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An Evaluation of Mindful Eating, Sleep Quality and Night Eating Syndrome of Adults

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ABSTRACT:
Purpose: This study aims to investigate the differences that emerged with mindful eating, sleep quality, and night eating syndrome in adults.
Material and Methods: A survey model was used for the study, and it included randomized selected 18-65 aged 580 adults in Konya with a questionnaire consisting of demographic and anthropometric measurements, nutrition habits, Mindful Eating Questionnaire (MEQ-30), Night Eating Questionnaire (NEQ), and Pittsburgh Sleep Quality Index (PSQI).
Results: The mean ($\bar{x}$±SE) of the MEQ-30 was found to be 3.25±0.027 in women and 3.22±0.024 men. Men's emotional eating score is higher than women, and their eating control, awareness, and eating discipline scores are lower than women, eating control (p=0.002) and eating discipline differed (p=0.045) for BMI. Due to the NEQ scores, 59% of those at risk for Night Eating Syndrome (NES) were in women and 41% men. Mood/sleep dysfunction scores differed in gender among other sub-dimensions of NEQ (p=0.044). In PSQI total scores, good (14.06±0.372) (55.3%) and poor (14.22±0.355) (44.7%) sleep quality did not differ (p=0.771). A negative correlation was found between NEQ and MEQ-30 scores (p=0.815) and PSQI and NEQ scores (p=0.195). However, MEQ-30 and the PSQI scores showed significant differences (p=0.000), and the correlation was found to be low (r=0.024).
Conclusion: Mindful eating, and sleep quality scores may be variable according to gender and BMI, it has a relationship between mindful eating and sleep quality, which has not been determined by night eating behaviors. Therefore, it is important to consider that factors be an indicator of maintaining healthy eating habits.
Keywords: *Mindful eating, Sleep quality, Night eating syndrome*

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INTRODUCTION

In recent years, the relationship between sleep and eating behavior has begun to be examined yet. Healthy nutrition behaviors, sleep quality and sleep disorders are relationship with each other (Chaput, 2014; Frank et al., 2017; St-Onge et al., 2016). Sleep quality plays an important role so that feel ready and be more vigorous for a new day. In cases where the sleep quality is qualitatively and quantitatively low, memory loses, health status, working and social life, and mental status can be affected (Briguglio et al., 2020; Navarro-Sanchis et al., 2017; Zhang et al., 2017). Night Eating Syndrome (NES), which is one of the eating behavior disorders seen during the sleep period, may occur due to different causes. NES as a clinical disorder characterized by evening hyperphagia, morning anorexia and insomnia, considering it to cause obesity, especially in obese individuals who are resistant to weight loss (Allison et al., 2010). The incidence of NES is approximately 1.5% in public, but in obese patients' rate was rising to 8.9%, and in eating behavior disorders (e.g., anorexia nervosa and bulimia nervosa) is changed from 9% to 16%. Symptoms for NES is that at least 25% of the daily food consumption occurs after the evening meal, reluctance to eat in the morning or

skipping breakfast 4 or more times a week, and a strong desire to eat during the time between dinner and starting sleep and/or during the night (Cleator et al., 2012; Gwin and Leidy, 2018). Eating behaviors due to genetic variations related to the serotonergic system and circadian rhythm have been shown to be related to sleep, mood, mealtime, and obesity, like NES (Huang et al., 2011; Tzischinsky et al., 2021). The concept of mindfulness has an important role in the examination of nutrition and dietary behaviors. Mindfulness skills may include features such as menu planning, portion control, and body weight management, preventing emotional eating, and stopping excessive food consumption, unlike the most well-known cognitive skills (Framson et al., 2009). Studies (Conversano et al., 2020; Kabat-Zinn, 2015; Masuda and Tully, 2012) mention that mindful eating is beneficial in alleviating the relationship between healthy eating behaviors and eating habits, reducing stress, weight loss and control, obesity and eating behavior disorders. It has also been shown to encourage the obese to improve their psychological and physical health. Mindfulness intervention showed a significantly greater decrease in emotional eating and external feeding; thus, it can effectively reduce the factors associated with problematic eating behavior (Winkens et al., 2018, 2019). Besides emotional regulation, interventions using mindfulness and mindful eating techniques are reported to be effective in reducing depressive symptoms and emotional eating and improving intuitive eating (Czepczor-Bernat et al., 2020). The aim of the study is to find out the relation between sleep quality, NES, and mindful eating in adults.

MATERIAL and METHODS

Purpose and Type of the Study

The purpose of the study is to find out the relation between sleep quality, NES, and mindful eating in adults. The study was designed as a survey model and variables were analyzed descriptively.

Sampling and participant

The sample was calculated in G*Power 3.1.9.2 software program. The program set as 0.15 for the effect size, 0.05 for the margin of error (α) and 0.95 for the power (1-β), and the sample size was calculated 580. Study group has generated by randomized adults residing in Konya, Turkey.

Data Collection Tools

The data were obtained between May and July 2021 with a face-to-face interview questionnaire. Questionnaire consists of 4 sections: (1) demographic and anthropometric measurements, nutrition and eating habits, (2) Mindful Eating Questionnaire (MEQ-30), (3) Night Eating Questionnaire (NEQ), (4) Pittsburgh Sleep Quality Index (PSQI). The questionnaire constitutes with benefit from studies (Agargun et al., 1996; Atasoy et al., 2014; Köse et al., 2017; TDG, 2016; WHO, 2019) and three experts helped finished the questionnaire. First practice conducted on 30 adults and necessary corrections fixed before the sampling. In the first part, demographic characteristics (e.g., age, gender), and nutritional habits (e.g., skipping meal, fast food consumption) and anthropometric measurements such as height (m) and body weight (kg) of adults were taken according to their own self-assessments. Body Mass Index (BMI) was calculated (kg/m^2) and determined by reference to Turkish Dietary Guide (TDG, 2016). In the second part, MEQ-30 was used to measure the mindful eating. The scale includes 7 sub-dimensions. MEQ-30 developed by (Framson et al., 2009) and Turkish validity and adaptation of the scale was done by Kose et al. (2017). Evaluation of the scale was scored forward and reverse with a 5-pointed Likert scale (1 to 5 points). Seven sub-dimensions in the scale are evaluated within themselves, an average of 3 points or more indicates they have it. The Cronbach α of the Turkish-adapted MEQ-30 was found 0.73. In the third part, NEQ assesses NES's behavioral and psychological aspects. In the NEQ, hunger, cravings, calories intake after dinner, insomnia and waking up from sleep, the desire to eat at night, the presence of eating behaviors, and their mood of individuals developed by (Allison et al., 2006) and adapted to Turkish (Atasoy et al., 2014) which consist of 17 items and scored between 0-4 using a 5-pointed Likert scale except for the 7th item. 1., 4. and 14. items were reverse scored. The total NEQ score is between 0-52 points. 15. and 16. items in the questionnaire were not included in the scoring. As a result of the total

NEQ scores, 25 points and below were evaluated "no risk", 25-30 points "risky", and 30 points and above "high risk". PSQI is in the fourth section of questionnaire. Agargun et al. (1996) adapted to Turkish version. PSQI consists of 19 items and 7 sub-dimensions. All items in the scale scored between 0 and 3 points. The sum of the scores of the seven sub-dimensions of sleep quality represents the total PSQI score. Sleep quality of those with a PSQI total score of less than 5 point was considered as "good", and those of 5 point and above were "poor".

Statistical Analysis

Data control was performed to analyze the data obtained from the questionnaires. Incorrectly coded or blanked data were removed using frequency analysis. After they were transferred into the using SPSS 22.0 statistical program. Data were categorized as frequency (n), percentage (%), and mean ($\bar{x}$), standard error of mean (SE) were obtained from descriptive statistics. In addition, advanced analyzes were carried out by using the parametric (e.g., Independent T test, One way ANOVA) for the data. Correlation (*r*) and regression analyzes were also performed to reveal the relationship between the data. Significance level of 0.05 was taken as a criterion for difference.

Ethical Approval

An ethic report exists of numbered 2019/14558 Selcuk University Health Sciences Faculty Ethics Committee of Non-Interventional Clinical Investigations. Adults were not included in the study without consent.

RESULTS

According to the results, it was determined that 48.4% of the adults are women and 51.6% men, and under 25, 25-34, 35-44, 45-54, 55–65-year-old found 29.6%,19.7%, 24.8%, 26%, 15.6, and 9.6%. Primary, secondary, high school, undergraduate and postgraduate education levels 4.3%, 6.5%, 28.6%, 60.6% respectively. The average mean of BMI obtained 24.5±0.280 in women and 25.5±0.260 in men and differed by gender (p=0.013). In total, a great majority was calculated in normal (49.1%) and pre-obese (34.8%) for BMI.

In Table 1, it was represented that significant difference between emotional eating (p=0.000), eating control (p=0.000), awareness (p=0.002) sub-dimensions between gender (p<0.05). Emotional eating score of men's is higher than women, and their eating control, awareness, and eating discipline scores are lower than women. In addition to this result, eating control (p=0.002) and eating discipline (p=0.045) differed in BMI. Accordingly, underweight group higher in eating control scores, on the other hand obese class II was the highest scores in eating discipline between others (p<0.05), but disinhibition, emotional eating, awareness, mindful eating, and interference, at the same time neither gender nor BMI for total score did not (p>0.05).

According to the NEQ scores, 59% of those at risk for NES were women and 41% in men. Mood/sleep dysfunction scores differed in gender among other sub-dimensions of NEQ (p=0.044). Considering the total NEQ score, 93.3% of adults do not have NES risk, while 6.7% have it (p>0.05). The mean of NEQ scores underweight, normal, pre-obese, obese class I and II were found 13.21±1.003, 14.38±0.376, 14.13±0.439, 13.30±0.844, and 13.86±1.612 respectively (p>0.05) (Data not shown). Lent et al. (2022) and Wang et al. (2014) night eating behaviors related to higher BMI; it's clearly targeted to the obesity. Olejniczak et al., (2018) reported that 40.7% of obese women with NES. O'Reardon et al. (2005) and Pinto et al. (2016) found NES incidence is nearly 1.5% all over the population but clinically follow-up overweight patients were 10% to 42%.

Another finding is PSQI scores in total good and poor sleep quality determined 55.3% and 44.7%, respectively, women (25.2%) have a higher poor sleep quality than men (19.5%) and significant difference in gender (p=0.001). On the contrary, sleep quality not differed by BMI (p>0.05). When black tea consumption after at 08:00 pm to go to bed compared with sleep quality compared, 55.0% had good, and 45.0% poor quality (p>0.05). Similar results in coffee consumption in same time, good quality was found 45.7% and poor 54.3% but unlike black tea, coffee consumption affects (p=0.005). This result is directly related to the consumption of caffeinated beverages.

Table 1. MEQ-30 scores of adults (n=580)

MEQ-30		Groups	x̄±SE	p*
Disinhibition	Gender	Women	3.35±0.807	0.327
		Men	3.42±0.796	
	BMI	Underweight	3.71±0.194	0.319
		Normal	3.38±0.047	
		Pre-obese	3.39±0.054	
		Obese Class I	3.35±0.110	
		Obese Class II	3.20±0.261	
Emotional Eating	Gender	Women	3.42±0.611	0.000
		Men	3.75±0.055	
	BMI	Underweight	3.99±0.197	0.121
		Normal	3.51±0.059	
		Pre-obese	3.65±0.072	
		Obese Class I	3.69±0.118	
		Obese Class II	3.42±0.267	
Eating Control	Gender	Women	3.01±0.045	0.000
		Men	2.72±0.039	
	BMI	Underweight	3.18±0.141[a]	0.002
		Normal	2.94±0.040[ab]	
		Pre-obese	2.80±0.053[bc]	
		Obese Class I	2.64±0.107[bc]	
		Obese Class II	2.52±0.190[c]	
Awareness	Gender	Women	3.25±0.032	0.002
		Men	3.11±0.030	
	BMI	Underweight	3.09±0.108	0.823
		Normal	3.17±0.034	
		Pre-obese	3.18±0.034	
		Obese Class I	3.21±0.060	
		Obese Class II	3.18±0.106	
Eating Discipline	Gender	Women	3.08±0.046	0.059
		Men	2.96±0.044	
	BMI	Underweight	2.72±0.129[a]	0.045
		Normal	3.02±0.043[b]	
		Pre-obese	2.99±0.057[b]	
		Obese Class I	2.83±0.111[ab]	
		Obese Class II	3.08±0.205[c]	
Mindful Eating	Gender	Women	2.93±0.030	0.798
		Men	2.92±0.032	
	BMI	Underweight	2.83±0.106	0.612
		Normal	2.90±0.032	
		Pre-obese	2.94±0.037	
		Obese Class I	3.01±0.078	
		Obese Class II	2.93±0.128	
Interference	Gender	Women	3.72±0.047	0.625
		Men	3.68±0.048	
	BMI	Underweight	3.82±0.171	0.079
		Normal	3.68±0.047	
		Pre-obese	3.79±0.057	
		Obese Class I	3.50±0.118	
		Obese Class II	3.43±0.217	
Total Score	Gender	Women	3.25±0.027	0.459
		Men	3.22±0.024	
	BMI	Underweight	3.33±0.084	0.396
		Normal	3.23±0.025	
		Pre-obese	3.26±0.032	
		Obese Class I	3.17±1.063	
		Obese Class II	3.12±0.118	

[a],[b], [ab],[bc],[c] Difference groups obtained from using with Oneway ANOVA-Duncan Test.

Table 2. A comparison of sleep quality and MEQ-30 and NEQ scores (n=580)

MEQ-30	PSQI	x̄±SE	p [a]
Disinhibition	Good	3.47±0.043	0.005
	Poor	3.28±0.051	
Emotional Eating	Good	3.72±0.054	0.000
	Poor	3.43±0.063	
Eating Control	Good	3.65±0.039	0.044
	Poor	3.49±0.046	
Awareness	Good	3.19±0.027	0.455
	Poor	3.15±0.037	
Eating Discipline	Good	3.12±0.042	0.000
	Poor	2.87±0.046	
Mindful Eating	Good	2.97±0.286	0.023
	Poor	2.87±0.351	
Interference	Good	3.72±0.090	0.405
	Poor	3.67±0.100	
Total	Good	3.30±0.023	0.000
	Poor	3.15±0.028	

[a]Independent T Test

NEQ	PSQI	x̄±SE	p [a]
Nocturnal ingestion	Good	4.08±0.235	0.867
	Poor	4.03±0.234	
Evening hyperphagia	Good	4.64±0.112	0.865
	Poor	4.72±0.113	
Morning anorexia	Good	2.28±0.076	0.730
	Poor	2.32±0.080	
Mood/sleep disfunction	Good	3.07±0.146	0.623
	Poor	3.16±0.113	
Total score	Good	14.06±0.372	0.771
	Poor	14.22±0.355	

[a] Independent T Test

Table 3. The relationship between MEQ-30, PSQI, and NEQ total scores

	Independent Variable	B	Std. Error	β	t	p
MEQ-30	PSQI	0.023	0.006	0.156	3.808	0.000[a]
MEQ-30	NEQ	-0.001	0.005	-0.010	-0.234	0.815[b]
PSQI	NEQ	-0.040	0.031	-0.054	-1.299	0.195[c]

[a] F=14.501, p =0.000, R^2=0.024; [b] F=0.904, p=0.815, R^2=0.002; [c] F=1.687, p =0.195, R^2=0.003

MEQ-30 scores differed for the sleep quality in five sub-dimensions and total score (p<0.05) except awareness and interference showed in Table 2. Accordingly, the sub-dimension scores of MEQ-30 with good sleep quality, disinhibition, emotional eating, eating control, eating discipline, and mindful were found to be higher than poor sleep quality. The important thing was that these results overlapped significantly with each other. The total score of MEQ-30 good and poor sleep quality was found 3.30±0.023 and 3.15±0.028, respectively (p=0.000). Adults with good sleep quality have higher mindful eating total scores than with poor sleep quality.

According to Table 3, the linear regression model established between the MEQ-30 score and PSQI score, the difference is significant (p=0.000). Increasing the PSQI score by one unit will increase the MEQ-30 score by β=0.156. On the other hand, other regression models established between the MEQ-30 score and the NEQ total score (p=0.815) and PSQI total score and the NEQ total score (p=0.195) did not. Köse & Tayfur, (2021) emphasized that only emotional eating correlates with sleep duration (p<0.05) but the total MEQ-30 score did not (p>0.05).

DISCUSSION

Many studies (Al-Musharaf, 2020; Kristeller et al., 2014; Modrzejewska et al., 2022) expressed that the factor that differentiates eating motives and behaviors is BMI and they implied higher levels of unhealthy motivations and eating behaviors (e.g., more emotional, and less mindful eating) with excess body weight compared to the healthy body weights in adults. But mindfulness and slow eating techniques are widely recommended for achieving weight loss within behavioral weight management programs, and the role of these eating strategies on energy intake and satiety is controversial (Simonson et al., 2020). Khosravi et al. (2021) reported that 42.9% of adults had poor sleep and habitual sleep

efficiency is the highest parameter of discrimination. Other studies (Asghari et al., 2012; Hinz et al., 2017; Wong and Fielding, 2011) like our results about PSQI scores. Atalıkoğlu Başkan and Güneş (2021) in their studies, the higher total score of PSQI than results and poor sleep quality is 71.6%. In addition, Huang and Zhao (2020) and Xiao et al. (2020) find similar results accordance with us. Watson et al. (2016) and Iranpour et al. (2020)stated shorter sleep is associated with greater caffeine consumption, and that consumption is greater in adults with reduced sleep quality, they overlapped our data. Demirbas et al. (2021) highlighted higher scores in BMI and sub-dimensions in males, obese participants for eating disinhibition, their eating control, eating discipline, and interference scores upper than normal weight. Other studies (Giannopoulou et al., 2020; Grosso et al., 2017; Köse et al., 2017; Köse & Tayfur, 2021) findings like us, but awareness and interference were varied from others and at the same time they announced a relationship between sleep duration and eating attitudes and sleep quality is a vital role of life. When we looked at the PSQI total scores for good (14.06±0.372) and poor (14.22±0.355) sleep, they were close to each other (p=0.771) (Table 2). On the contrary to many MEQ-30 sub-dimension scores, sleep quality did not vary from NEQ (p>0.05). Akdevelioğlu et al. (2020) found similar NEQ scores in accordance with BMI (p>0.05), and sleep quality (p<0.05) compared with our findings (Table 2) and they represented a close correlation between NES to daily nutrient and energy intake of participants. Other studies (Allison et al., 2005; Türközü and Aksoydan, 2015) support our study that no difference between NES and sleep quality. Talley and Shelley-Tremblay, (2020) in their study, mediated emotion regulation with mindfulness had a relationship with sleep quality. Caldwell et al. (2011) reported that increases in mindfulness were significantly correlated with sleep quality. NES is close to obesity-related behaviors in this context, Battles (2018) expressed mindful eating was a unique predictor of eating behaviors like NES.

CONCLUSION

In our study, we tried to evaluate adults in terms of eating mindful eating, sleep quality, and night eating syndrome status and their relations. Ongoing healthy eating behaviors are affected by environmental such (e.g., sleep) and individual factors (e.g., BMI). Mindful eating is a major indicator to change eating behavior during life. Not only to healthy eating behaviors but also to fight and treat nutrition-related non-communicable diseases such as obesity and others. It has been shown in this study, as well as in other studies, that mindfulness in eating behavior is of great importance not only in the consumption of foods, but also in emotion, mood, control, and other hedonic components in shaping and maintaining eating behaviors in individuals. Because it would be more accurate to examine eating behavior from a multidimensional perspective. The fact that mindful eating is closely related to sleep quality shows that sub-dimensions can also be evaluated in this context. However, the interesting part of the study was that while differences in sleep quality were determined, they did not with night eating behaviors. This situation explains the importance of irregular meal patterns and the need to be evaluated within the daily routine of staying awake. It may be suggested to reveal the factors affecting eating awareness with further studies.

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Conflict of Interest

All authors declared no conflict in the study.

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