

## Original Article

# Sleep Quality among Health Care Workers

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## Abstract

**Background:** Sleep problems are common complaints in health care workers that can affect quality of life and productivity, both in patients and healthy individuals. This study evaluates the prevalence of low sleep quality in health care workers with no health issues or complaints of sleep problems.

**Methods:** In this cross-sectional study was conducted on healthy employees of a health care organization in Tehran. The presence of physical and mental health issues and satisfaction from their sleep quality was assessed by means of a self-administered questionnaire. Sleep quality was evaluated by the Persian version of the Pittsburgh Sleep Quality Index (PSQI). PSQI scores of 5 or less were considered as good sleep quality.

**Results:** From 925 participants, 56.9% were good sleepers. There was a significant association between poor sleep quality and female sex, divorced, shift-working, and age; it was not associated with education level. Self-rated health (SRH) had a significant positive correlation with sleep quality.

**Conclusion:** Poor sleep quality is common in our study population and associated with a lower SRH. The high prevalence of poor sleep quality in a group of healthy non-complaining employees can be an important early sign of underlying physical or mental health issues. Providing screening and monitoring programs to detect the underlying health conditions and their consequent treatment can promote health and productivity of employees and improve society's health, both directly and indirectly.

**Keywords:** Health Personnel, Iran, occupational health, self-rated health, sleep

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## Introduction

Sleep disturbance is a common complaint of which tremendous variation exists among different populations and age groups.<sup>1</sup> Sleep quality can be affected by many physical and mental health conditions. Numerous studies have evaluated sleep conditions in patients with rheumatologic diseases,<sup>2</sup> cancers,<sup>3-5</sup> myocardial infarction,<sup>6</sup> those undergoing hemodialysis,<sup>7</sup> and in individuals suffering from various psychological and neurological diseases.<sup>8</sup> The prevalence of sleep disorders has increased in Iran in recent decades.<sup>9</sup>

Sleep quality can affect both quality of life and productivity in patients and healthy individuals.<sup>10-13</sup> Sleep disturbance can be present in otherwise healthy, non-complaining elderly patients.<sup>14</sup> An association has been observed between dopamine receptors and the duration of sleep in good sleepers.<sup>15</sup> Sleep problems are associated with sickness absence, occupational accidents, and long-term health problems.<sup>16-18</sup>

Sleep quality is complex, with both subjective and objective aspects, which makes it difficult to assess.<sup>19</sup> The Pittsburgh Sleep Quality Index (PSQI) is a clinical instrument designed to evaluate different aspects of sleep quality through a set of 19 self-rated

questions. This instrument has an 89.6% sensitivity and 86.5% specificity in detecting sleep disturbances.<sup>19</sup>

A person's occupation is believed to affect the prevalence of sleep disorders.<sup>20</sup> A recent study has shown that sleep problems are common among health care workers, although many factors such as socio-demographic and occupational characteristics also affect its prevalence.<sup>21</sup> Patterson et al. have observed that the average PSQI score from emergency medical service workers is in the poor sleep quality range, with more than half of them considered to be fatigued. Sleep disturbance can negatively affect work quality and increase the risk of adverse events and safety-compromising behaviors.<sup>22</sup>

In this cross-sectional study, we have evaluated the prevalence of sleep problems in healthy, non-complaining health care workers. We intend to provide an overview of this widely-accepted, poorly-understood health problem which is an important warning sign of many medical conditions and can affect many aspects of life.

## Materials and Methods

This was a cross-sectional study conducted during the Summer and Fall of 2010 on healthy employees of the former Iran University of Medical Sciences in Tehran, Iran. Participants consisted of hospital staff, office workers, primary health care providers, and faculty members. Occupations consisted of physicians, nurses, other health professionals, office and unskilled workers. Varied work schedules existed for all occupations.

We provided all participants with self-administered paper questionnaires. The questionnaires were anonymous and the participants completed them within 14 days before they were collected. The response rate was 79.8%. Exclusion criteria were the pres-

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**Table 1.** Participants' scores for the seven scales of the Pittsburgh Sleep Quality Index (PSQI).

| Scale                      | Total participants | Number (%)      |            |            |                 |
|----------------------------|--------------------|-----------------|------------|------------|-----------------|
|                            |                    | 0               | 1          | 2          | 3               |
| Subjective sleep quality   | 944                | 347 (36.8)      | 547 (57.9) | 47 (5)     | 3 (0.3)         |
| Sleep latency              | 896                | 384 (42.9)      | 370 (41.3) | 122 (13.6) | 20 (2.2)        |
| Sleep duration             | 880                | 121 (13.8)      | 389 (44.2) | 136 (15.4) | 234 (26.6)      |
| Habitual sleep efficiency  | 850                | 555 (65.3)      | 80 (9.4)   | 34 (4)     | 181 (21.3)      |
| Sleep disturbance          | 873                | 0 <sup>25</sup> | 825 (94.5) | 48 (5.5)   | 0 <sup>25</sup> |
| Need for sleep medications | 929                | 891 (95.9)      | 28 (3.1)   | 6 (0.6)    | 4 (0.4)         |
| Daytime dysfunction        | 911                | 599 (65.8)      | 216 (23.6) | 80 (8.8)   | 16 (1.8)        |

ence of any physical or mental health problem (disease, sign, or symptom), or sleep problems as assessed by the Health and Productivity Questionnaire (HPQ). We used the Persian version of the HPQ because it has shown good reliability and validity in a previous study.<sup>23</sup>

To evaluate sleep quality, participants were asked to complete the Persian version of the PSQI. The reliability and validity of the original instrument and the Persian version have been documented.<sup>19,24</sup> This questionnaire assesses seven scales of sleep: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications, and daytime dysfunction. A score of 0 to 3 is assigned to each of the seven scales (0 meaning no problem). We calculated the Global PSQI Score as the sum of these scales, which ranged from 0 to 21. Participants whose Global PSQI score was 5 or less were considered to have good sleep quality.<sup>19</sup>

Data on demographic variables, shift work, and SRH were gathered. To evaluate SRH, participants rated their health in five categories, from poor to perfect. In our study, we defined shift work as work which occurred at times other than approximately 7 am to 6 pm.

All questionnaires were self-administered and unnamed and the participants signed an informed consent. The study was approved by the review board of (former) Iran University of Medical Sciences.

Participants signed informed consents for study participation. Study approved by Ethics Committee of Tehran University of Medical Sciences, Tehran, Iran.

Statistical analysis was performed using SPSS software version 16. Descriptive statistical methods were administered.  $P < 0.05$  was considered significant. Chi-square and ANOVA tests were performed to compare subgroups. After evaluating the associations with univariate analysis, multivariate linear regression was performed based on all variables.

## Results

In this study, 975 participants who were disease-free with no complaints of sleep problems completed the questionnaires. Participants' ages ranged from 18 to 62 ( $34.5 \pm 9.0$  years). Females comprised 50.1% of the study population and 38.8% had shift-work schedules. None of the participants rated their health as very poor.

The scores of participants in the seven scales of sleep quality are shown in Table 1. A score of 0 indicated the participant reported no problem. About 96% of the participants reported no history of sleep medication usage. Participants reported neither disturbance-free sleep nor severe sleep disturbance during the previous month.

We defined disturbance as any physical, psychological, and/or environmental condition (urination urgency, breathing problems, coughing, snoring, temperature discomfort, nightmares, pain, etc.) that postponed or interrupted desired sleep.

Among the 744 participants who completed all of the questions in the PSQI questionnaire, 423 (56.9%) were good sleepers. In a univariate analysis, a significant association existed between poor sleep quality and age, SRH, being female, divorced, and shift work; there was no association with education level (Table 2). Age categories showed a different prevalence of poor sleep quality, with the highest prevalence among middle-aged employees. The prevalence of poor sleep quality also differed according to the occupation categories, with the difference mainly observed in shift workers. Shift workers were comprised of 41.2% men and 36.1% women whose mean ages were 36.3 years<sup>26</sup> and 32.8 years (women;  $P < 0.001$ ). Among the 138 shift-workers, the highest prevalence of poor sleep quality was observed in nurses (64%) and the lowest was seen in simple workers (38%;  $P < 0.021$ ).

According to multivariate analysis, shift work, divorced, and SRH were associated with poor sleep quality (Table 2).

## Discussion

It is estimated that sleep disorders affect one-third of the general population, with the prevalence increasing with age.<sup>25</sup> The prevalence of sleep disorders is estimated to be approximately 37% in the general population of Tehran.<sup>26</sup> Almost 43% of the participants in this study report some degree of sleep problems. The high prevalence of poor sleep quality in a group of healthy, non-complaining employees can be an important early sign of underlying undetected physical or mental health issues. A higher prevalence of sleep disorders has also been observed in a study on medical students in Tehran, although the participants were not exclusively healthy.<sup>27</sup>

In this study, 47.6% of women reported sleep problems. The higher prevalence of sleep problems in women has been reported in many studies, both in the general population and in the elderly.<sup>14,25,27,28</sup> The above mentioned difference was not observed in multivariable analysis and might be due to a higher prevalence of undesirable SRH in female participants.

Research has shown that age adversely affects sleep quality.<sup>1,14,25</sup> The pattern of sleep disorder in our participants is the same, as more than half of those participants over the age of 46 have reported some degrees of sleep disorder.

Shift-work is frequently described to be associated with sleep disorders.<sup>29,30</sup> In our study, the prevalence of sleep disorders among shift-workers (48%) was significantly higher than day-workers (40%), both according to univariable and multivariable

**Table 2.** Distributions of poor sleep quality according to gender, education, marital status, age, work schedule, and self-rated health (SRH) subgroups.

| Variable                                   | Number | Poor sleep quality (%) | Univariable analysis <sup>‡</sup><br>OR (95% CI) | Multivariable analysis<br>OR (95% CI) |
|--|--------|------------------------|--|---------------------------------------|
| <b>Gender</b>                              |        |                        |  |                                       |
| Female                                     | 376    | 179 (47.6)             | —  | —                                     |
| Male                                       | 359    | 140 (39)               | 0.7 (0.5–0.9)                                    | 0.7 (0.5–1.1)                         |
| <b>Age (years)</b>                         |        |                        |  |                                       |
| 18–45                                      | 589    | 252 (42.8)             | —  | —                                     |
| Over 46                                    | 86     | 47 (54.7)              | 1.6 (1.0–2.5)                                    | 2.0 (1.1–3.5)*                        |
| <b>Marital status</b>                      |        |                        |  |                                       |
| Married                                    | 505    | 211 (41.8)             | —  | —                                     |
| Single                                     | 208    | 91 (43.8)              | 1.1 (0.8–1.5)                                    | 1.1 (0.7–1.6)                         |
| Divorced                                   | 14     | 12 (85.7)              | 8.4 (1.8–37.7)                                   | 16.0 (2.0–129.7)**                    |
| Widowed                                    | 6      | 3 (50)                 | 1.4 (0.3–7.0)                                    | 4.4 (0.4–45.3)                        |
| <b>Education (years)</b>                   |        |                        |  |                                       |
| Less than 12                               | 166    | 79 (47.6)              | 1.3 (0.9–1.8)                                    | 1.3 (0.7–2.4)                         |
| 12–16                                      | 485    | 201 (41.4)             | —  | —                                     |
| More than 17                               | 77     | 36 (46.8)              | 1.2 (0.8–2.0)                                    | 0.9 (0.4–2.1)                         |
| <b>Work schedule</b>                       |        |                        |  |                                       |
| Day-worker                                 | 441    | 177 (40.1)             | —  | —                                     |
| Shift-worker                               | 285    | 137 (48.1)             | 1.4 (1.0–1.9)                                    | 1.2 (0.9–1.8)*                        |
| <b>Occupation</b>                          |        |                        |  |                                       |
| Physician                                  | 42     | 23 (54.8)              | 1.6 (0.8–3.1)                                    | 2.0 (0.6–6.1)                         |
| Nurse                                      | 69     | 38 (55.1)              | 1.6 (0.9–2.8)                                    | 1.3 (0.6–2.8)                         |
| Other health professional                  | 203    | 81 (39.9)              | 0.9 (0.6–1.3)                                    | 0.9 (0.5–1.6)                         |
| <b>Office worker</b>                       | 143    | 56 (39.2)              | 0.8 (0.5–1.3)                                    | 0.9 (0.5–1.6)                         |
| <b>Simple worker</b>                       | 198    | 86 (43.4)              | —  | —                                     |
| <b>Smoking status</b>                      |        |                        |  |                                       |
| Non-smoker                                 | 722    | 314 (43.5)             | 2.3 (0.6–8.6)                                    | 0.6 (0.1–2.6)                         |
| Smoker                                     | 12     | 3 (25)                 | —  | —                                     |
| <b>Self-rated health (SRH)<sup>‡</sup></b> |        |                        |  |                                       |
| Excellent                                  | 298    | 108 (36.2)             | —  | —                                     |
| Very good                                  | 273    | 121 (44.3)             | 1.4 (1.0–2.0)                                    | 1.5 (1.0–2.3)*                        |
| Good                                       | 143    | 75 (52.4)              | 1.9 (1.3–2.9)                                    | 2.1 (1.3–3.4)**                       |
| Fair                                       | 25     | 14 (56.0)              | 2.2 (1.0–5.1)                                    | 2.6 (1.0–6.6)*                        |

<sup>‡</sup> =  $P < 0.05$  in univariable analysis for gender, age, marital status, work schedule, and SRH. <sup>‡</sup> = none rated their health as “Poor”.  $P < 0.05$  in linear by linear association; \* $P < 0.05$ ; \*\* $P < 0.01$ .

analyses. Shift work can affect the health of workers and their productivity, causing long term effects.<sup>10,18</sup>

SRH was another important variable in this study. Many studies have proven the ability of SRH in predicting mortality and morbidity.<sup>31,32</sup> As healthy participants were included in this study, none rated their health as poor and very few rated their health as fair. The prevalence of poor sleep quality increased significantly as the SRH changed from excellent to fair. Many researchers have observed an association between sleep problems and fair/poor SRH.<sup>33,34</sup> In a study on the effect of various lifestyle factors on SRH, sleep quality was highly associated with SRH.<sup>35</sup>

The high prevalence of sleep problems in shift-working nurses was another important finding of this study. Dorrian et al. indicated that “Sleep problems, high levels of stress and exhaustion and low job satisfaction are prevalent among nurses and midwives”.<sup>36</sup> In a study on Taiwanese nurses, the rate of insomnia was 59%.<sup>37</sup> Zencirci et al. showed that a recent experience of a workplace accident (such as a needle stick or a sharp injury) increased the risk of poor sleep quality in nurses.<sup>38</sup>

The findings of this study can be a sign of undiagnosed physical and mental health conditions in the health care profession. Providing screening programs to detect these underlying health conditions and their consequent treatment can improve health and productivity of employees. Monitoring the health status of the employees can assist with early detection and treatment of health problems. Such interventions can ultimately directly and indirectly improve society’s health.

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