Impact of shift work on sleep and quality of life in industrial workers: A cross sectional study

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Abstract

Introduction: Shift work is associated with impaired sleep patterns, poor quality of life (QOL), and several medical conditions. Shift work disrupts the sleep-wake cycle and biological rhythms. Poor sleep quality and disruption of the normal circadian cycle are likely to cause cardiovascular disorders, obesity, diabetes mellitus, anxiety, depression, lethargy, and fatigue. It is also associated with diminished vigilance and work performance.

Aim: The aim of the study is to evaluate the impact of shift work on quality of sleep and QOL in industrial workers.

Methodology: This is a cross-sectional, comparative study conducted on 147 rotating shift work employees and 132 regular nonshift day workers in various industries. Semi-structured pro forma was used for sociodemographic data. Pittsburgh Sleep Quality Index and Epworth Sleepiness Scale were used to assess the quality of sleep. The WHO-5 Well-Being Index and WHOQOL-BREF were used to assess the QOL. Appropriate statistical methods were used to analyze the data.

Results: Compared with nonshift day workers, those work for variable shifts exhibited higher rates of heavy smoking and increased caffeine consumption. Variable shift workers reported persistent sleep disturbance, poor sleep quality, and daytime sleepiness compared to fixed day shift workers (P < 0.05). The overall QOL score and well-being index were also significantly (P < 0.05) low in shift workers compared to nonshift day workers.

Conclusion: Shift work has a significant negative impact on quality of sleep and QOL and results in poor functioning and disturbances in mental and physical health of the individual. Hence, attention must be paid to the strategies that can improve the quality of sleep and QOL.

Keywords: Industrial workers, quality of life, quality of sleep, shift work

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INTRODUCTION

Industrial and technological development with increasing competition between various industries and even countries increased the need for 24 h day of productivity and shift work. Shift work is a working system in which different groups of workers divide work across the 24 h of the day to provide continuous service coverage.[1] Shift work, especially night shift, can have deteriorating effects on health, the quality of life (QOL), and social functioning of the workers. Shift work is associated with impaired sleep patterns, disruptions in social and family life, and a risk factor for several medical conditions.[1,3] The organization of the shift cycle, the coping strategies of the individual, and the psychological demands make important contributions to both social and health consequences of shift work.[2] Some authors have suggested that sleep problems are the most important reason of quitting shift work.[3,4]

Shift work disrupts the sleep-wake cycle/circadian rhythm and its synchrony with other endogenous biological rhythms that can cause sleepiness when wakefulness is required and insomnia during the main sleep period.[1,5-7] Shift work can result in insomnia, poor sleep quality, and daytime sleepiness. The most common complaint is loss of subjective sleep quality.[1] Earlier studies have shown that most people who work in shifts have sleep pattern disturbances.[8,9] Studies have shown that due to shift work, the main sleep period at an unusual time is 1–4 h shorter than night sleep.[10] However, other factors are also involved in the deterioration of sleep quality: fatigue, stress, daylight, health, and age.[10] Poor sleep has important implications for shift workers, and evidence suggests associations with poor health, reduced productivity, poor QOL, increased accidents at work, and absenteeism.[11,12] Another study reported higher rates of cigarette smoking and the use of sleeping pills and alcohol among variable-shift workers.[11,12] It has also been reported that relatively moderate levels of sleepiness impair performance to an extent that is equivalent to or greater than that currently acceptable for alcohol intoxication.[13]

Poor sleep quality and disruption of the normal circadian cycle are likely to cause sleep deprivation, cardiovascular disorders, obesity, diabetes mellitus, anxiety, depression, lethargy and fatigue, and impairment of cognitive function.[9] It is also associated with diminished vigilance and work performance.[14] Earlier studies have linked mental health disorders such as depression and anxiety to shift work.[1,15] There is not much Indian research carried out on the impact of shift work on sleep and QOL. The current study tries to evaluate the impact of shift work on quality of sleep and QOL.

Aims and objectives
1. To evaluate the impact of shift work on sleep and QOL
2. To compare sleep and QOL in rotating shift workers with nonshift day workers.
METHODOLOGY

This is a cross-sectional, comparative study conducted on 147 rotating shift work employees and 132 regular nonshift day workers between April 2018 and June 2018 at various industries in Visakhapatnam. Study is conducted after obtaining approval from the Institutional Ethics Committee and the permission from industrial authorities and written informed consent from workers. Study is conducted using consecutive convenient random sampling. Semi-structured pro forma was used for sociodemographic data, average sleep duration, and coping strategies. Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) were used to assess the quality of sleep. WHO-5 Well-Being Index and WHOQOL-BREF were used to assess the QOL.

The PSQI[16] is a self-report questionnaire that assesses sleep quality over 1-month time interval. The measure consists of 19 individual items, creating 7 components that produce one global score and takes 5–10 min to complete. The component scores consist of subjective sleep quality, sleep latency (i.e., how long it takes to fall asleep), sleep duration, habitual sleep efficiency (i.e., the percentage of time in bed that one is asleep), sleep disturbances, use of sleeping medication, and daytime dysfunction. Each item is weighted on a 0–3 interval scale. The global PSQI score is then calculated by totaling the seven component scores, providing an overall score ranging from 0 to 21, where lower scores denote a healthier sleep quality.

The ESS[17,18] is a scale intended to measure daytime sleepiness. The questionnaire asks the participant to rate his or her probability of falling asleep on a scale of increasing probability from 0 to 3 for eight different situations that most people engage in during their daily lives although not necessarily every day. The scores for the eight questions are added together to obtain a single number. A number in the 0–9 range is considered to be normal while a number in the 10–24 range indicates that expert medical advice should be sought.

The WHO-5 Well-Being Index[19] is a short questionnaire consisting of 5 simple and noninvasive questions, which tap into the subjective well-being in the past 2 weeks. The raw score is calculated by totaling the figures of the five answers. The raw score ranges from 0 to 25, 0 representing worst possible and 25 representing best possible QOL. To obtain a percentage score ranging from 0 to 100, the raw score is multiplied by 4. A percentage score of 0 represents worst possible, whereas a score of 100 represents best possible QOL. Evidence suggests that raw score <13 or a transformed score <50 is indicative for low mood and warrants further assessment.

QOL Instrument (WHOQOL-BREF)[20,21] is a structured self-report interview, developed by the WHO division of mental health. It consists of 26 items. Its purpose is to assess QOL of person. It assesses patients under four domains which are physical, psychological, social, and environmental (each domain to score of 100).

Statistical analysis

Descriptive and appropriate statistics such as Chi-square, t-test, and ANOVA were used to analyze the compiled data using the Statistical Package for the Social Sciences version 25 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.).

OBSERVATIONS AND RESULTS

A total of 278 industrial workers were recruited in the study. Out of which, 147 (52.9%) were of rotating shift work and 131 (47.1%) were of nonshift day workers.

Age, sex, and marital status of shift workers showed significant difference compared to those of nonshift workers with $P < 0.05$ [Table 1].

There is a significant association between shift work and average duration of sleep, quality of sleep, and substance use to stay awake during work with a $P < 0.05$ [Table 2].

There is a significant association between shift work and WHO 5 Well-Being Index and physical, psychological, and social domains of QOL, with $P < 0.05$. There is a significant association between the overall QOL score and shift work with $P < 0.00$ [Table 3].

DISCUSSION

In a competitive world of industries where shift work is a reality, it is important to know the effects of shift work on health and QOL. Shift work can impact day-to-day life and behavioral patterns. In our study, age, sex, and marital status of shift workers showed significant difference compared to those of nonshift workers. The mean age of rotating shift workers (19.67) was significantly less than that of fixed daytime workers (31.80). This might be due to regional selection of younger people for shift jobs soon after completing their education and in the long-term change to fixed daytime work.

In our study, we found significantly higher scores on PSQI scale and ESS in shift workers indicating poor quality of
sleep and excessive daytime sleepiness ($P < 0.05$). The mean PSQI score for shift workers (7.31) was much high compared to that of nonshift day workers (3.55). The mean ESS score was also much high in rotating shift workers (7.91) compared to nonshift day workers (2.44). Average duration of sleep was also significantly lower in shift workers (6.63) when compared to nonshift workers (7.08) ($P < 0.05$). These findings are in correlation to the studies done by Paim et al.,[4] Waage et al.,[2] Yazdi et al.,[7] Niu et al.,[8] Olawale et al.,[13] and Ohayon et al.,[23] which showed association of shift work with poor sleep quality and/or sleep disorders. There was a significant association between shift work and increased consumption of coffee and tobacco to stay awake during work in shift workers ($P < 0.05$). Coffee was consumed by 87 shift work employees (59.2%) whereas only 54 among the nonshift daytime workers (41.2%) consumed coffee. Cigarette smoking was present in 58 (39.5%) shift workers whereas only 33 (25.2%) nonshift workers smoked cigarette. These findings were in accordance to the results of study by Krishnaswamy et al.[13]

In our study, we found significant association between shift work and QOL in various domains such as physical, psychological, and social domains ($P < 0.05$). Mean score on physical domain of QOL for shift workers (59.66) was comparatively lesser than that of nonshift day workers (65.59). Mean score on psychological domain of QOL was also found to be significantly low for rotating shift workers (55.16) compared to nonshift day workers (58.79). Even the mean scores of social domain of QOL are much less for rotating shift workers (51.36) compared to nonshift day workers (61.17). However, in our study, though the mean scores of QOL in environmental domain were less in rotating shift workers (62.88) than that in nonshift workers (64.78), it was not statistically significant. Shift workers also have significantly low scores of QOL in various domains such as physical, psychological, and social domains ($P < 0.05$) low in shift workers compared to nonshift day workers. These findings may be due to impairment of sleep and job stress. These findings are in accordance with earlier studies by Olawale et al.,[13] and Boughattas et al.,[23]

**Limitations**

1. The findings are related to industries localized in one area and hence cannot be generalized to all industries.
2. The whole study is based on self-reported questionnaire, and objective measures were not included like polysomnography which are required for the full evaluation of sleep. Hence, the results may be vulnerable to bias. Further large studies with objective measures may yield better results.

**CONCLUSION**

Shift work has a significant negative impact on quality of sleep and QOL that may result in poor functioning and disturbances in mental and physical health of the individual. Hence, this issue needs to be addressed and attention must be paid to the strategies that will improve the quality of sleep and QOL in shift work employees in industries.

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**Conflicts of interest**

There are no conflicts of interest.

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