Sleep Quality and Health-Related Quality of Life in Workers of Kermanshah Industrial Town: A Correlation Study

Seyed-Ramin Ghasemi, Mehdi Khezeli, Nader Rajabi-Gilan, Manoochehr Kouhani, Nooshin Moloudi-Safa, Ali Hemati, Mojgan Afkari, Fatemeh Zolfaghari

Social Development and Health Promotion Research Center, Health Institute, Kermanshah, University of Medical Sciences, Health Deputy, Kermanshah University of Medical Sciences, Kermanshah, Iran

Abstract

Background: Sleep Quality (SQ) is one of the most important predictors of quality of life in individuals. This study was conducted to evaluate the quality of life and SQ of industrial male workers in Kermanshah. Materials and Methods: In this cross-sectional study, 404 male workers selected by stratified sampling in the Kermanshah Industrial Town participated. The research questionnaires included demographic information checklist, the 36-Item Short-Form Health Survey (SF-36), and the Pittsburgh Sleep Quality Index (PSQI). Data were analyzed by SPSS18 software, using descriptive statistics, Pearson’s correlation, and partial correlation tests. Results: The mean age of respondents was 35.33 ± 7.31; ranged from 20 to 62 years old. The mean score of mental health and physical health were 55.01 ± 21.62 and 54.96 ± 21.93, respectively. Out of all participants, 58.6% of participants had a score of 50 or less in terms of health-related quality of life (HRQL). Two dimensions of subjective SQ (1.48 ± 0.97) and sleep duration (1.48 ± 0.97) had the worst mean score, and sleep efficiency (0.05 ± 0.3) had the most favorable mean score. The results of the Pearson’s correlation test showed that the total score of SQ had a negative and significant correlation with the main dimensions of quality of life (P < 0.001). The highest correlation was found between physical pain (r = 0.350) and mental health (r = 0.332) with SQ. Conclusion: This study showed that more than half of the workers reported poor HRQL. Besides, a considerable number of workers had some degree of sleep disorders. The results of the study showed that there is a moderate correlation between SQ and HRQL.

Keywords: Job satisfaction, physical pain, quality of life, sleep quality, workers

Introduction

Sleep is a dynamic and complex biological process that involves a considerable portion of life and its quantity or quality is associated with social interactions. Sleep disorders and sleep deprivation are among the common health problems in human societies. Sleep is an important aspect of a healthy lifestyle and it has been suggested that an adult will spend about one-third of life in sleep. Sleep is not only a segregated part of daily life but also is a vital need through which the body reconstructs the basis of a healthy and prolonged life. A national survey in the United States showed that approximately 20% of the general population suffers from sleep disorders. The results of studies on various groups have shown that the prevalence of sleep disorders were observed in nurses (77.7%), truck drivers (61%), college students (72.71%), and mining workers (53.1%). Although sleep recovery is an essential function for the vital energy balance, sleep duration in the population of working age has decreased over the last few decades. SQ of the working population can have an adverse or negative effect on their quality of life. A survey on more than 47,000 Brazilian workers showed that 21% of workers had poor SQ. A study concluded that SQ was the most important predictor of quality of life among healthcare providers. Insomnia can increase the sleepiness during the day and subsequent occupational and social accidents. Low SQ is also associated with a range of negative factors.

Address for correspondence: Mr. Nader Rajabi - Gilan, Social Development & Health Promotion Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran. E-mail: rajabi_nader@yahoo.com

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including health problems, low quality of life, and economic costs. A recent meta-analysis study has shown that sleep disturbance is a predictor of future diabetes.

The ultimate and desired goal of any society is to achieve a desirable level of well-being and a higher quality of life for all members of society. Improving the quality of life as one of the main goals of community development has had an impact on the policies of many countries. Donald argues that the quality of life is a descriptive term that refers to the health and emotional, social, and physical development of individuals and their ability to perform routine tasks. In other words, quality of life is a structure that assesses how a person feels about the health status and other non-medical aspects of life. Industrial workers have potential conditions for reducing the quality of sleep and quality of life due to their work hardiness as well as the work shifts. One study showed that 53.1% of miners in Iran had poor SQ.

Workers despite their relative hard work activities do not receive comparative salaries and benefits. Unhealthy work environments, difficult working conditions, and long shifts may hurt the quality of sleep, as well as on the quality of life of workers. Assessing the quality of sleep and the quality of life of workers and some related factors in the workplace can provide useful information. Therefore, the present study was conducted to investigate the relationship between quality of sleep and HRQL in workers of industrial units referred to the Occupational Medicine Unit in Kermanshah.

MATERIALS AND METHODS

Design and sampling

The present study was conducted as a cross-sectional study and data were collected using a questionnaire. The statistical population of the research was the industrial workers of Kermanshah city in 2017. Given that, the standard deviation of the SQ score in a study by Zare and colleagues was 2.35, therefore, the sample size was determined for 385 people using the appropriate formula.

\[ n = \frac{Z^2 \times \sigma^2}{d^2} = \frac{(1.96)^2 \times 2.35^2}{0.235^2} \]

\[ = \frac{21.215235}{0.055225} = 384.16 \approx 385 \]

Further, to achieve a sufficient sample size, we used the design effect of 1.5 due to the difficult working conditions in the factories and the likelihood of failure to answer questions because of the fatigue of the workers. Consequently, the final sample size was determined as 577 people. In the present study, we applied the stratified sampling method according to which every unit of the Kermanshah Industrial City was considered as one stratum. The requirement for each industrial unit to enter the study was to have at least 50 active workers. Kermanshah Industrial City at the time of the study had 89 units, among which 29 units had at least 50 workers. We selected 10 units by simple random sampling methods among the final list of the units. In the next step, a list of all workers from selected units was provided by the Occupational Health Unit. Based on the total sample size determined, the quota for each industrial unit was determined based on the total number of active workers employed in that unit. Finally, workers who met the inclusion criteria were randomly selected from the list according to the quota of each stratum. After explaining the purpose of the study and obtaining a written informed consent form, the questionnaires were submitted to the workers. Finally, from 577 distributed questionnaires, 428 questionnaires were received (74% response rate), of which 404 completed questionnaires were analyzed. Inclusion criteria were having at least 3 years of work experience in the industrial units of Kermanshah. People with addiction and those who use alcohol, psychoactive drugs, severe depression drugs, or sleep medications (such as diazepam, etc.) were excluded.

Instruments

The survey questionnaire consists of three parts. The first part of the questionnaire included demographic and contextual information. Age, marital status, level of education, years of employment, work shift, and job satisfaction were the demographic variables. Job satisfaction was measured by employing 6 questions in which the responses designed in the six-point Likert-type from not-at-all to very high; scored between zero and five. Total scores ranged from 0 to 30, according to which more scores mean more satisfaction toward job conditions. The face validity and content validity of the job satisfaction questions were approved by an expert panel including eight specialists in sociology, psychology, and occupational health. Using experts’ opinions, the validity of the questionnaire was confirmed using the content validity ratio (CVR) of 0.783, and the content validity index (CVI) of 0.85. Cronbach’s alpha coefficient for the whole questionnaire was 0.763.

PSQI: Pittsburgh Sleep Quality Index is used to measure the quality and patterns of sleep in adults. The questionnaire was designed by Buysse and colleagues to measure SQ and to help identify people with sleep disorders. It has 18 questions and consists of seven components. In scoring the PSQI, seven component scores are derived, each scored 0 (no difficulty) to 3 (severe difficulty). The component scores are summed to generate a total score (ranged 0 to 21). Higher scores indicate worse SQ. The first component is the subjective SQ, which is characterized by question nine. The second component is the sleep latency, which is determined by the average score of two questions, including questions 2 and 5a. The third component is related to sleep duration, which is identified with question 4. The fourth component is related to sleep efficiency and is determined by questions 1, 3, and 4; calculated by the following formula: (total number of hours asleep)/(total # of hours in bed) \times 100. The fifth component is about sleep
disturbance and is obtained by calculating the mean scores of 5b–5j. The sixth component is related to the use of sleep medications, which is determined by question six. The seventh component shows daytime dysfunction, which is characterized by two questions (mean scores for questions 7 and 8). The reliability of the Persian version of the Pittsburgh sleep quality questionnaire has been reported using Cronbach’s alpha of 0.83.

36-Item Short-Form Health Survey (SF-36) Questionnaire: In the present study, a 36-item short-form (SF-36), constructed to survey health status in the Medical Outcomes Study (MOS) was used to measure “quality of life.” This questionnaire measures quality of life in two general scales included physical health and mental health, as well as eight multiple-item subscales that evaluate the physical function, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, vitality, pain, and general health perception. The two first questions, which measures the recent state of health and compared to last year, are not included in any of the sub-scales. The total score on each SF-36 subscale ranges between 0 and 100. Montazeri and colleagues showed that the Persian version of this questionnaire had sound reliability and validity.

Ethical issues

This study received ethics approval from the Research Ethics Committee of Kermanshah University of Medical Sciences (No. KUMS.REC.1394.224).

Data analysis

The Statistical Package for the Social Sciences (SPSS-18) was used for the statistical analysis of study data. Descriptive analyses are reported as numbers and percentages, means, and standard deviations. To determine the relationships between the variable, Pearson’s correlation (both bivariate and partial correlation) was applied. In the analysis, P value <0.05 was considered statistically significant.

Results

In this research, 404 workers of industrial units of Kermanshah were studied. According to descriptive results, 239 (60.2%) had a diploma, 16.3% had a college education, and the rest had education less than a diploma. The mean age of respondents was 35.33 ± 7.31; ranging from 20 to 62 years. In terms of marital status, 18.8% were single, 78.3% were married, and 3% were separated. The mean hours of works per day were 10.2 ± 1.54, and the average work experience was 6.68 ± 6.26 years. Among the study participants, 13.6% had a second job. The results showed that 81.1% of respondents were in the morning shift, 0.8 worked in the night shift, and 18.1% were engaged in rotary shifts. Out of the 404 participants, 19.6% had at least one chronic disease. The most commonly reported diseases were hypertension and diabetes.

The results of the study on job satisfaction showed that 10.6% of the workers were not satisfied with their direct supervisors while 8.9% perceived very high discrimination in the workplace. The results showed that 13.6% of the workers like their job and the average satisfaction score of the work environment was 17.14 ± 6.38.

Descriptive results showed that the mean score of mental health and physical health was 55.01 ± 21.62 and 54.96 ± 21.93, respectively. Out of 404 participants in terms of quality of life, 19.6% had a score ranged between 76–100 scores, 21.8% had a score of 51–75, and 58.6% had a score of 50 or less.

The mean score of total SQ was 69.6 ± 82.2. Among participants, 36.5% had normal sleep, 63.5% had sleeping problems, and 14.7% of the respondents had a very serious problem in the sleep duration. Nearly 24.3% of workers were using sleep medications. Moreover, 23.7% of workers had a serious problem with daytime dysfunction due to a sleep problem.

Among physical dimensions, physical pain had the highest correlation with the total SQ score (r = -0.350, P < 0.001). Among the dimensions of mental health, the mental health subscale had the highest correlation with the overall score of SQ (r = 0.312, P < 0.001). There was a significant negative correlation between job satisfaction and an overall score of sleep; an increase in the job satisfaction score was associated with a lower score for workers’ SQ (Note: A low score in SQ means better SQ) (Table 3). Job satisfaction had the highest correlation with general health. (r = 0.428, P < 0.001) (Table 3).

The results of the partial correlation test showed that controlling the work shift variable did not have a significant effect on the relationship between quality of life with SQ (P > 0.05), but the job satisfaction variable weakened the relationship between SQ and quality of life (Table 4).

Table 1: Mean scores of quality of life dimensions in the workers

| Scale                  | Sub-scales                             | Mean (SD) |
|------------------------|----------------------------------------|-----------|
| General Physical Health| Physical functioning (Ph. F)            | 59.15 (27.46) |
|                        | Role limitations (physical) (Ph.R.L)    | 48.91 (39.62) |
|                        | Bodily pain (B.P)                       | 53.63 (26.41) |
|                        | General health perceptions (G.H.P)      | 57.8 (19.53) |
|                        | The total dimension of physical health (T.ph.H) | 54.96 (21.93) |
| General Mental Health  | Vitality (Vi)                           | 53.58 (18.27) |
|                        | Social functioning (S.F)                | 57.72 (26.03) |
|                        | Role limitations (emotional) (E.R.L)    | 51.55 (41.90) |
|                        | Mental health (M.H)                     | 57.19 (18.42) |
|                        | The total dimension of mental health (T.M.H) | 55.01 (21.62) |
| Total health-related quality of life |                                    | 54.85±20.35      |
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Table 2: Descriptive statistics of sleep quality and its dimensions

| Sleep quality and its dimensions | Mean (SD) | Degree of Sleep Problem |
|---------------------------------|----------|------------------------|
|                                 |          | No problem n (%)       | Medium n (%) | Severe n (%) | Very serious n (%) |
| Subjective sleep quality n=404 | 1.48 (0.97) | 52 (12.9) | 196 (48.5) | 67 (16.6) | 89 (22.0) |
| Sleep latency n=390             | 1.08 (0.82) | 93 (23.8) | 192 (49.2) | 82 (21.0) | 23 (5.9)  |
| Sleep duration n=395            | 1.48 (0.97) | 80 (20.3) | 101 (25.6) | 156 (28.6) | 58 (14.7) |
| Sleep efficiency n=392          | 0.05 (0.30) | 377 (96.2) | 11 (2.8) | 2 (0.5) | 2 (0.5) |
| Sleep disturbance n=366          | 1.25 (0.57) | 16 (4.4) | 248 (67.8) | 93 (25.4) | 9 (2.2) |
| Use of sleep medications n=404  | 0.43 (0.82) | 306 (75.7) | 35 (8.7) | 50 (12.4) | 13 (3.2) |
| Daytime dysfunction n=396        | 1.01 (0.87) | 127 (32.1) | 156 (39.4) | 94 (23.7) | 19 (4.8) |
| Total sleep quality n=348       | 6.69 (2.82) | 127 (36.5) |                |                |                |

Table 3: Pearson’s correlation between main research variables

| Variables | Physical Health Dimensions | Mental Health Dimensions | Total Mental Health |
|-----------|---------------------------|--------------------------|---------------------|
|           | Ph. F | Ph.R.L | B.P | G.H.P | Vi | S.F | R.LM | M.H | J.S |
| Subjective sleep quality | -266 | -225 | -294 | -232 | -325 | -275 | -284 | -201 | -254 | -295 | -241 |
| Sleep latency | -024 | -049 | -060 | -029 | -039 | -085 | -131 | -071 | -130 | -127 | -143 |
| Sleep duration | -150 | -268 | -198 | -245 | -282 | -215 | -227 | -172 | -149 | -229 | -190 |
| Sleep efficiency | -041 | -064 | -142 | -036 | -092 | -076 | -082 | -037 | -076 | -075 | -069 |
| Sleep disturbance | -141 | -105 | -236 | -106 | -184 | -122 | -212 | -120 | -147 | -177 | -134 |
| Use of sleep medications | -137 | -033 | -086 | -076 | -101 | -111 | -075 | -083 | -100 | -108 | -014 |
| Daytime dysfunction | -285 | -204 | -283 | -284 | -329 | -216 | -196 | -195 | -215 | -245 | -197 |
| Total score of sleep quality | -251 | -251 | -350 | -284 | -357 | -301 | -302 | -209 | -312 | -320 | -259 |
| Job Satisfaction | 0.207 | 0.366 | 0.421 | 0.428 | 0.409 | 0.417 | 0.372 | 0.359 | 0.399 | 0.362 | 1 |

Table 4: Correlation between sleep quality and total dimensions of quality of life by controlling work shift and job satisfaction

| Variables | Total Physical Health | Total Mental Health |
|-----------|-----------------------|---------------------|
| Total Score of Sleep Quality | With controlling shift work | -0.361 | -0.314 |
| Job Satisfaction | With controlling work job satisfaction | -0.301 | -0.265 |

Discussion

In this study, HRQL in both physical and mental dimensions was below 60 scores. The mean scores of physical and mental dimensions were lower than the similar study conducted in Iran. In research conducted among textile dyeing workers in Thailand, the score of physical dimension was 69.46, which is higher than the present study. Contrary to these results, a study among Brazilian public transport workers showed that the average score of the physical and mental dimension were 39.95 and 34.19, respectively which were less than the average scores of the present study. Zare and colleagues in Iran showed that 33.7% of workers of Golgohar Mining and Industrial Company had physical disorders. The physical and mental deterioration of workers and their low quality of life may be manifested over time in behavioral reactions, such as depression, verbal violence, and physical conflict among workers with colleagues and their families.

The results of this study showed that the average score of total SQ was 6.69. According to the interpretation of the questionnaire scores, this mean score indicates the undesirable SQ in the respondents. From the probable effective factor on the poor SQ of our sample, we can note the high level of mean working hours in a day, having a chronic disease in 20% of the sample, and also a rotatory shift in about 20% of the sample. Having a second job can also be another important factor in the low quality of workers’ sleep. Some people have other sources of income besides the main job to make their living easier. For example, many men do other activities after finishing their work hours such as driving. The results of a study among bus drivers in Iran also showed that their mean score of total SQ was 6.98, which was consistent with the present study. In another study, the results showed that the average score of SQ in workers of Golgohar Mining and Industrial Company was 5.86, which was more favorable than the present study. In sleep-related studies, several interrelated aspects such as sleep duration (quantity) and SQ are important, and evidence suggests that SQ is as important as the sleep duration in maintaining health.
The results of a study involving the participation of health personnel of the Iran University of Medical Sciences showed that 36.8% of respondents did not have difficulty in subjective SQ compared to the present study with 12.9%. In other dimensions, except for the sleep duration and sleep efficiency, health workers were in a better position. The results of a study in Malaysia showed that 62.5% of migrant Myanmar workers had poor sleep status.[27]

The results of this study showed that there is a significant correlation between the overall score of SQ and the quality of life in workers. In this regard, the correlation coefficient between SQ and physical dimensions of quality of life was stronger than the mental dimension. Another study showed that poor SQ is associated with a high risk of developing diabetes in workers without a family history of diabetes.[28] The SQ is intrinsically linked to the quality of life,[29] and sleep problems are associated with a range of physical and mental health outcomes.[30] In this regard, sleep problems are known as a risk factor for mental health problems such as depression.[12] Experts also believe that the physiological consequences resulting from the low quantity and quality of sleep, such as obesity, cardiovascular disease, and diabetes can play as a mediator in the relationship between sleep and death.[24]

The results of a study showed that there is a significant correlation between the overall quality of life and SQ in nurses.[31] However, the correlation observed in their study was stronger than the present study. This difference is likely to be due to the high percentage of employment in night shifts in their study. Another study among diabetic patients in Hamedan showed that the SQ score was significantly correlated with physical dimensions of quality of life.[31] Other studies have shown a significant relationship between SQ of life among different groups, including the elderly,[32] and patients with chronic heart failure.[33] Studies also have shown that there is a strong correlation between SQ with indicators such as occupational activity, psychological and physical well-being, and even death.[34] Besides, problems such as depression, tension, anxiety, and general health problems among people with sleep problems are more common.[39]

In the present study, there was a significant relationship between job satisfaction and SQ, so that those with higher job satisfaction had better SQ. In line with this study, Knudsen and colleagues found that there is a significant relationship between the various dimensions of occupational stress with subscales of SQ in full-time American workers.[12]

In the present study, the majority of workers did not use sleep medications, which is consistent with the previous study.[8] Moreover, 23.7% had daytime dysfunction, which was about 4 times higher compared to a similar study.[10] Other results of the present study showed that there is a negative and significant correlation between job satisfaction and an overall score of SQ, meaning that higher job satisfaction will lead to better SQ, which is consistent with other studies in different occupational groups.[4,23]

In the present study, there was a positive and significant correlation between job satisfaction and physical and mental dimensions of HRQL, consistent with a study on teachers of Gilan-e gharb city.[16] Among the most important outcomes of job, dissatisfaction is job burnout and occupational stress, which can overwhelm both the physical and mental dimensions of HRQL.[37,38]

Job satisfaction can improve health through various mechanisms. It has been emphasized that increasing the level of job support including financial and emotional at the organization level and among employees can lead to increased job satisfaction and can be affected as a factor in personal health promotion. In this situation, individuals always perceived themselves in a network of job-assuring relationships with their colleagues, that this reduces the level of anxiety, depression, and ill health.[39]

Disturbance in sleep patterns can lead to impaired activity, mental confusion, sleepiness and distraction,[40] and overall causes of adverse effects on both workers’ safety and health and the profitability of employers.[41] Therefore, given the high prevalence of sleep problems among industrial workers in this study, occupational health experts have been recommended to take additional supportive and supervisory measures to monitor workers who work with sensitive devices. Occupational health experts have given the position of employers in policy-making, need to demand from them policies and executive programs that promote adequate sleep in workers. Sleepiness during work can lead to carelessness in doing work, reduced work efficiency, increased personal errors, and occupational accidents. A study in Japan showed that there was a significant relationship between the prevalence of occupational accidents and excessive drowsiness.[42] Occupational health professionals are advised to pay more attention to the field of occupational health psychology and to inform workers about the dangers of sleepiness and subsequent injuries. It is also recommended that occupational medicine physicians pay attention to the sleep problems of workers during their clinical examinations. Given the stronger association between SQ and the physical dimension of quality of life, especially physical pain among workers, it is recommended that supportive measures and counseling on sleep-related problems be taken in workers who have a common physical complaint.

**Conclusion**

The results of this study showed that more than half of the workers reported poor quality of life. Besides, the majority of workers had some degree of sleep problems. The results also confirmed that there is a moderate correlation between SQ and quality of life in industrial workers. One of the limitations of this research is the self-report of the research variables. Another limitation is that the present study is conducted only among male workers, and it is recommended that female workers be investigated in future studies.
Declarations of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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