Original Article

Subjective Sleep Quality in Urban Population

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Abstract

Background: Sleep disturbances are common among adult populations and can have a significant effect on daytime activities. The aim of this study is to determine the prevalence of sleep problems and subjective sleep quality in the adult population of Tehran, Iran.

Methods: From an urban community of Tehran, a random sample of 3400 adult men and women were selected by a cross-sectional design. Using the Persian version of the Pittsburgh Sleep Quality Index (PSQI), subjects were interviewed face-to-face. There were 3114 completed questionnaires returned and analyzed.

Results: The mean age of the subjects was 43.57 (± SD 17.5) years. Overall 37% (95% CI: 35–39) of the population were categorized as poor sleepers. The PSQI > 5 showed 27% were males versus 35% among females. The global PSQI scores ranged from 4.20 ± 2.67 to 5.60 ± 3.74 for males and 5.03 ± 3.00 to 7.97 ± 4.31 for females by age groups. The difference across age groups for global PSQI score was significant in females ($P < 0.01$).

Conclusion: The prevalence rate of sleep complaints in this population-based study was high. Females, older adults, widows and separated couple were the most important risk factors for sleep disturbances.

Keywords: Pittsburgh Sleep Quality Index (PSQI), sleep disorders, subjective sleep quality

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Introduction

Sleep difficulties represent a common problem among the adult population. It has been shown that, in different countries, between 10% to 40% of the population suffer from insomnia.[1–5] The wide estimates of prevalence can be explained by the characteristics of the sampled population, the definition of insomnia, the use of different methods, and different perceptions of sleep disorders.

Sleep disturbances can have a huge effect on a patient's quality of life and daily function. Excessive daytime sleepiness (EDS) and its association with increased road traffic accidents is one of the most important complications of sleep disturbances.[6] It is shown that about 30% of road accidents are related to sleep disorders.[7]

The Pittsburg Sleep Quality Index (PSQI) is an effective instrument used to measure the quality and patterns of sleep in adults. The PSQI has a good internal consistency with a reliability coefficient (Cronbach's alpha) of 0.83 for its seven components. The PSQI is a subjective measure of sleep and can be used to subjectively screen sleep disturbances.[8]

The evaluation of sleep quality in the general population is useful as a reference point for clinicians and researchers to compare their findings, and to compare the epidemiologic findings across studies.

Nowadays, the general population is more concerned with sleep quality and quality of life. Zeitlhofer et al. have shown in their study that quality of sleep could be used as a screening method in the exploration of quality of life.[9]

The aim of this study was to determine the prevalence of sleep problems and subjective sleep quality using the Persian version of PSQI in the adult population of Tehran, Iran.

Materials and Methods

From May 2008 to February 2009, 3114 subjects were studied using a cross-sectional study. The targeted population consisted of urban people age 18 years or older who resided in Tehran, Iran. We used a multistage random sampling strategy for collecting subjects. The 22 municipal districts were considered as clusters in the sampling process. Our aim was to estimate the prevalence of any subscale of sleep disorders with an estimation of at least 10%. For a 95% confidence interval (CI), precision of 0.013, and design effect of 1.5, the sample size was estimated to be approximately 3400. From this, 3114 people responded (91%). Based on the proportion of population in each district, between 1 to 14 clusters were selected.

A total of 140 clusters were randomly selected based on postal codes. For each cluster, a team of two trained interviewers (one male and one female) approached the index household, which was specified through the aforementioned random selection of clusters, and continued the enumeration in 24 to 25 neighbor households in a systematic manner by proceeding in a clock-wise direction.

We used the Persian version of PSQI. The reliability and validity of this questionnaire was studied by Shahidi et al. The internal consistency of the Persian version of PSQI was reported as good (Cronbach's alpha = 0.73).[10]

The PSQI is composed of seven clinically derived components of sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, daytime dysfunction, and sedative medication use,

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Table 1. Age and sex characteristics of participants compared with the Tehran population.

Characteristics	Tehran population (%)	Participants (%)
Age groups (years)		
18–24	1561924 (25.3)	539 (17.4)
25–34	1554670 (25.2)	585 (18.9)
35–44	1205296 (19.5)	555 (17.9)
45–54	884701 (14.3)	541 (17.5)
55–64	500954 (8.1)	417 (13.5)
65–74	293516 (4.8)	290 (9.4)
75–99	162412 (2.7)	167 (5.4)
Sex*		
Male	3146999 (51.0)	1409 (45.5)
Female	3026683 (49.0)	1685 (54.5)
*18 years and older		

Table 2. Subjective sleep quality scores (mean and standard deviation) of male subjects by age groups (n = 1409).

PSQI	18–20 years	20–29 years	30–39 years	40–49 years	50–59 years	60–69 years	70–79 years	+80 years
Global PSQI	4.20 (2.67)	4.62 (2.70)	4.74 (2.80)	4.79 (3.15)	4.57 (2.99)	5.27 (3.08)	5.28 (3.24)	5.60 (3.74)
Sleep quality	0.78 (0.63)	0.78 (0.73)	0.78 (0.68)	0.76 (0.74)	0.74 (0.69)	0.71 (0.67)	0.75 (0.68)	0.83 (0.76)
Sleep latency	1.16 (1.17)	1.01 (1.02)	0.97 (1.00)	0.96 (0.98)	0.89 (1.01)	1.13 (0.97)	1.10 (0.95)	1.00 (1.07)
Sleep duration	0.65 (0.75)	0.77 (0.82)	0.79 (0.79)	0.91 (0.88)	0.92 (0.88)	0.92 (0.86)	1.00 (1.04)	0.73 (0.93)
Sleep efficiency	0.18 (0.54)	0.29 (0.69)	0.32 (0.68)	0.32 (0.70)	0.39 (0.79)	0.42 (0.77)	0.56 (0.95)	0.50 (0.91)
Sleep disturbances	0.74 (0.44)	0.93 (0.40)	0.96 (0.45)	0.96 (0.49)	0.99 (0.45)	1.08 (0.46)	1.06 (0.41)	1.21 (0.52)
Sedative medication use	0.04 (0.33)	0.07 (0.40)	0.17 (0.63)	0.23 (0.74)	0.25 (0.76)	0.47 (1.00)	0.42 (0.99)	0.62 (1.15)
Daytime dysfunction	0.94 (0.98)	1.03 (1.02)	1.01 (1.00)	0.91 (0.92)	0.73 (0.89)	0.80 (0.91)	0.72 (0.87)	0.93 (0.91)

all of which are summed to a single global PSQI score (0-21). The PSQI consists of 19 self-rated items and 5 items rated by a bed-partner. The last five items are not reported in this article. The 19 questions consist of 7 components and are weighted on a 0-3 scale. A high PSQI score indicates poor sleep quality.

We assessed the PSQI score on a numeric and nominal scale. As a numeric variable, mean and standard deviation were used. A global PSQI score of more than five has been shown to discriminate poor from good sleepers in the Iranian version of PSQI.[11] We categorized age into seven groups with a range of ten years.

This study was approved by the Institutional Review Board of the Medical School of Iran University of Medical Sciences.

For the purpose of statistical analysis we used SPSS (version 13, SPSS Inc., Chicago, Illinois), and Stata statistical software, version 10.0 (Stata Corporation, TX, USA).

Frequency, mean, and standard deviation (SD) of a single global PSQI score and its components were calculated. One-way analysis of variance compared means between age groups. We used a cutoff point of five for the PSQI score and estimated the prevalence of people with sleep problems by 95% CI. We adjusted proportions and means using age and sex from the 2006 population census data of Tehran. The correlation between age categories and PSQI component scores was calculated by Kendall T_b. We used multiple linear regression for the estimation of the independent effect of marital status on the mean of the global PSQI score. Statistical significance was considered to be $P \leq 0.05$.

Results

From 3114 subjects, 20 were excluded because of missing data in their questionnaires. The data of 3094 subjects (1409 males and 1685 females) were used in the study.

Table 1 shows age and sex characteristics of the sample compared with the population of Tehran, of which the sex and age frequencies of the sample were different from the population. Elderly people and females were over-represented in our sample.

Of the total sample, the mean age was 43.57 ± 17.5 years, however the mean age for men was 44.7 ± 18.5 and for women, it was 42.6 ± 16.6. Of participants, 25% were single and almost 70% married. Good sleepers comprised 63% of subjects (PSQI < 5); 37% (95% CI: 35–39) were poor sleepers (PSQI > 5). PSQI > 5 was shown in 27% (95% CI: 25–28) of males versus 35% (95% CI: 33–37) of females, which was significant (P = 0.001).

The global PSQI score was 5.06 (95% CI: 4.9–5.1). There was a significant difference between the global PSQI score and age groups, as elderly people had a higher score than younger people (P<0.01). Statistical significance was shown for all components of the PSQI by age groups too (P < 0.01).

The mean global PSQI score was independently higher among married (5.38 ± 3.43), separated couple (5.16 ± 2.20), and widowed (6.66 ± 3.78), versus single subjects (4.83 ± 2.93) when adjusted by age. This difference was significant (P = 0.04).

Among men, separated men (7.50 ± 3.53) had a higher global PSQI. Among women, being widowed was an important risk factor for sleep disturbances (6.90 ± 3.82). These differences were not significant in a multivariable analysis adjusted for age.

Figure 1 demonstrates the dependency of age and PSQI score grouped according to sex. PSQI global score and all seven components had a significant association with age (P < 0.01; Kendall T_b). The age dependency of sedative medication use by sex is shown in Figure 2.

Tables 2 and 3 show the subjective sleep quality of male and female participants. The PSQI component scores ranged from 0.04 ± 0.33 in sedative medication use for males and 0.06 ± 0.40 in sedative medication use for females (both groups aged less than 19 years) to 1.21 ± 0.52 in sleep disturbances for males aged 80 years or older and 1.68 ± 0.80 in sleep latency for females aged 80 years or older. The PSQI component scores of 3, 5, 6, and 7 were significantly different across age groups in males (P < 0.01). All PSQI component scores except for number 7 were significantly different

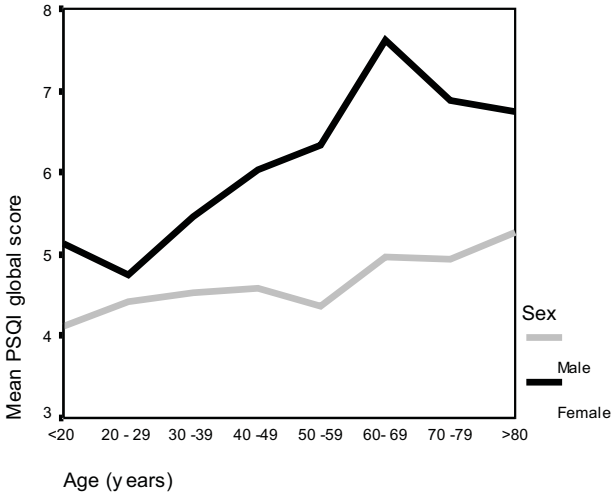

Figure 1. Increasing PSQI global score with age categories by sex.

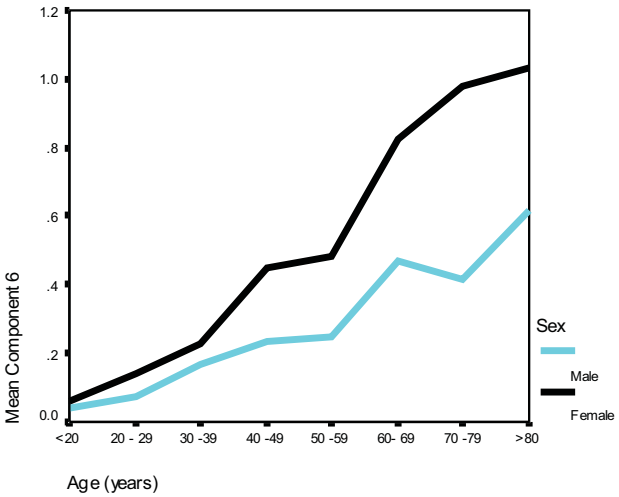

Figure 2. Increasing mean component score of sedative medication use with age categories by sex.

Table 3. Subjective sleep quality scores (mean and standard deviation) of female subjects by age groups (n = 1685).

PSQI	18–20 years	20–29 years	30–39 years	40–49 years	50–59 years	60–69 years	70–79 years	+80 years
Global PSQI	5.36 (2.77)	5.03 (3.00)	5.75 (3.60)	6.27 (3.70)	6.64 (3.93)	7.97 (4.31)	7.34 (3.99)	6.97 (3.95)
Sleep quality	0.83 (0.66)	0.77 (0.70)	0.92 (0.76)	1.01 (0.80)	1.03 (0.79)	1.19 (0.86)	1.04 (0.76)	1.18 (0.77)
Sleep latency	1.55 (1.06)	1.25 (1.01)	1.37 (1.10)	1.49 (1.12)	1.48 (1.10)	1.82 (1.07)	1.37 (1.06)	1.68 (0.80)
Sleep duration	0.57 (0.77)	0.49 (0.72)	0.78 (0.90)	0.92 (0.97)	1.05 (0.97)	1.26 (1.09)	0.94 (0.90)	0.96 (1.14)
Sleep efficiency	0.34 (0.76)	0.42 (0.80)	0.50 (0.94)	0.46 (0.89)	0.60 (0.94)	0.79 (1.11)	0.70 (0.98)	0.59 (0.93)
Sleep disturbances	0.95 (0.42)	1.02 (0.45)	1.05 (0.48)	1.13 (0.51)	1.23 (0.56)	1.31 (0.59)	1.29 (0.54)	1.09 (0.45)
Sedative medication use	0.06 (0.40)	0.14 (0.54)	0.23 (0.71)	0.45 (0.99)	0.48 (1.04)	0.82 (1.22)	0.98 (1.33)	1.03 (1.36)
Daytime dysfunction	1.30 (1.04)	1.17 (1.04)	1.21 (1.05)	1.12 (1.04)	1.07 (1.04)	1.13 (1.06)	1.24 (1.06)	1.28 (1.14)

according to age groups among females ($P < 0.01$).

The global PSQI scores ranged from 4.20 ± 2.67 to 5.60 ± 3.74 for males by age groups and 5.03 ± 3.00 to 7.97 ± 4.31 for females by age groups. The difference across age groups for the global PSQI score was significant in females ($P < 0.01$).

Discussion

This study showed that the prevalence of sleep problems is 37% (CI: 35%–39%). In the Austrian[9] and Japanese[12] adult population using PSQI this estimate was reported as almost 32%. The higher percentage of sleep problems in our study could be explained by a difference between urban population (our study) compared to the general (urban and rural) population for the Austrian and Japanese studies. This is because rural residents are more likely to report good levels of sleep quality compare to urban residents.[13] Other factors such as sleep habits, sleep hygiene, cultural and racial differences, and life-style stresses should be considered.

The prevalence of poor sleep quality was higher in women than men. The other studies showed a higher prevalence of sleep problems among women, as well.[9,12–15] This difference could be due to gender differences in the prevalence of psychiatric morbidities, socio-cultural factors, and coping strategies.[13] However, in our study the difference between the two genders was larger than in other studies. One explanation could be the difference between the urban versus general population in these studies. Cultural and life-style differences also may have an effect.

The present study also found that the PSQI global score differed among age groups in males and females. Sleep disturbances increased significantly with age. We found that the global PSQI score increased with age among males and females. Women aged 80 years or older had higher scores for all PSQI component scores, with the exception of sleep disturbances. These findings were also observed in other studies.[9,12]

We showed that being widowed was an important determinant factor for the subjective quality of sleep. Widowed subjects had a higher global PSQI score overall. This finding was compatible with other reports.[16,17]

The use of hypnotic medications was higher in females compared to males, and increased by age. These findings were compatible with previous studies in other countries.[12,16,18]

In conclusion, sleep quality assessment as a part of quality of life is important. Sleep quality measurement in the general population is a valuable reference point for other related investigations in the community, as well as for health policy making. Sleep problems are common worldwide and are more common in urban residents and the elderly. Sleep disturbances and use of hypnotic drugs are more common among females and tend to increase by age. When comparing marital status, widows have more sleep problems.

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