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Stress Levels and Sleep Pattern of Industrial Workers

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Abstract

Industrialization has brought several changes in the society and lifestyle. Stress and sleep plays an inevitable role in maintaining the health status of an individual. Stress has caused negative impact on physical health. Both physical and mental illness have impact on job satisfaction and it reduces work performance. Work stress has become a widespread and expensive health problem. Sleep and mental health are intrinsically connected. Less hours of sleep and poor sleep quality have influence in the lifestyle pattern. An Exploratory research design of 500 industrial workers in various industrial sectors in Tamil Nadu were chosen as the study participants. The stress levels and sleep quality was assessed using standard tools such as Perceived Stress Scale and Pittsburgh Sleep Quality Index. Majority 65% of the participants were male and 35% were female; 60.4 % of the participants had poor sleep quality and 57.4 % had higher stress levels. Stress and sleep have a reciprocal relationship. There was a significant association between stress levels and sleep quality. Higher the stress scores, poorer the sleep quality. Work hours and sleep hours also have an impact on the levels of stress. Higher stress levels was observed among majority of the participants. Healthy coping strategies must be adopted in stress management, improving sleep quality and in maintaining a healthy lifestyle.

Keywords: *Industrialization, Stress, Sleep, Lifestyle, Industrial Workers*

1. Introduction

Industrialization has brought immense changes in society and lifestyle. It has sparked the emergence of opportunities among individuals. Industries have transformed commoners into a new working class of individuals who work in factories [1]. Health status plays a significant role in attaining the productivity in workplace. The workplace is one of the settings where a variety of risks and consequences related to health, functioning and quality of life can occur. Communicable diseases, non- communicable diseases and occupational illness are the most common health problems associated with industrial workers. [2]

Stress has been explained by psychologists as a state of tension and pressure in the mind. Low amounts of stress may be beneficial and healthy [3]. Every individual encounters stress at some point in their lives as it is a natural component of life. In 1936, Hans Selye introduced the concept of stress and described it as "the nonspecific response of the body to any demand for change." Individuals go through thousands of different stress-related experiences in their lifetime. Stress levels can range from extremely high to very low. Stress is a common occurrence throughout every phase of the human lifespan. People can be affected by stress in both positive and negative ways [4].

Stress could be typical and adaptive response to danger. Its purpose is to alert people to danger and get them ready to defend themselves. The effects of stress on one's mental and physical health are detrimental. A majority of psychologists claim that mild stress inspires people to work hard, fosters creativity and increase productivity. Eustress is the name for this stress. Although extreme stress may prevent people from performing well on challenging activities. Distress is the term for this stress.

Additionally, stress causes an increase in substance abuse, eating disorders, accidents and smoking. Stress or distress at a high level can have a negative impact on health [4]. Over the past few years, work-related stress and its harmful impacts on human health have risen sharply. It results in a variety of stress reactions and leads to several diseases [5].

Sleep is an essential human function as it gives our bodies and minds to rejuvenate. The human body do not receive the full benefits of sleep, such as memory consolidation and muscle repair, when there is sleep deprivation. Poor sleep quality can impair mood, memory and judgement. Chronic sleep deprivation can contribute to health issues such as obesity and high blood pressure and drowsiness [6].

Poor quality of life (QOL), disrupted sleep habits, and a number of medical issues are all linked to shift employment. The sleep-wake cycle and biological rhythms are disturbed by shift work. Heart disease, obesity, diabetes, depression, anxiety, and exhaustion are all likely to result from poor sleep quality and disruptions to the circadian cycle. Additionally, it is linked to decreased vigilance and productivity at work [7].

There is a strong correlation between sleep quality and both physical and mental health. Sleep quality varies over the course of a person's life due to both biological and social influences. Both short and long sleeper exhibit elevated risk for a variety of health consequences, albeit the underlying causes vary. The emergence of mental health diseases is also influenced by sleep difficulties [8].

Elevated levels of systemic inflammation are linked to psychosocial stress, whether it is acute or chronic. Higher levels of inflammatory activity also appear to be linked to insufficient sleep, especially sleep disruptions. In several of contexts, women appear to have higher correlations between stress and inflammation than men. Systemic inflammation is frequently predicted by stress and sleep deprivation [9].

This study aimed to explore the sleep pattern and stress levels among industrial workers of various industrial sectors in Tamil Nadu. Stress and Sleep have a reciprocal relationship. Stress levels have an impact on the sleep quality.

2. Materials And Methods

Design of the study

This study is an Exploratory research design The study was designed to assess the 500 industrial workers working in various industrial sectors in Chennai.

Sample size and selection of subjects

A sample size of 500 industrial workers in various industrial sectors in Tamil Nadu were selected using purposive sampling technique. Industrial workers in the age group of 21 – 60 years and willingness to participate in the study were the criteria used

Objectives of the study

To elicit information on the demographic profile of industrial workers using a validated questionnaire and to assess the stress levels and sleep pattern.

Data collection

The study was explained to the participants and the informed consent was given according to the willingness of the participant. Standardized questionnaire was used to elicit information on socio demographic details.

The sleep quality and stress levels was assessed using standard tools such as Perceived Stress Scale of Sheldon Cohen and Pittsburgh Sleep Quality Index of Daniel J. Buysse Sleep quality and sleep pattern of the industrial workers was assessed using Pittsburgh Sleep Quality Index (PSQI). The tool differentiates “poor” from “good” sleep by measuring seven domains: sleep quality, sleep inaction, sleep period, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction. The sleep component scores are summed to yield a total score ranging from 0 to 21. Higher the total score indicates poor quality of sleep.

Stress is a major cause for health problems among industrial workers. Stress level of the industrial workers was assessed using the perceived stress scale (PSS) developed by Sheldon Cohen in 1983. The tool consists of 10 items that includes questions about participant’s stressful thoughts of feelings related to situations in their life within the last month. Out of 10 questions, 6 are negative and 4 are positive questions which the industrial workers should rate each questions on a 5-point hedonic scale. The options provided in the 5-point hedonic scale are ‘never’, ‘almost never’, ‘sometimes’, ‘fairly

often' and 'very often'. The perceived stress scale ranged from 0 to 40 where 0 – 13 were categorized under low stress, 14 – 26 medium stress and 27 – 40 high stress.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) version 23.0 software was used to conduct the statistical analysis (SPSS Inc., Chicago, IL, USA). Categorical variables were expressed as percentages. Chi square test and Pearsons Correlation were the tests performed

3. Results and Discussion

Socio-demographic profile of Industrial Workers

The present study was carried out among 500 industrial workers of various industrial sectors in Tamil Nadu. The socio - demographic profile of the industrial workers included gender, age, type of industry, shift work and work hours. Sociodemographic profile of industrial workers is presented in Table 1.

Table 1: Sociodemographic profile

Socio-demographic profile	Number (n=500)	Percentage
Gender		
Male	325	65.0
Female	175	35.0
Age (In Years)		
21 – 30	77	15.4
31 – 40	285	57.0
41 – 50	73	14.6
51 – 60	65	13.0
Type of Industry		
Food industry	142	28.4
Manufacturing industry	138	27.6
Chemical industry	120	24.0
Water processing and service industry	100	20.0
Shift work		
Day	185	37.0
Night	207	41.4
Alternate	108	21.6
Work hours		
6 - 8 hours	64	12.8
More than 8 hours	436	87.2

It is observed that majority (65%) of the industrial workers were male and 35 per cent were female. It is also observed that 57 per cent of the industrial workers were in the age group of 31 – 40 years, 15.4 per cent were in the age group of 21 – 30 years. 28.4 per cent of the industrial workers belonged to food industry and 27.6 per cent belonged to manufacturing industry. Factory workers employed in shift work hours are often prone to disturbances in their family and social life. Most of the industrial workers, 41.4 per cent of the industrial workers were night shift workers followed by 37 per cent who were day shift workers. Majority (87.2%) of the industrial worked more than eight hours in a day.

Sleep Pattern and Stress Levels of Industrial Workers

The sleep pattern and stress levels was assessed using standard tools such as Pittsburgh sleep quality Perceived Stress Scale. In Pittsburgh Sleep Quality Index (PSQI), the sleep component scores are summed to yield a total score ranging from 0 to 21. The tool differentiates good sleep and bad sleep. Stress levels of the industrial workers was assessed using Perceived Stress Scale (PSS), The perceived stress scale ranges from 0 to 40 where 0 – 13 were categorized under low stress, 14 – 26 medium stress and 27 – 40 high stress. Sleep pattern and Stress levels of industrial workers is presented in Table 2.

Table 2: Sleep Pattern and Stress Levels of Industrial Workers

	Number (n=500)	Percentage
Sleep hours		
< 6 hours	295	59
6 – 8 hours	165	33
>8 hours	40	8

	Sleep quality	
Good sleep (Score - <5)	198	39.6
Poor sleep (Score - >5)	302	60.4
	Stress Score	
Low (Score – 0 - 13)	65	13.0
Moderate (Score – 14 – 26)	148	29.6
High (Score – 27 – 40)	287	57.4
	Symptoms experienced due to stress	
Frequent headache	47	9.4
Depression	227	45.4
Anxiety attack	28	5.6
Loss of appetite	58	11.6
Insomnia	140	28.0
	Job Stress	
Less than 1 year	156	31.2
1 – 5 years	248	49.6
More than 5 years	96	19.2
	Activities that relieve stress	
Exercise	21	4.2
Family outing	206	41.2
Movie	43	8.6
Hobby	21	4.2
Yoga / Meditation	91	18.2
Smoking	118	23.6

It is observed that majority (59%) of the industrial workers had a sleep pattern of less than six hours, 33 per cent of the industrial workers slept around 6- 8 hours in a day**.** Majority (60.4 %) of the industrial workers had a poor sleep quality. Then 57.4 per cent of the industrial workers experienced high stress levels followed by 29.6 who experienced moderate stress levels. Then 45.4 per cent of the industrial workers experienced depression due to stress and 28.0 experienced insomnia. Stress also has a negative impact on the physical health, and both physical and mental illness make the employee unfit for work. Work stress has become a widespread and expensive health problem. Majority (49.6 %) of the industrial workers experienced job stress around 1- 5 years followed by 31.2 per cent who experienced for more than five years. It is also observed that 41.2 per cent of the industrial workers had the practice of family outing as an activity to relieve stress followed by 23.6 per cent who smoked to relieve stress.

Table 3: Association between stress levels and sleep quality

Stress levels	Good sleep quality (per cent)	Bad sleep quality (per cent)	Chi square	Sig (2 tailed)
Low	98.4	1.6	442.888	0.000
Medium	90.5	9.5		
High	0	100		

Table 3 infers that majority (98.4%) of the industrial workers with low stress levels have good sleep quality. 90.5 per cent with medium stress levels had a good sleep quality. Majority (100 %) of the industrial workers with high stress levels had bad sleep quality. Stress and sleep have a reciprocal relationship. Correlation is significant at 0.01 level.

Table 4: Correlation between Stress scores and sleep quality score, work hours and sleep hours using Pearson Correlation Coefficient

		Sleep quality score	Work hours	Sleep hours
Stress Scores	Pearson Correlation	0.873	0.777	- 0.938
	Sig (2 tailed)	0.000	0.000	0.000
	N	500	500	500

Table 4 infers that when higher stress exists poorer the sleep quality, there is a significant association between the sleep quality scores and stress scores of the industrial workers, r = 0.873. Correlation is significant at 0.01 level. Stress has been found to have a direct relationship with poor sleep quality. When work hours is higher, higher is the stress levels, r = 0.777. There is a significant association between work hours and stress scores. Correlation is significant at the 0.01 level. Less sleep hours was associated with high stress levels, there is a significant association between the sleep hours and stress scores of the industrial workers, r= -0.938. Correlation is significant at the 0.01 level.

A country's progress is greatly aided by industrialization and the introduction of new technology. This study explored the stress levels and sleep pattern among industrial workers of various sectors in Tamil Nadu. In the present study carried out majority (65%) of the industrial workers were male and 35 per cent were female. It was also observed that 57 per cent of the industrial workers were in the age group of 31 – 40 years. In the current society, young adults prefer to work in the IT industry because of multiple career paths and high salaries. Then 28.4 per cent of the industrial workers were from the food industry followed by 27.6 per cent from manufacturing industry. Most of the industrial workers (41.4%) worked during the night. In the modern era, ten to thirty percent of the adult working population are employed in shift work. The unusual and frequently erratic work schedules need frequent, abrupt shifts in waking and sleeping times [10].

Night shift work can have a negative impact on the physical and mental health. The body's exposure to the natural light-dark cycle is changed by working nights, which throws off the body's circadian rhythms. Disruption of circadian rhythms results by working at night [11]. Majority (87.2 %) of the industrial workers worked more than eight hours. Most of the factory workers work more than eight hours because they have to accomplish the required day to day production and quality rates. In a study conducted by Zheng *et al.,* (2023) it was found that working more than nine hours reduces job satisfaction and also the adverse effects of long working hours on job satisfaction are mediated by poor physical health [12]. Working long hours and getting inadequate sleep have been linked to decreased worker safety [13]. Long working hours can negatively impact workers which can result in various health risks such as CVD, hypertension, poor sleep quality, stress, depression and various other health risks [14].

Majority (59%) of the industrial workers slept less than 6 hours every day followed by 33 per cent who slept 6- 8 hours. Most of the industrial workers (60.4%) had poor sleep quality. Less hours of sleep and poor sleep quality has an influence in the lifestyle pattern. In a study conducted by Diaz *et al.,* 2022 among higher prevalence of heightened acute stress symptoms, depressive symptoms, and anxiety symptoms was seen in individuals who slept less than six hours per night and who had moderate and severe insomnia symptoms [15].

Sleep and mental health are intrinsically connected, with persistent sleep problems being closely associated with depression, anxiety, and other mental health issues because of the close connection between sleep and mental health, sleep issues like insomnia can contribute to and are a result of mental health issues [16]. Recent research indicates that inadequate sleep has an effect on depressive mood disorders [17]. Insomnia symptoms and reduced sleep duration are common in shift workers, notably those who work overnight, early in the morning, or shift labour [18].

Industrial workers experience stress due to work pressure. The phenomena of workplace stress is so widespread that many people don't even realize it exists and are just accepting of it as a normal part of their employment. Individuals respond differently to stress. The effect of stress varies from individual to individual. Any emotional, physical, social, economic, or other circumstances that demand a reaction or change can cause stress [19]. In the present study carried out majority (57.4%) of the industrial workers experienced high stress followed by 29.6 per cent who experienced moderate stress. The study showed strong associations between levels of perceived stress at work and exposure to potentially stressful work characteristics such as working long hours, high exposure to noise and high workload.

Majority (49.6%) of the industrial workers experienced job stress for 1 – 5 years and the most common symptoms experienced due to stress were depression (45.4%) and insomnia (28%). This study is in line with the study conducted by Kploanyi *et al*., 2020 where major psychiatric conditions such as depression and insomnia are predicted by job stress and also insomnia was reported among employees who experienced extreme job stress [20].

Various activities were performed by industrial workers to relieve stress, 41.2 per cent of the industrial workers had the practice of family outing as an activity to relieve stress followed by 23.6 per cent who smoked to relieve stress and 18.2 per cent performed yoga or meditation to relieve from

stress. In a study conducted by Rao and Ramesh (2015) it was observed that 18 - 36 per cent of the industrial workers experience anxiety and stress [21]. Industrial workers believe that smoking reduces stress but smoking increases the chances of developing depression. The risk of depression increases with smoking volume and frequency, whereas the risk of depression decreases with quitting smoking [22]. Studies have revealed that yoga improves the treatment of ailments by enhancing physical illness and promoting mental peace by removing tension, anxiety, and depression. It also improves a person's quality of life and bring about beneficial changes like increased happiness and well-being [23].

A basic human need is sleep. Good sleep is defined as sleep that is satisfactory (enough in duration and of high quality), whereas bad sleep is defined as sleep that leaves people feeling dissatisfied. Anxiety, stress, exhaustion, impaired intellectual function, cognitive impairments, and depression are all caused by poor sleep quality [24]. Independent risk variables for poor sleep quality included long work hours, physical disease, and mental illnesses such anxiety and depression. Poor sleep promotes disease and unfavorable health consequences [25]. Good sleep quality can be attained by optimal schedule and maintaining good physical and mental health [26].

In the present study carried out there is a significant association between stress levels and sleep quality. Higher the stress levels poorer the sleep quality. Long working hours as a significant impact on the stress levels. Stress and Sleep have a reciprocal relationship. In a study conducted by Getahun *et al*., 2023 where prevalence of poor sleep quality was higher among garment and textile industrial workers in which working hours had an impact on the sleep quality [27]. In a study conducted by Park *et al*., 2020 long working hours were associated with stress among young Korean employees aged to 20 to 35. Long work hours are known to have a negative impact on both physical and mental health. Individuals who are frequently under stress may have depression, which can worsen their health and their quality of life [28]

Stress levels was found to be higher among the industrial workers which had an impact on the sleep quality. Cognitive functions are also disrupted due to lack of sleep. Industrial workers experience depression, insomnia and anxiety due to stress. Previous studies recruiting civil servants also reported on the effects of psychological stress on sleep. High perceived stress increased the risk of poor sleep quality in Japanese public servants 35 years of age and older [29].

In a study conducted by Haghighi *et al*., 2021 it was observed that workers who experienced insomnia and depression reported demand in increased rest time during work and also had lower job satisfaction [30]. The stress levels of industrial workers had a significant association with work hours, sleep hours and sleep quality. Increased stress levels has detrimental effects in the overall health of an individual. Healthy coping strategies must be adopted to relieve stress and improve the sleep quality of industrial workers

4. Conclusion

The present study was carried out among industrial workers of various sectors. Most of the industrial workers were male and most of them worked in night shift. Night shift work has adverse effects on the overall health and well-being of an individual. The relationship that exists between the situation and the person is stress. When an individual's resources are insufficient to meet the demands and strain of the circumstance, a psychological and physical state ensues. This study showed that high to moderate level of stress is common among in industrial workers. Majority of the industrial workers experienced high stress due to shift work and work pressure to attain productivity. Occupational stress related to responsibility associated with work, corporate culture or personality conflicts can lead to physical as well as emotional disorder and may lead to depression. Less sleep hours has an impact on the sleep quality and the overall health of an individual. Poor sleep quality was observed among most of the industrial workers in the present study. It was also observed that in the present study job stress was experienced by industrial workers for 1- 5 years. Insomnia and depression were the common symptoms experienced due to stress. The stress levels was found to be very high which had an impact on the number of sleep hours and sleep quality. Stress levels was significantly associated with long work hours, sleep hours and sleep quality. Healthy coping strategies must be inculcated to reduce stress levels and improve sleep quality to live a productive and healthy lifestyle.

Conflict of Interest

Nil

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