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Relationship between the compliance of healthy eating index with obsessive compulsive disorder and sleep quality in employees of Ahvaz Water and Power Organization

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ABSTRACT

Usually people spend a significant part of their time at their workplaces with conditions that may reinforce keeping away from healthy behaviors and this can affect their nutrition, sleep quality and obsessive status. The aim of present study was to evaluate the relation between the compliance of healthy eating index with obsessive disorder and sleep quality in employees of Ahvaz Water and Power Organization. A total sample of 340 participants, were recruited from Water and Power Organization of Ahvaz in this observational study. Anthropometric indices were measured based on standard methods. Healthy Eating Index (HEI) was used to assess the quality of diet based on a standard food frequency questionnaire, Pittsburgh Sleep Quality Index (PSQI) questionnaire for sleep quality and Obsessive-Compulsive Inventory-Revised (OCI-R) questionnaire for obsession-Compulsive disorder assessment. Linear regression was used to assess the correlation between HEI with sleep quality and obsessive status. The mean HEI score for the total sample was 55.49±6.09. Also mean score for PSQI and OCD was (7.94±5.53 for PSQI) and (15.10±9.87 for OCI-R), respectively. There were no significant correlations between HEI with sleep quality and OCD ($P < 0.05$). However, the relationship between OCI-R total score with PSQI and gender was significant (OCD was more common in people with poor sleep quality and women). Also, there was a significant association between sleep quality and OCD (subjects with obsessive had poorer sleep quality). The results showed that there were no significant associations between the HEI with sleep quality and OCD in the study population. But participants with OCD had significantly poorer sleep quality and women had significantly higher obsessive scores.

1- Introduction

Usually people spend one third of their time at their workplaces with conditions that may reinforce keeping away from healthy behaviors [1]. An unhealthy lifestyle can result in illness, absenteeism, and low performance of the employees [2], the healthy lifestyle behaviors are self-actualization, health responsibility, exercise, nutrition, interpersonal support and stress management [3]. Highly prevalent health problems related to eating habits, such as obesity, myocardial infarction, stroke and type 2 diabetes mellitus not only affect the elderly population, but also the middle aged adult working population [4]. Furthermore, nutrition related health problems may lead to high rates of absenteeism and decrease employee performance [5-8].

One of approaches to assessing an individual's diet is healthy eating index (HEI), which scores the diet with a set of criteria to produce a composite index of diet quality [9]. The total HEI score provides a picture of overall dietary quality, while the component scores used to calculate the total HEI score, offer an opportunity to study important components of dietary intake [10].

This is reported that the prevalence of mental disorders in Iran in 2010, was 23.6% [11]. Anxiety disorders are the most common psychiatric disorders in the developed world, affecting a quarter of the population during lifetime [12]. The Obsessive–compulsive disorder (OCD) is categorized under the group of anxiety disorders in DSM IV [13]. It is estimated that prevalence of OCD in the population worldwide is 1–3% [14] and in Iran is 1.8% (0.7% and 2.8% in males and females, respectively) [15].

Obsession is defined as an unwanted, intrusive, improper, recurrent, and continual thought, impulse, and/or mental image. Compulsion refers to repetitious behavioral and/or mental activities. Obsessions are usually perceived to be excessive and senseless by the external world and often cause considerable distress to their sufferers. Obsessive-compulsive events usually consume at least an hour of the sufferer's daytime period and cause embarrassment, especially in social, occupational, and other daily situations [13].

Clinical obsessions include the fear of dirt/germs, a yearning for symmetry/certainty, suspicion, sexuality, and a fixation on religion. Thus, compulsions often include rituals focused on cleansing, controlling, arranging, counting, touching, and collecting [16]. Literature review revealed OCD patients had significantly poor quality of life compared to the general population [17-19] .Behavior-related symptoms of OCD include changes in performance, absence, and turnover, as well as changes in eating habits, increasing smoking or consumption of alcohol, rapid speech, fidgeting, and sleep disorders [20].

In particular, sleep disorders are associated with lower job performance, greater absenteeism, and increased use of sick leave [21-24]. Poor sleep quality, including interrupted sleep or non-restorative sleep, is associated with a variety of negative consequences, including health-related problems [25], diminished quality of life [26], and economic costs [27].

To the best of our knowledge, there are no published comprehensive research clarifying relationship of HEI with OCD and sleep pattern. So the aim of current study was conducted to evaluate the relationship between nutritional quality of the employees working in Water and Power Organization of Ahvaz with OCD and sleep pattern and some associated factors. Understanding the relationship between employees' food choices with OCD and sleep pattern will help inform efforts to provide worksite wellness interventions that improve long-term health outcomes and decrease healthcare costs.

2-Materials and method

This cross-sectional, descriptive-analytical study was performed on employees working in the Water and Power Organization of Ahvaz, South-west of Iran, in 2020.

2-1-Participants

The study participants were 819 employees recruited from the Water and Power Organization of Ahvaz, which 340 of them selected through proportional stratified random sampling.
The inclusion criteria were officially employed, male or female between 18 to 60 years old, working in any administrative department for any duration and willing to participate in the study. The exclusion criteria were employees suffering from hypertension, diabetes mellitus and any diseases that can affect their diet.

Data were gathered by 5 questionnaires: food frequency questionnaire (FFQ) and HEI-2015 to evaluate food intake, Pittsburgh Sleep Quality Index (PSQI) to evaluate sleep pattern, Obsessive–Compulsive Inventory-Revised (OCI-R) to evaluate mental health and MET for physical activity.

2-2-Anthropometric measurements

Weight was measured with the least clothing and without shoes with an electronic scale (Type: GLAMOR GBF-830, China) with accurate to 0.1 kg, and height was measured barefoot with a tape meter instrument with accurate to 0.5 cm. Body mass index (BMI) was calculated as body weight in kg divided by the square of height in meters.

2-3-OCD questionnaire

The OCI-R is an 18-item self-reported questionnaire developed to assess the distress associated with obsessions and compulsions. In addition to composite scores of the OCI-R which is the sum of all items, six separate subscale scores are calculated for washing, checking, ordering, obsessing, hoarding and neutralizing symptom clusters. Items are rated on a five-point scale. The total score ranges from 0 to 72, and each subscale score ranges from 0 to 12 [28].

2-4-Sleep quality and quantity assessment

Sleep quality was measured with the Pittsburgh Sleep Quality Index (PSQI). In this self-rated 19-items questionnaire, the first 4 items are open questions and the remaining 15 items are measured on a 4-point Likert scale.

PSQI assesses sleep quantitatively and qualitatively during the previous month and generates 7 component scores (range of each component score, 0-3): sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction. The sum of these 7 component scores yields 1 global score of sleep quality (range, 0-21); higher scores represent more sleep complaints. A global PSQI score greater than 5 distinguishes healthy controls from sleep-disordered patients with a high sensitivity and high specificity [28].

2-5-Food intake and HEI assessment

Dietary intake was assessed by a food frequency questionnaire (FFQ) including 147 items; which is validated in Iran [29]. Dietary data were analyzed by Nutritionist 4 (N4) software and then a 100-point scale, HEI-2015, of the food and nutrient intake of each individual was calculated; this scale is constructed to reflect the evidence-based recommendations of the Dietary Guidelines for Americans (DGA) and to evaluate conformance to these recommendations [9, 30, 31].

The HEI assessment was based on the U.S. Department of Agriculture's 2015 HEI (the instrument is revised every five years). This version of the instrument includes 13 components, nine of which are related to the adequacy of food consumption include : total fruits (5 points), whole fruits (5 points), total vegetables (5 points), greens and beans (5

points), whole grains (5 points), dairy products (10 points), total proteins (5 points), seafood and plant proteins (5 points), and fatty acids) while the other four focus on moderation (refined grains (10 points), sodium (10 points), added sugar (10 points) and saturated fats (10 points)), For the adequacy components, higher intakes result in higher scores (i.e., the higher the dietary components, the healthier the diet), and maximum scores are based upon meeting or exceeding the lowest recommended amount for each food group. For the moderation components, lower intakes result in higher scores (i.e., the lower the dietary components, the healthier the diet), and maximum scores are based upon remaining under or meeting the highest recommended amount for each food group. The scores can be expressed as a percentage of calories (in cases of lower estimated average requirements) or per 1000 calories. The only exception to this is fatty acid, which is scored on the basis of unsaturated/saturated fatty acids. Finally the dietary reference intake values were compared with the recorded intake.

The scores are classified as follows: 50% = low quality diet; 51-80% = diet requiring improvement and ≥81% = good quality diet [31].

2-6-Physical activity assessment

Physical activity measured by metabolic equivalents questionnaire (METs/min) was calculated from the time spent for the nine types of physical activity (sleeping ,passive sitting, active sitting, walking, bicycle riding, gardening , running, standing and playing sports). This MET questionnaire is validated in Iranian population [32].

MET values for each activity were as follows: walking (3 MET), bicycle riding (4 MET), standing (2 MET), running (7.0 MET), playing sports (8.0 MET), sleeping (0.9 MET) and
passive sitting (1 MET), active sitting (1.5 MET). These METs were multiplied by the time spent for each activity, and the sum of these yielded the extent of physical activity, which was expressed as METs/min/day [32].

2-7-Statistical analysis

Dietary data were analyzed by Nutritionist 4 (N4) software. All analyses were carried out using SPSS version 16.0 (SPSS, Inc, Chicago, IL), using descriptive and analytical statistics. Frequency, percentage, mean and standard deviation were used to describe demographic characteristics. The main statistical tests used in the study were linear regression (for correlation between HEI with OCD and sleep quality). To assess differences in characteristics, chi-square test was used for qualitative variables and ANOVA for quantitative variables.

3-Results and discussion

The study sample consisted of 340 subjects including 238 males and 102 females. Seventy percent of the study participants were men, aged 44.26±8.33 years old. On average; the mean age of the women was 42.07±7.02 years old and the majority of them (86.5%) was married. All of subjects had a college degree (95.3% had Bachelor and Master of sciences) and 5.9% of subjects were smokers.

The mean BMI was 26.21±4.04 kg/m2. 37.6% had normal weight and 62.1% of subjects were overweight and obese. The men had a greater physical activity level and waist circumference than did the women (table 1). Characteristics of samples are presented in Table 1.

The mean healthy eating index (HEI) score and the proportion of subjects in each HEI category (good, needs improvement, and poor), are presented in Table 2 for the total sample and by gender. The mean HEI score for the total sample was 55.49±6.09. About 19.7% of the total subjects was classified as having a poor diet, 80.3% of the total subjects was classified as having a need improvement diet and No one classified as having a good diet (table 2).

The total of sleep hours was 6.03 ± 1.25 and the mean total Pittsburgh Sleep Quality Index (PSQI) score was 7.94±5.53. The mean of total OCI-R score was 16.64±9.32 in women and 14.43±10.05 in men (Table 3).

The Regression statistical results showed no significant correlation between OCI-R total score and BMI; HEI; and doing professional sports. We also didn't found any correlations between sleep quality and BMI; HEI; total energy intake and doing professional sports. However the relationship between OCI-R total score and gender (higher in women than men; $P < 0.05$) and PSQI ($P < 0.001$) were significant. OCD was more prevalent in women and participants with OCD had poorer sleep quality. This study is the first to survey dietary intakes, mental health and sleep pattern of a governmental organization personnel at the same time. This cross-sectional study was performed on a group of Ahvaz Water and Power Organization employees.

According to the results of this study, average score of HEI was 55.49, which classified as "need to improve" according to the criterion of Bowman (1998) [31]. Some studies have been conducted on employees` and the range of mean score was not wide.[33-36] Two studies were conducted in Iran; one of them have done in northeastern and HEI mean was 51.43 ± 10.07 (34), another study was done in Baqiyatallah Al-Azam Hospital's female employees
in Tehran (HEI = 64.5±8.1) (36). One study was conducted on primary school employees in Massachusetts and the average HEI was 58 [37].

However, in this research HEI were not associated with obsessive-compulsive disorder; to the best of our knowledge, no study has reported the association of HEI with OCD. But there are studies that show a significant relationship between dietary pattern and anxiety which means more healthy food consumed in the diet (High-quality diet) is directly relevant to better mental health [38-44] and HEI score (diet quality) was poorer in persons with depressive and anxiety disorders [45]. This difference maybe is due to differences in the parameters under study or the community under study. It should be noted that both of these studies used HEI-2010 while the most updated HEI-2015 was used in the current study. It is estimated that sleep disorders affect one-third of the general population, with the prevalence increasing with age [46]. The results of this study about PSQI showed that almost 62.6% (n=213) of the employees report some degree of sleep problems (PSQI < 5). The prevalence of sleep disorders is estimated to be approximately 37% in the general population of Tehran [47]. In the Austrian [48] and Japanese [49] adult population using PSQI this estimate was reported as almost 32%. In Roodbandi., et al's study, 79.6% of the employees of Afzalipoor Hospital, Kerman, Iran had poor sleep quality [50] and in Ghalichi., et al. research, almost 43% of employees working in a health care organization in Tehran have reported some degrees of sleep problems [51]. Therefore, in general, the prevalence of poor sleep quality in Iranian employees is higher than the general population and other countries mentioned, and among these, poor sleep quality in this population is moderate.

According to our study, there was no association between HEI and sleep pattern; Few studies exactly survey the association between PSQI and HEI [52-54] .They conducted in chronic obstructive pulmonary disease patients in Iran [52], students of a college in America [53] and pregnant women in Singapore [54]. They all reported that higher HEI scores were associated with better sleep quality.

Our study showed a clear direct correlation between sleep pattern and OCD; participants with OCD had poorer sleep quality, which is consistent with some studies [55-59].

This study has some limitations. First, most of the data are self-reported measures, not observed. It is somewhat difficult to precisely

ascertain the extent to which statistically significant changes in psycho-social constructs and self-reported behaviors found in this study. Another limitation that could be mentioned in the present study is that the majority of study population were men (70%), so gender differences cannot be appropriately probed. The generalizability is another limitation of the present study since we recruited participants through the convenience sampling method. Although the people referring to this organization might not be representative sample of entire employee population.

Also, we did not investigate possible causes of poor sleep quality and OCD. Also, the consequences of poor sleep quality should be studied. So we could not differentiate acute and chronic problems, or short term and long term consequences of poor sleep quality.

4-Conclusion

In conclusion, the present study indicates that no significant relationships were found between HEI with sleep pattern and OCD; and a significant association was found between OCD with sleep pattern and gender. OCD was more common in people with poor sleep quality and women.

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Table 1: Demographic and anthropometric characteristics of study participants.

	Female	**male**	**Total**
Age (years)	42.07±7.02	44.26±8.33	43.60±8.01
BMI (kg/m2)	25.34±3.29	26.58±4.28	26.21±4.04
waist circumference (cm)	83.84±11.14	94.47±11.58	91.28±12.43
Physical Activity (met/day)	2626.21±719.78	2785.25±579.97	2737.54±628.36

Data are reported as mean±SD
BMI: Body Mass Index

Table 2: Correlation between gender and healthy eating index of participants.

gender	good quality Number (percent)	need improvement Number (percent)	low quality Number (percent)	Total Number (percent)	P-value*
female	0 (0%)	88 (16.3%)	14 (13.7%)	102 (30%)	
male	0 (0%)	185 (47.7%)	53 (22.3%)	238 (70%)	0.28[a]
Total	0 (0%)	273 (80.3%)	67 (19.7%)	340 (100%)	

*p<0.05 was considered statistically significant in regression test

[a]There was no significant difference between gender and healthy eating index score

Table 3: Correlation between sleep quality and obsession with gender of participants

			Total score	P-value*
OCI-R	Female	16.64±9.32	15.10±9.87	0.025[a]
	Male	14.43±10.05		
PSQI	Female	8.85±5.81	7.94±5.53	0.228[b]
	Male	7.55±5.37		

*p<0.05 was considered statistically significant in regression test

Data are reported as mean±SD
OCI-R: Obsessive Compulsive Inventory - Revised

PSQI: Pittsburgh Sleep Quality Index

[a]There was a significant difference between obsession and gender

[b]There was no significant difference between sleep quality and gender

Table 4: Correlation between obsession and sleep quality with compliance of Healthy Eating Index

Quartiles of score of HEI	Q1(n=85)	Q2(n=85)	Q3(n=85)	Q4(n=85)	P-value
PSQI (mean±SD)	7.57±5.00	8.21±6.00	7.83±5.47	8.14±5.68	0.841[a]
OCD (mean±SD)	14.61±10.03	16.74±9.57	14.12±10.10	14.91±9.76	0.335[b]

*$p<0.05$ was considered statistically significant in ANOVA test

Q_{1-4}: Quartiles of HEI

OCI-R: Obsessive Compulsive Inventory - Revised

PSQI: Pittsburgh Sleep Quality Index

[a]There was no significant difference between sleep quality and healthy eating index score

[b]There was no significant difference between obsession and healthy eating index score

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ارتباط بین امتیاز پیروی از شاخص تغذیه سالم با اختلال وسواس فکری اجباری و کیفیت خواب در کارکنان سازمان آب و برق اهواز

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چکیده

معمولاً افراد بخش قابل توجهی از زمان خود را در محل کار خود با شرایطی می گذرانند که ممکن است دوری از رفتارهای تغذیه ای سالم را تقویت کند و این امر می‌تواند بر تغذیه، کیفیت خواب و وضعیت وسواسی آن‌ها تأثیر بگذارد. هدف پژوهش حاضر بررسی رابطه بین میزان پیروی از شاخص تغذیه سالم با اختلال وسواس جبری و کیفیت خواب در کارکنان سازمان آب و برق اهواز است. در این مطالعه مشاهده‌ای، تعداد ۳۴۰ شرکت کننده از سازمان آب و برق اهواز انتخاب شدند. شاخص‌های آنتروپومتریک بر اساس روش‌های استاندارد اندازه‌گیری شد. از شاخص تغذیه سالم (HEI) برای ارزیابی کیفیت رژیم غذایی بر اساس پرسشنامه استاندارد بسامد غذا (FFQ)، پرسشنامه شاخص کیفیت خواب پیتزبورگ (PSQI) برای کیفیت خواب و پرسشنامه وسواس-اجباری-بازبینی شده (OCI-R) برای وسواس-اجباری استفاده شد. برای ارزیابی همبستگی بین HEI با کیفیت خواب و وضعیت وسواس از رگرسیون خطی استفاده شد. میانگین نمره HEI برای کل نمونه ۵۵/۴۹±۶/۰۹ بود. همچنین میانگین امتیاز برای PSQI وOCD، ۷/۹۴±۵/۵۳ و ۱۵/۱۰±۹/۸۷ بود. بین HEI با کیفیت خواب و OCDهمبستگی معنی‌داری وجود نداشت (P<۰/۰۵). با این حال، ارتباط بین نمره کل OCI-R با PSQI و جنسیت، معنی‌دار بود (OCD در افراد با کیفیت خواب ضعیف و زنان شایع‌تر بود). همچنین بین کیفیت خواب و OCD ارتباط معنی داری وجود داشت (افراد مبتلا به وسواس جبری، کیفیت خواب ضعیف تری داشتند). نتایج نشان داد که هیچ ارتباط معناداری بین HEI با کیفیت خواب و OCD در جمعیت مورد مطالعه وجود ندارد. اما شرکت کنندگان مبتلا به OCD به طور قابل توجهی کیفیت خواب ضعیف تری داشتند و زنان به طور قابل توجهی نمرات وسواسی بالاتری دریافت نمودند.