Correspondence.
61. Gonzaga NC, Sena ASS, Coura AS, Dantas FG, Oliveira RC, Medeiros CCM. Sleep quality and metabolic syndrome in overweight or obese children and adolescents. *Rev Nutr*. 2016;29(3):377-389.
62. Roskoden FC, Krüger J, Vogt LJ, et al. Physical activity, energy expenditure, nutritional habits, quality of sleep and stress levels in shift-working health care personnel. *PLoS One*. 2017;12(1):e0169983. doi:10.1371/journal.pone.0169983.
63. Ulhôa MA, Marqueze EC, Burgos LGA, Moreno CRC. Shift work and endocrine disorders.*Int J Endocrinol*.2015; 2015. doi:http://dx.doi.org/10.1155/2015/826249.
64. Knutsson A. Health disorders of shift workers. *Occup Med (Chic Ill)*. 2003;53:103-108. doi:10.1093/occmed/kqg048.
65. Karlsson B, Knutsson A, Lindahl B. Is there an association between shift work and having a metabolic syndrome? Results from a population based study of 27 485 people. *Occup Env Med*. 2001;58:747-752.
66. Bacquer D De, Risseghem M Van, Clays E, Kittel F, Backer G De, Braeckman

L. Rotating shift work and the metabolic syndrome : a prospective study. *Int J Epidemiol*. 2009;38:848-854. doi:10.1093/ije/dyn360.

67. Lucassen EA, de Mutsert R, le Cessie S, et al. Poor sleep quality and later sleep timing are risk factors for osteopenia and sarcopenia in middle-aged men and women: The NEO study. *PLoS One*. 2017;12(5):e0176685. doi:10.1371/journal.pone.0176685.
68. Hui SA, Grandner MA. Associations between poor sleep quality and stages of change of multiple health behaviors among participants of employee wellness program. *Prev Med Reports*. 2015;2:292-299. doi:10.1016/j.pmedr.2015.04.002.
69. Froy O. The relationship between nutrition and circadian rhythms in mammals. *Front Neuroendocrinol*. 2007;28:61-71. doi:10.1016/j.yfrne.2007.03.001.
70. Johnston J. Physiological links between circadian rhythms, metabolism and nutrition.*Exp Physiol 99*. 2014;9:1133-1137. doi:10.1113/expphysiol.2014.078295.
71. Leproult R, Van Cauter E. Role of sleep and sleep loss in hormonal release and metabolism. *Endocr Dev*. 2010;17:11-21.
72. Parvaneh K, Poh BK, Hajifaraji M, Ismail MN. Sleep deprivation is related to obesity and low intake of energy and carbohydrates among working Iranian adults: A cross sectional study. *Asia Pac J Clin Nutr*. 2014;23(1):84-90. doi:10.6133/apjcn.2014.23.1.02.
73. Chaput J. Sleep patterns, diet quality and energy balance. *Physiol Behav*. 2014;134:86-91.
74. Katagiri R, Asakura K, Kobayashi S, Suga H, Sasaki S. Low intake of vegetables, high intake of confectionary, and unhealthy eating habits are associated with poor sleep quality among middle-aged female Japanese workers. *J Occup Health*. 2014;56(5):359-368.
75. Arora T, Taheri S. Associations among late chronotype, body mass index and dietary behaviors in young adolescents. *Int J Obes*. 2015;39(1):39-44. doi:10.1038/ijo.2014.157.
76. Fleig D, Randler C. Association between chronotype and diet in adolescents based on food logs. *Eat Behav*. 2009;10(2):115-118.
77. Peuhkuri K, Sihlova N. Diet promotes sleep duration and quality. *Nutr Res*. 2012;32:309-319.
78. Sato-Mito N, Sasaki S, Murakami K, Okubo H, Takahashi Y, Shibata S. The

midpoint of sleep is associated with dietary intake and dietary behavior among young Japanese women. *Sleep Med*. 2011;12:289-294.

79. Afaghi A, Connor HO, Chow CM. High-glycemic-index carbohydrate meals shorten sleep onset. *Am J Clin Nutr*. 2007;85:426-430.
80. Gezmen Karadağ M, Aksoy M. Uyku regülasyonu ve beslenme. *Göztepe Tıp Derg*. 2009;24(1):9-15.
81. Yehuda S, Rabinovitz S, Mostofsky DI. Essential fatty acids and sleep : mini-review and hypothesis. *Med Hypotheses*. 1998;50:139-145.
82. Lieberman HR. Nutrition , brain function and cognitive performance. *Appetite*. 2003;40:245-254. doi:10.1016/S0195-6663(03)00010-2.
83. Buysse D, Reynolds C, Monk T, Berman S, Kupfer D. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28(2):193-213.
84. Ağargün M, Kara H, Anlar Ö. Pittsburgh Uyku Kalitesi İndeksi'nin geçerliliği ve güvenirliliği. *Türk Psikiyatr Derg*. 1996;7(2):107-115.
85. Üstün Y, Çınar Yücel Ş. Hemşirelerin uyku kalitesinin incelenmesi. *Maltepe Üniversitesi Hemşirelik Bilim ve Sanatı Derg*. 2011;4(1):29-38.
86. Huth JJ, Eliades A, Handwork C, Englehart JL, Messenger J. Shift worked, quality of sleep, and elevated body mass index in pediatric nurses. *J Pediatr Nurs*. 2013;28(6):e64-e73. doi:10.1016/j.pedn.2013.02.032.
87. The Sleep Council. *Sleep Diary*. doi:10.1037/t15896-000.
88. Akıncı E, Orhan FÖ. Sirkadiyen ritim uyku bozuklukları. *Psikiyatr Guncel Yaklasimlar*. 2016;8(2):178-189. doi:10.18863/pgy.81775.
89. Patel SR, Hu FB. Short sleep duration and weight gain: A systematic review. *Obesity*. 2008;16(3):643-653. doi:10.1038/oby.2007.118.
90. Buchvold HV, Pallesen S, Øyane NMF, Bjorvatn B. Associations between night work and BMI, alcohol, smoking, caffeine and exercise--a cross-sectional study. *BMC Public Health*. 2015;15:1112. doi:10.1186/s12889-015-2470-2.
91. Marquezea EC, Lemosa LC, Soaresa N, Lorenzi-Filhob G, Morenoa CRC. Weight gain in relation to night work among nurses. *Work*. 2012;41(SUPPL.1):2043-2048. doi:10.3233/WOR-2012-0429-2043.
92. Kim MJ, Son KH, Park HY, et al. Association between shift work and obesity among female nurses: Korean Nurses' Survey. *BMC Public Health*. 2013;13(1):1204. doi:10.1186/1471-2458-13-1204.

93. Griep RH, Bastos LS, Fonseca M de JM da, et al. Years worked at night and body mass index among registered nurses from eighteen public hospitals in Rio de Janeiro, Brazil. *BMC Health Serv Res*. 2014;14(1):603. doi:10.1186/s12913-014-0603-4.
94. Haus E, Reinberg A, Mauvieux B, Le Floc'h N, Sackett-Lundeen L, Touitou Y. Risk of obesity in male shift workers: A chronophysiological approach. *Chronobiol Int*. 2016;528(July):1-19. doi:10.3109/07420528.2016.1167079.
95. Peplonska B, Bukowska A, Sobala W. Association of rotating night shift work with BMI and abdominal obesity among nurses and midwives. *PLoS One*. 2015;10(7):1-14. doi:10.1371/journal.pone.0133761.
96. Lac G, Chamoux A. Biological and psychological responses to two rapid shiftwork schedules. *Ergonomics*. 2004;47(12):1339-1349.
97. Kivimaki M, Head J, Ferrie JE, et al. Work stress , weight gain and weight loss : evidence for bidirectional effects of job strain on body mass index in the Whitehall II study. *Int J Obes*. 2006;30:982-987. doi:10.1038/sj.ijo.0803229.
98. Özdemir A. *Santral memuru kadınların beslenme durumları üzerine vardiyalı sistemde çalışmanın etkisi.* Ankara, Ankara Üniversitesi, 2006.
99. Nejman M, Gotlib J. Impact of nurses' shift work on their nutrition attitudes. *Pıelęgnıarstwo Pol*. 2017;1(63):13-20.
100. Barbadoro P, Santarelli L, Croce N, et al. Rotating shift-work as an independent risk factor for overweight Italian workers: a cross-sectional study. *PLoS One*. 2013;8(5):1-6. doi:10.1371/journal.pone.0063289.
101. Bonnell EK, Huggins CE, Huggins CT, McCaffrey TA, Palermo C, Bonham MP. Influences on dietary choices during day versus night shift in shift workers: A mixed methods study. *Nutrients*. 2017;9(3):1-13. doi:10.3390/nu9030193.
102. Garcez AS, Canuto R, Paniz VM V, et al. Association between work shift and the practice of physical activity among workers of a poultry processing plant in southern Brazil . *Nutr Hosp*. 2015;31(5):2174-2181. doi:10.3305/nh.2015.31.5.8628.
103. Smith P, Fritschi L, Reid A, Mustard C. The relationship between shift work and body mass index among Canadian nurses. *Appl Nurs Res*. 2013;26(1):24-31. doi:10.1016/j.apnr.2012.10.001.
104. Santa Cecília Silva AA, Lopes T do VC, Teixeira KR, et al. The association between anxiety, hunger, the enjoyment of eating foods and the satiety after food

intake in individuals working a night shift compared with after taking a nocturnal sleep: A prospective and observational study. *Appetite*. 2017;108:255-262. doi:10.1016/j.appet.2016.10.005.

105. Karagözoğlu S, Bingöl N. Sleep quality and job satisfaction of Turkish nurses. *Nurs Outlook*. 2008;56(6):298-307.
106. Fujii H, Miyamoto M, Miyamoto T, Hirata K, Muto T. Relationship between daily meal frequency and subjective sleep quality or daytime sleepiness in Japanese medical students. *Dokkyo J Med Sci*. 2009;36(3):135-142.
107. Moreno-Vecino B, Arija-Blázquez A, Pedrero-Chamizo R, et al. Sleep disturbance, obesity, physical fitness and quality of life in older women: EXERNET study group. *Climacteric*. 2017;7137(June):1-8. doi:10.1080/13697137.2016.1264934.
108. Rahe C, Czira ME, Teismann H, Berger K. Associations between poor sleep quality and different measures of obesity. *Sleep Med*. 2015;16(10):1225-1228. doi:10.1016/j.sleep.2015.05.023.
109. de Assis M, Nahas M, Bellisle F, Kupek E. Meals , snacks and food choices in Brazilian shift workers with high energy expenditure. *J Hum Nutr Diet*. 2003;16:283-289.
110. Da Rocha M, De Martino M. Stress and sleep quality of nurses working different hospital. *Rev ESC Enferm USP*. 2010;44(2):280-6.

7. APPENDICES

ANADOLU
In Affiliation with
JOHNS HOPKINS MEDICINE

Anadolu Eğitim ve Sosyal Yardım Vakfı Sağlık Tesisleri İktisadi İşletmesi
Kanuni Merkez: Fatih Sultan Mehmet Mahallesi, Balkan Caddesi,
No:58 Buyaka AVM. E Blok Tepeüstü, Ümraniye / İstanbul
Büyük Mükellefler V.D. 0680263503
Mersis No Merkez: 0-6802-6350-300011
Mersis No Gebze : 7-1472-2237-6591466

T.C.

ÖZEL ANADOLU SAĞLIK MERKEZİ

ETİK KURULU

Sayı : ASM-EK-16 / 40 **24.11.2016**
Konu : Çalışma İzni Hk.

İLGİLİ MAKAMA,

Yürütücülüğünü Hazal ÇATIRTAN'ın yaptığı "Uyku Düzeni ve Kalitesinin Beden Kitle İndeksi, Bel Çevresi ve Besin Seçimine Etkisinin Değerlendirilmesi" konulu çalışma Etik Kurulumuz tarafından değerlendirilmiştir.

Çalışmanın Özel Anadolu Sağlık Merkezi hastanesinde yürütülmesinde bir sakınca görülmemiştir.

Bilgilerinize arz ederiz.
ASM Hastane Etik Kurulu

Başkan
Prof Dr Fatih Ağalar

Üyeler

Uzm Dr Resmiye Beşikçi

Prof Dr Ayşen Yücel

Prof Dr Hüseyin Baloğlu

Prof Dr Salih Türkoğlu

Prof Dr Cemil Uygur

7.2. Informed Consent

Katılımcının beyanı

Sayın Dyt. Hazal Çatırtan tarafından Anadolu Sağlık Merkezi Hastanesi'nde tıbbi bir anket yapılacağı belirtilerek bu anket ile ilgili bilgiler bana aktarıldı. Bu bilgilerden sonra böyle bir ankete "katılımcı" olarak davet edildim.

Araştırma sonuçlarının eğitim ve bilimsel amaçlarla kullanımı sırasında kişisel bilgilerimin kullanılmayacağı konusunda bana yeterli güven verildi.

Anket için yapılacak harcamalarla ilgili herhangi bir parasal sorumluluk altına girmiyorum. Bana da bir ödeme yapılmayacaktır.

Bu ankete katılmak zorunda değilim ve katılmayabilirim. Katılmam konusunda zorlayıcı bir davranışla karşılaşmış değilim.

Bana yapılan tüm açıklamaları ayrıntılarıyla anlamış bulunmaktayım. Kendi başıma belli bir düşünme süresi sonunda adı geçen bu anket projesinde "katılımcı" olarak yer alma kararını aldım. Bu konuda yapılan daveti büyük bir memnuniyet ve gönüllülük içerisinde kabul ediyorum.

İmzalı bu form kağıdının bir kopyası bana verilecektir.

Katılımcının Adı-soyadı, İmzası, Adresi (varsa telefon no., faks no,...)

Açıklamaları yapan araştırmacının Adı-soyadı, İmzası

7.3. Survey

UYKU KALİTESİ VE VARDİYA SİSTEMİNİN BEDEN KÜTLE İNDEKSİ, BEL ÇEVRESİ VE BESİN SEÇİMİNE ETKİSİNİN DEĞERLENDİRİLMESİ

Aşağıda vereceğiniz bilgiler bilimsel amaçlı kullanılacak ve kimseyle paylaşılmayacaktır.

Anket no:

I. KİŞİSEL BİLGİLER

1. **Adı – Soyadı:**
2. **Cinsiyet** : A) Kadın B) Erkek
3. **Yaş**:……
4. **Ağırlık: ……** Kg
5. **Boy:** ……..cm
6. **BKI:**
7. **Bel ölçüsü:**
8. **Medeni durumunuz nedir?**

A) Evli B) Bekar

9. **Eğitim durumunuz nedir?**

A) Okuma-yazma bilmiyor.
B) Okuma-yazma biliyor.
C) İlköğretim
D) Ortaokul
E) Lise
F) Üniversite
G) Yüksek lisans
H) Diğer …….

10. **Mesleğiniz nedir?**

A) İdari personel
   a. Aşçı
   b. Banka
   c. Garson
   d. Güvenlik
   e. Hasta danışmanı
   f. Temizlik
   g. Posta hizmetleri
   h. Yönetim
   i. Diğer…

B) Sağlık personeli
   a. Doktor
   b. Hasta bakım teknikeri
   c. Hemşire
   d. Diğer…

11. Gece vardiyaya/nöbete kalıyor musunuz?

A) Evet

B) Hayır

Cevabınız "evet" ise sıklık belirtiniz (Hafta/ay bilgisini işaretleyiniz).

Haftada/Ayda …… gün

12. Diyet kısıtlaması gereken kronik bir hastalığınız var mı?

A) Evet

B) Hayır

Cevabınız "evet" ise; aşağıdaki kronik hastalıklardan hangisi var?

A) Diyabet

B) Hipotiroid

C) Hipertiroid

D) Kalp

E) Kanser

F) Böbrek hastalığı

G) Diğer.....

II. ÖĞÜNLERLE İLGİLİ BİLGİLER

13. Ana öğünlerinizi (kahvaltı, öğle yemeği, akşam yemeği) düzenli olarak yapıyor musunuz?

A) Evet (Cevabınız "**evet**" ise 16. soruya geçebilirsiniz.)

B) Hayır

C) Bazen

14. Cevabınız " hayır" veya "bazen" ise hangi öğünü atlarsınız?

A) Kahvaltı

B) Öğle yemeği

C) Akşam yemeği

15.* Öğün atlama sebebiniz nedir? *(Birden fazla şık işaretleyebilirsiniz)

A) İş yoğunluğundan dolayı vakit bulamıyorum.

B) Açlık hissetmediğim için öğün atlıyorum.

C) Bulunduğum yerde kendime uygun yemekler bulamıyorum.

D) 3 ana öğün yapmayı gereksiz görüyorum.

E) Kilo vermek istiyorum.

F) Medyada duyduklarım nedeniyle atlıyorum.

G) Diğer …….

16. Ara öğün yapma alışkanlığınız var mı?

A) Evet

B) Hayır (Cevabınız "**hayır**" ise 18.soruya geçebilirsiniz.)

Cevabınız " evet" ise günde kaç kez ara öğün yapıyorsunuz?

A) 1-2 kez

B) 2-3 kez

C) 3 kez ve daha fazla

17. **Ara öğünlerinizde genellikle neler tüketirsiniz?** ***(Birden fazla seçenek işaretleyebilirsiniz.)***

A) Taze/kuru meyveler
B) Yağlı tohumlar (ceviz, fındık, badem)
C) Süt, yoğurt, ayran
D) Sandviç, tost, galeta, grissini vb.
E) Kraker, bisküvi vb.
F) Poğaça, simit, börek vb.
G) Çikolata, gofret vb.
H) Diğer (lütfen belirtiniz)…….

18. Gece vardiyasında/nöbette kaç öğün tüketiyorsunuz? (**Kalmıyorsanız** 20.soruya geçebilirsiniz.)

A) 1-2
B) 2-3
C) 3ten fazla

19. Gece vardiyasında tükettiğiniz yiyecek - içecekler neler ve nasıl temin ediyorsunuz?

	Kurum veriyor.	**Kendim getiriyorum.**
Fast food (sosisli sandviç vb.)		
Poğaça – simit vb		
Kahvaltı		
Taze/kuru meyveler		
Yağlı tohumlar (ceviz, fındık, badem)		
Süt, yoğurt, ayran		
Kraker, bisküvi vb.		
Çikolata, gofret vb.		
Kahve, çay, kola gibi kafeinli içecekler		
Sandviç, tost, galeta, grissini vb		

III. EGZERSİZ İLE İLGİLİ BİLGİLER

20. Düzenli egzersiz yapıyor musunuz?

A) Evet
B) Hayır (Cevabınız "**hayır**" ise 22.soruya geçebilirsiniz.)

21. Hangi egzersizleri ne sıklıkta ve kaç dakika yapıyorsunuz? (gün/hafta/ay bilgisini işaretleyiniz.)

Yürüyüş/Koşu: ……dk…… gün/hafta/ay
Yüzme: ……dk…… gün/hafta/ay
Bisiklet: ……dk…… gün/hafta/ay

Pilates: ……dk…… gün/hafta/ay
Diğer (belirtiniz:……): ……dk…… gün/hafta/ay

IV. EMOSYONEL DURUMLA İLGİLİ BİLGİLER

22. Kendinizi genel olarak nasıl hissediyorsunuz?

A) Mutlu
B) Mutsuz
C) Yorgun
D) Stresli
E) Düşünceli

23. Duygu durumunuz ile beslenmeniz arasında bir ilişki olduğunu düşünüyor musunuz? <u>Hepsi için belirtiniz.</u>

	Evet az veya çok yerim.	Kararsızım	Hayır değişiklik olmaz.
Mutlu			
Yorgun			
Stresli			
Düşünceli			
Mutsuz			

24. Duygu durumunuz ile uyku düzeniniz arasında bir ilişki olduğunu düşünüyor musunuz? <u>Hepsi için belirtiniz.</u>

	Evet az veya çok uyurum.	Kararsızım	Hayır değişiklik olmaz.
Mutlu			
Yorgun			
Stresli			
Düşünceli			
Mutsuz			

7.4. Pittsburgh Sleep Quality Index

Pittsburgh Uyku Kalitesi İndeksi

1. Geçen ay geceleri genellikle ne zaman yattınız?

.....

2. Geçen ay geceleri uykuya dalmanız genellikle ne kadar zaman (dakika) aldı?

.....dakika

3. Geçen ay sabahları genellikle ne zaman kalktınız?

.....

4. Geçen ay geceleri kaç saat uyudunuz (bu süre yatakta geçirdiğiniz süreden farklı olabilir)?

.....saat (bir gecedeki uyku süresi)

5. Geçen ay aşağıdaki durumlarda belirtilen uyku problemlerini ne sıklıkla yaşadınız?

Haftada	Hiç	1den az	1-2 kez	3ten fazla
30 dakika içinde uykuya dalamadınız				
Gece yarısı veya sabah erkenden uyandınız				
Tuvalete gittiniz				
Rahat bir şekilde nefes alıp veremediniz				
Öksürdünüz veya gürültülü bir şekilde horladınız				
Aşırı derecede üşüdünüz				
Aşırı derecede sıcaklık hissettiniz				
Kötü rüyalar gördünüz				
Ağrı duydunuz				
Diğer nedenler ……				

6. Geçen ay uyumanıza yardımcı olması için ne kadar sıklıkla uyku ilacı (reçeteli veya reçetesiz) aldınız?

a) Hiç
b) Haftada 1'den az
c) Haftada 1 veya 2 kez
d) Haftada 3 veya daha fazla

7. Geçen ay araba sürerken, yemek yerken veya sosyal bir aktivite esnasında ne kadar sıklıkla uyanık kalmakta zorlandınız?

a) Hiç
b) Haftada 1'den az
c) Haftada 1 veya 2 kez
d) Haftada 3 veya daha fazla

8. Geçen ay bu durum işlerinizi yeteri kadar istekle yapmanızda ne derecede problem oluşturdu?

a) Hiç problem oluşturmadı.
b) Yalnızca çok az bir problem oluşturdu.
c) Bir dereceye kadar problem oluşturdu.
d) Çok büyük bir problem oluşturdu.

9. Geçen ay içindeki uyku kalitenizi nasıl değerlendirirsiniz?

a) Çok iyi
b) Oldukça iyi
c) Oldukça kötü
d) Çok kötü

7.5. Sleep Diary

UYKU GÜNLÜĞÜ

	Pazartesi	Salı	Çarşamba	Perşembe	Cuma	Cumartesi	Pazar
Saat kaçta yattınız?							
Saat kaçta uyandınız?							
Ne kadar iyi uyudunuz?							
Gece uyandıysanız hangi saatlerde uyandınız?							
Yatmadan önce en son ne yediniz/içtiniz?							
Günün stres seviyesini 1'den 10'a derecelendirin.							
Yatmadan önce alkol veya ilaç aldıysanız yazın.							

7.6. Cirruculum Vitae

Kişisel Bilgiler

Adı	Hazal	**Soyadı**	ÇATIRTAN
Doğum Yeri	Kadıköy	**Doğum Tarihi**	18.02.1992
Uyruğu	TC	**Telefon**	0535 404 2337
E-mail	catirtanhazal@gmail.com		

Öğrenim Durumu

Derece	**Alan**	**Mezun olduğu kurumun adı**	**Mezuniyet yılı**
Doktora	-	-	-
Yüksek lisans	Beslenme ve Diyetetik	Yeditepe Üniversitesi	2015 - halen
Lisans	Beslenme ve Diyetetik	Yeditepe Üniversitesi	2015
Lise	Fen	Ümraniye Anadolu Lisesi	2010

İş Deneyimi

Görevi	**Kurum**	**Süre (Yıl – Yıl)**
Beslenme ve Diyet Uzmanı	Acıbadem Altunizade Hastanesi	02/2017 - halen
Diyetisyen	Anadolu Sağlık Merkezi	01/2016 – 02/2017

Bilgisayar Bilgisi

Program	**Kullanma Becerisi**
Microsoft Office	İyi
BEBİS	Orta
SPSS	Orta

Yabancı Dil

Yabancı Dil	**Seviye**
İngilizce	Çok iyi
Almanca	Orta