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THE RELATIONSHIP OF SLEEP QUALITY AND SLEEP DURATION WITH CORONARY ARTERY DISEASE

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Summary

In this study, it was aimed to determine whether there is a statistically significant difference of sleep duration and sleep quality between non-CAD individuals from general population and patients admitted in a third stage cardiology clinic with a diagnosis of CAD. This observational, descriptive study was carried out between January 1, 2018 and March 31, 2018 with 150 non-CAD people from general population, and 150 patients with CAD diagnosis admitted in a cardiology clinic. People under 18 years of age and those with sleep apnea syndrome, or other significant medical conditions leading to sleep disturbance were excluded from the study. A questionnaire of socio-demographic characteristics and of the Pittsburgh Sleep Quality Scale (PSQS) was applied to the participating patients and control group by face-to-face interview method. Pittsburgh Sleep Quality Index (PSQI) and total sleep duration were determined according to the responses to the questions in the PSQS. Differences between the groups were investigated. In the study, the mean duration of sleep (hours) in the group with CAD, DM, HT, and HLwas found to be statistically significantly lower than the non-CAD group. The mean total score of PSQS in the group with CAD, DM, HT, and HLwas found to be statistically significantly higher than non-CAD group. No statistically significant difference was observed between the mean duration of sleep and averages of PSQS total points of the smoking and non-smoking groups. Sleep quality and duration of sleep were found to be significantly associated with diseases such as CAD, cardiovascular heart diseases and their risk factors such as DM, HT, HL. In this context, it is possible to determine the sleep quality and the duration of sleep easily in the outpatient clinic conditions using the PSQS in the practice of family medicine application. By specifying the measures to be taken in this direction, appropriate counselling services can be provided for people at risk.

Keywords: *coronary artery disease, sleep duration, sleep quality, Pittsburgh Sleep Quality Scale*

Rezumat

Relația calității și duratei somnului cu boala ischemică coronariană

Scopul acestui studiu a fost de a stabili dacă există o diferență statistic semnificativă între durata și calitatea somnului la indivizii care nu suferă de boală ischemică coronariană (BIC) din populația generală și la pacienții internați într-o clinică de cardiologie de nivelul trei cu un diagnostic de BIC. Acest studiu observațional, descriptiv a fost efectuat în perioada 1 ianuarie 2018 – 31 martie 2018, incluzând 150 de persoane din populația generală care nu au BIC și 150 de pacienți cu diagnostic de BIC, internați într-o clinică de cardiologie. Au fost excluse din studiu persoanele sub 18 ani și cele cu sindrom de apnee în somn sau cu alte afecțiuni medicale semnificative, care conduc la tulburări de somn. Un chestionar cu privire la caracteristicile sociodemografice și la scala Pittsburgh de calitate a somnului (PSQS) a fost aplicat pacienților-participanți și grupului de control prin metoda interviului față în față. Indicele Pittsburgh al calității somnului (PSQI) și durata totală a somnului au fost determinate în funcție de răspunsurile la întrebările din PSQS. Au fost evaluate diferențele dintre grupuri. În studiu, durata medie a somnului (ore) în grupul cu BIC, diabet zaharat (DZ), hipertensiune arterială (HTA) și hiperlipidemie (HL) a fost considerată statistic semnificativ mai mică decât în grupul fără BIC. Scorul mediu total al PSQS din grupul cu BIC, DZ, HTA și HL a fost constatat statistic semnificativ mai mare decât în grupul fără BIC. Nu a fost observată nicio diferență semnificativă statistic între durata medie a somnului și mediile punctelor totale PSQS la cei care fumează și la nefumători. S-a constatat că durata și calitatea somnului sunt asociate în mod semnificativ cu boli precum BIC, maladii cardiovasculare și factorii de risc ai acestora, cum ar fi DM, HTA, HL. În acest context, este posibil să se determine cu ușurință calitatea somnului și durata somnului în condiții de ambulatoriu, folosind aplicația PSQS în practica medicinei de familie. Precizând măsurile care trebuie luate în această direcție, se pot oferi servicii de consiliere adecvate pentru persoanele cu risc.

Cuvinte-cheie*: boală ischemică coronariană, durata somnului, calitatea somnului, scala Pittsburgh de calitate a somnului*

Резюме

Взаимосвязь качества и длительности сна с заболеваниями коронарных артерий

Исследование было направлено на определение статистически значимых различий продолжительности и качества сна между лицами, не страдающими ишемической болезнью сердца (ИБС) из общего населения, и пациентами, поступившими в кардиологическую клинику третьего уровня с диагнозом ИБС. Это описательное исследование, основанное на наблюдении, было проведено в период с 1 января 2018 года по 31 марта 2018 года с участием 150 человек из общей популяции, не имеющих ИБС, и 150 пациентов с диагнозом ИБС, поступивших в кардиологическую клинику. Люди в возрасте до 18 лет и лица с синдромом апноэ во сне или другими серьезными заболеваниями, приводящими к

нарушению сна, были исключены из исследования. Вопросник социально-демографических характеристик и Питтсбургской шкалы качества сна (PSQS) был применен к участвующим пациентам и контрольной группе методом очного интервью. Питтсбургский индекс качества сна (PSQI) и общая продолжительность сна были определены в соответствии с ответами на вопросы в PSQS. Были исследованы различия между группами. В исследовании средняя продолжительность сна (часы) в группе с ИБС, сахарным диабетом (СД), артериальной гипертензией (АГ) и гиперлипидемией (ГЛ) была статистически значимо ниже, чем в группе без ИБС. Средний общий балл PSQS в группе с ИБС, СД, АГ и ГЛ был статистически достоверно выше, чем в группе без ИБС. Статистически значимых различий между средней продолжительностью сна и средними значениями общего количества баллов PSQS в группах среди курящих и некурящих не наблюдалось. Было установлено, что качество и продолжительность сна в значительной степени связаны с такими заболеваниями, как ИБС, сердечно-сосудистые заболевания и такими факторами риска, как СД, АГ, ГЛ. В этом контексте можно легко определить качество сна и продолжительность сна в условиях поликлиники, используя PSQS в практике семейной медицины. Определив меры, которые необходимо предпринять в этом направлении, людям, подверженным риску, могут быть предоставлены соответствующие консультативные услуги.

Ключевые слова: *ишемическая болезнь сердца, продолжительность сна, качество сна, Питтсбургская шкала качества сна*

Introduction

Today, cardiovascular diseases (CVDs) are still the leading cause of death both, in the world and Turkey. In the Turkish Adult Risk Factor (TARF) cohort study (1990-2016), coronary heart disease (CHD) has been reported to be the leading cause of death with the rate of 42% which is followed by cancer (24%), other causes (traffic accident, violence, suicide, pulmonary heart disease, diabetes mellitus (DM), chronic renal failure (CRF), Alzheimer's disease, etc.) (22%), and cerebrovascular diseases (CVD) (12%), respectively. Turkey ranks first for women and second for men after Latvia considering the CHD-related mortality rates in the age group of 45–74 among the European countries with high coronary artery disease (CAD) mortality rates [1].

Age (≥45 in men and ≥55 or early menopause in women), family history, smoking, hypertension (HT) (blood pressure of ≥140/90 or use of antihypertensive medication), hypercholesterolemia (total cholesterol of ≥200, low-density lipoprotein [LDL]-cholesterol of ≥130), low high-density lipoprotein (HDL)-cholesterol (<40 mg/dL), and DM can be listed as the most important risk factors for CHD [2]. The underlying causes of CVD, which have become epidemic all over the world, are atherogenesis and typically accompanying thrombosis [3]. The concept of risk factors for CVD is supported by an independent study [4].

Sleep is a state of inactivity that allows the organism to rest, which is also a regeneration process that re-prepares the entire body for life. It is among the most basic and inevitable daily life activities affecting the quality of life and general health of people and has physiological, psychological and social dimensions [5]. Factors affecting sleep include age [6], gender [7], health status (presence of any disease) [8], caffeine [9] and nicotine [10] consumption, alcohol use [11], exercise [12], drug use [13], diet, lifestyle [14] and environmental factors. Sleep quality includes both quantitative parameters such as sleep duration, latency, and number of awakenings and qualitative parameters such as sleep depth and sleep comfort. Sleep quality and sleep time can lead to CAD directly or indirectly by causing risk factors for CAD.

The aim of this study was to investigate any possible statistically significant difference between patients with CAD and healthy individuals in terms of sleep duration and sleep quality.

Material and method

This observational descriptive study included a total of 150 patients who were admitted to the Cardiology Clinic or Coronary Intensive Care Unit of Republic of Turkey Ministry of Health University of Health Sciences Istanbul Bağcılar Health Application and Research Center (SUAM) due to any CAD diagnosis between January 1, 2018 and March 31, 2018. This study was approved by the ethics committee of Republic of Turkey Ministry of Health University of Health Sciences Istanbul Bağcılar SUAM on February 2, 2018 with the decision no. 2018.02.1.02.015. Patients under the age of 18 and those who diagnosed with sleep apnoea syndrome or had other medical causes leading to sleep disturbance were excluded from the study. The control group consisted of 150 individuals from the general population who were over 18 years of age and had no sleep apnoea syndrome, CAD, and other medical causes leading to sleep disturbance.

A questionnaire consisting of the Pittsburgh Sleep Quality Index (PSQI) and questions about socio-demographic characteristics was applied to all

patients and healthy individuals who participated in the study through a face-to-face interview method. Socio-demographic characteristics, age, gender, sociocultural status, socioeconomic status, marital status, presence of CAD, family history of CAD, history of DM, HT or hyperlipidemia (HL), smoking history, and the number of cigarettes smoked per day for those with a smoking history were recorded for all patients and healthy individuals. Total sleep time (TST) and PSQI score were determined according to the answers given to the questions in the PSQI. The PSQI components, which were subjective sleep quality (component 1), sleep latency (component 2), sleep duration (component 3), sleep efficiency (component 4), sleep disturbance (component 5), use of sleep medications (component 6), and daytime dysfunction (component 7), were calculated for both groups separately. Patients with PSQI>5 were considered to have poor sleep quality and those with a daily total sleep time of <6 hours were considered to have a low sleep duration.

Statistical analysis was performed using Number Cruncher Statistical System (NCSS) 2007 Statistical Software. Descriptive data were expressed as mean, standard deviation, frequency, and percentage distribution. Shapiro-Wilk test was used to check the normality of variables. Independent t-test was used for the pairwise comparison of variables that were normally distributed whereas Mann Whitney U test was used for the pairwise comparison of variables that were not normally distributed. Qualitative data were compared by using the chi-square test. Among the factors affecting CAD, logistic regression analysis was performed to determine PSQI and TST levels. A p value of <0.05 was considered statistically significant.

Results

Socio-demographic characteristics of groups and the significance levels are shown in the table at the end of the article.

Evaluation of study data in terms of sleep quality showed that the mean sleep duration (hours) was significantly lower in patients with CAD compared to the control group (p=0.0001). All of the seven components in the PSQI were found to be significantly higher in patients with CAD compared to the control group. Total mean PSQI scores of CAD patients were found to be significantly higher than the control group (p=0.0001).

The mean sleep duration (hours) was found to be significantly lower in patients with DM compared to those without DM (p=0.0001). All of the seven components in the PSQI were found to be significantly higher in patients with DM compared to those without DM. The total mean PSQI scores were found to be significantly higher in patients with DM compared to those without DM (p=0.0001).

The mean sleep duration (hours) was found to be significantly lower in patients with HT compared to those without HT (p=0.0001). All of the seven components in the PSQI were found to be significantly higher in patients with HT compared to those without HT. The total mean PSQI scores were found to be significantly higher in patients with HT compared to those without HT (p=0.0001).

The mean sleep duration (hours) was found to be significantly lower in patients with HL compared to those without HL (p=0.0001). The first six components of the PSQI were found to be significantly higher in patients with HL compared to those without HL. The total mean PSQI scores were found to be significantly higher in patients with HL compared to those without HL (p=0.0001).

Discussion

The incidence and prevalence of CHD increases with age (3) and men older than 45 years of age and women older than 55 years of age have a much higher CHD risk compared to others (4). In the present study, the number of individuals aged 55–64 years, 65–79 years, and >80 years was found to be significantly higher in the CAD group compared to the control group (p=0.0001).

In the study, the number of male patients in the CAD group was found to be significantly higher than in control group (p=0.0001). Men are more likely to develop atherosclerosis than women if other risk factors are equal. Women are protected against advanced atherosclerosis causing disease until menopause. Myocardial infarction is rare in women in the perimenopause period unless predisposing conditions such as diabetes, HL or severe HT are present [15].

In the present study, the number of high school and university graduates in the CAD group was significantly lower than the control group (p=0.0001). There are studies in the literature that are compatible with our results. In a study by Falkstedt et al. [16], the relative risk of CHD has been reported to increase as the education level decreases among Swedish men. In another study by Gudmundsson et al. (1995) of Icelandic individuals, all the risk factors for CHD have been found

to increase in both genders among individuals with low education level. Gonzalez et al. [17] reported a negative correlation between education level and risk of ischemic heart disease. The findings reported by Tillmann et al. [18] support that higher education level is associated with a lower CHD risk.

In the present study, low socioeconomic status has been shown to be associated with CAD. Studies in the literature have shown that risk factors for CHD including obesity, DM, HT, and poor lipid profile increase in connection with diet in individuals with low socioeconomic status. L. Navalpotro et al. [19] has reported that the prevalence of obesity is higher in regions with low socioeconomic status. WM. Hoang et al. [21] found in their study that low and moderate socioeconomic status were important risk factors for the development of systemic HT in women. Similarly, in a study by Clark et al. [21], low socioeconomic status has been shown to be associated with great increases in CVD risk in both men and women. Z. Yu et al. [22] has reported that the prevalence of risk factors for CVD is higher in individuals with low socioeconomic status and the relationship between socioeconomic status and CVD has been further reported to be more consistent in women than in men.

The number of single patients in the CAD group was significantly lower than the control group in the present study (p=0.0001). However, there are many studies in the literature showing that CAD and CAD-related mortality and morbidity are lower in married individuals [23, 24, 25]. The reason for the different results in the present study may be attributed to the fact that the number of samples is limited and the distribution of risk factors for CAD between age groups is different.

In the Adult Treatment Panel III (ATP III) guidelines published by National Cholesterol Education Program (NCEP) in 2001 and Coronary Heart Disease Prevention and Treatment Guidelines published by Turkish Society of Cardiology in 2002, risk factors for CAD have been reported to be HT, DM, HL, and family history of CAD [2, 26]. The results obtained from this study are compatible with both the NCEP ATP III guideline and information in the guideline published by the Turkish Society of Cardiology.

There was a significant difference between individuals with and without CAD in terms of both sleep duration and sleep quality (p<0.0001). In a meta-analysis by D. Wang et al. [27], a significant correlation was found between short and long sleep duration and increased risk of CHD. Compared to patients who slept seven hours a day, the CHD risk was reported to increase by 7% increase with every additional hour of sleep and by 11% with every hour by which sleep duration was reduced [27]. T. Chandola et al. [28] reported that short sleep duration (≤6 hours) significantly increased the risk of CHD among participants who reported sleep disturbances and they further reported that there was little evidence that short sleep duration increased CHD risk among participants who did not report any sleep disturbance. In a study by X.Q. Lao et al. [29], a positive correlation was reported between CHD risk and both short sleep duration and poor sleep quality. M Sharma et al. [30] found an independent correlation between CAD and both short sleep duration (<6 hours) and poor sleep quality (PSQI>5). A positive correlation between CAD and short sleep duration (<6 hours) and poor sleep quality (PSQI>5) was reported in Indian adults and short sleep duration and poor sleep quality were reported to be important modifiable risk factors for CAD in the Indian population [30]. In the present study, a significant difference was found between patients with and without DM in terms of both sleep duration and sleep quality (p<0.0001). Similar findings are available in the literature [31, 32, 33, 34].

We found a significant difference between patients with and without HT in terms of both sleep duration and sleep quality (p<0.0001). The mean sleep duration (hours) was found to be significantly lower in patients with HT compared to those without HT (p=0.0001). Studies in the literature support the findings of the present study [35, 36, 37].

Conclusion

Considering the study data and literature review, sleep duration and sleep quality can be said to have a significant correlation with CAD and risk factors for CAD such as DM, HT, and HL. Furthermore, sleep quality and duration are thought to be poorer in individuals with such diseases.

One of the aims of Family Medicine both all over the world and in Turkey is to reduce the incidence of diseases such as CVD, CAD, DM, HT, and HL and to prevent the costs related to these diseases. Family Physicians can apply PSQI to the population dependent to them as a preventive medicine and easily obtain information about their patients' sleep quality and sleep duration.

Socio-demographic characteristics of the individuals included in the study and statistical significance levels

Parameters	*Items*	*CAD (-) (n=150)*		*CAD (+) (n=150)*		*p*
Age	18–44 Years	116	77.33%	12	8.00%	0.0001
	45–54 Years	24	16.00%	36	24.00%	
	55–64 Years	6	4.00%	40	26.67%	
	65–79 Years	4	2.67%	58	38.67%	
	>80 Years	0	0.00%	4	2.67%	
Gender	Male	59	39.33%	98	65.33%	0.0001
	Female	91	60.67%	52	34.67%	
Sociocultural status	Literacy	5	3.33%	32	21.33%	0.0001
	Primary education	53	35.33%	95	63.33%	
	High school	34	22.67%	19	12.67%	
	University graduate	58	38.67%	4	2.67%	
Socioeconomic status	<TRY 1,500.00	56	37.33%	104	69.33%	0.0001
	TRY 1,501.00–3,000.00	39	26.00%	41	27.33%	
	TRY 3,001.00–5,000.00	38	25.33%	5	3.33%	
	TRY 5,001.00–7,500.00	9	6.00%	0	0.00%	
	>TRY 7,500.00	8	5.33%	0	0.00%	
Marital status	Married	92	61.33%	144	96.00%	0.0001
	Single	57	38.00%	3	2.00%	
	Divorced-Widow	1	0.67%	3	2.00%	
Family history	No	90	60.00%	55	36.67%	0.0001
	Yes	60	40.00%	95	63.33%	
Diabetes mellitus	No	141	94.00%	88	58.67%	0.0001
	Yes	9	6.00%	62	41.33%	
Hypertension	No	139	92.67%	57	38.00%	0.0001
	Yes	11	7.33%	93	62.00%	
Hyperlipidemia	No	137	91.33%	85	56.67%	0.0001
	Yes	13	8.67%	65	43.33%	
Cigarette smoking	No	102	68.00%	90	60.00%	0.149
	Yes	48	32.00%	60	40.00%	
Number of cigarettes	Non-smoker	102	68.00%	90	60.00%	0.025
	1 small package/day	22	14.67%	17	11.33%	
	1 package or 2 packages/day	26	17.33%	37	24.67%	
	2 large packages/day	0	0.00%	6	4.00%	

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