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PREVALENCE OF INSOMNIA AMONG WORKERS IN AN INDUSTRY UTILISING ASBESTOS CONTAINING MATERIALS IN AMBATTUR, TAMIL NADU, INDIA.

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Abstract

Introduction: - Insomnia is a growing public health concern and it is characterised by difficulty in initiating and maintaining sleep. Individuals working in occupations with exposure to respiratory irritants may be at elevated risk of developing insomnia.

Objective: To estimate the prevalence of insomnia in an industry utilising asbestos containing materials & to analyse the factors contributing to it.

Methodology: A cross sectional study was conducted among 100 workers in an industry utilising asbestos containing materials in Ambattur, Tamil Nadu after getting the IHEC approval & consent. Socio demographic information of the study participants were obtained through a semi structured questionnaire, and the prevalence of insomnia was measured using Insomnia Severity Index (ISI). Collected data was entered in the MS Excel & statistical analysis was done using Jamovi 2.6.4. Socio demographic and environmental characteristics of the study participants were described using descriptive statistics. Frequencies and percentages were used to present categorical data, while continuous data were expressed as mean and standard deviation. The Chi-square test was applied for Statistical analysis, and a p-value of less than 0.05 was considered as statistically significant.

Results: The prevalence of insomnia was found to be 23% among the study participants of which 18% were having moderate insomnia, 5% were having severe insomnia based on the ISI questionnaire. 36% of the study participants reported subthreshold insomnia. There was a statistically significant association between age(OR-3.93(95% CI -1.63-9.47), gender (OR-2.991(95%CI=1.079-8.296), travel time(OR=5.639(95%CI= 2.064-15.41), working hours (OR-2.636(95%CI=1.117-6.223, Night shift workers (OR-5.639(95%CI=2.064-15.41) with Insomnia.

Conclusion: The findings suggest Insomnia is prevalent among the study participants in an industry utilizing asbestos-containing materials. This study provides important finding of a strong association between occupational, demographic factors and insomnia. These findings underscore the need for occupational health screening and interventions to address sleep disorders this vulnerable population.

Keywords: Insomnia, Asbestos, Industrial Workers, Occupational Health, India

INTRODUCTION

Insomnia is a growing public health concern which is defined as persistent difficulty in initiating or maintaining sleep or a report of nonrestorative sleep accompanied by related daytime impairment.[1] It affects between 2.3% to 25.5%[2] of the adults globally, with prevalence rates among shift workers ranging that ranges from 12.8% to 76.4%.[3] Insomnia can lead to health-related complications in various ways. It causes cardiovascular problems such as hypertension, increased risk of an episode of cardiac & cerebral ischemia[4], metabolic disorders,[5] depression,[6] and impaired immune system.[7] In the occupational setting, Insomnia have been related to decreased productivity, a drop in cognitive performance,[8] Increased absenteeism,[9] and increased hazard of occupational injuries.[10]

Asbestos is a type of fibrous silicate mineral which is well known for its thermal stability and corrosion resistance properties. However, occupational exposure to asbestos has been associated with variety of health problems including asbestosis,[11] lung cancer,[12,13] Mesothelioma.[14,13] Recognising its carcinogenic potential, WHO classifies Asbestos as an occupational carcinogen, and its use has been banned or restricted in many countries.[15] In India, asbestos mining is completely banned, however asbestos-based products such as cement sheets and pipes continue to be manufactured, placing workers in these industries at potential risk of exposure.[14]
The combination of physical strain, toxic exposures, and psychological stressors in such occupational environments may contribute to sleep disturbances, including insomnia.[16] Despite this, there is limited evidence exploring insomnia among workers in asbestos-related industries in India. Our study aimed to estimate the prevalence of insomnia among industry utilising asbestos containing materials & to analyse the factors contributing to it.

METHODOLOGY

This cross-sectional analytical study was conducted in an industry utilizing asbestos-containing materials in Ambattur in the two-month duration between November and December 2023 in Chennai, Tamil Nadu, India. To estimate the prevalence of insomnia in an industry utilising asbestos containing materials & to analyse the factors contributing to it. After obtaining IHEC approval, Participants who were workers from the factory were included in the study after obtaining permission from the factory's human resources department. Participation in the study was voluntary and no monetary benefits were provided. The inclusion criteria included workers aged 18 years and above who were willing to provide informed consent & working for than more one year. Participants who were not part of directly exposed to the asbestos were excluded. Based on the universal sampling technique & inclusion criteria total of one hundred participants were selected for the study. Socio demographic information of the study participants included age, gender, education, type of family, socio economic status, work experience, travelling time, personal habits and Insomnia severity index was used to asses insomnia. Insomnia severity index is a seven item questionnaire for assessing common sleep issues such as trouble falling sleep, Staying sleep or waking up early from sleep as well as how this problem affects daily life. Each question is rated on a 5 point Likert scale ranging from 0-4 with a total score between 0 to 28. Based on the score, insomnia can be classified as, 0-7:no significant insomnia, 8-14: subthreshold insomnia, 15-21: moderate insomnia, 22-28: Severe insomnia.[17] The Insomnia severity index (ISI) has sensitivity of 86.1% and specificity of 87.1% in identifying insomnia.[18] Collected Data was entered in the MS Excel & statistical analysis was done using Jamovi 2.6.4. Socio demographic and environmental characteristics of the study participants were described using descriptive statistics. Frequencies and percentages were used to present categorical data, while continuous data were expressed as mean and standard deviation. The Chi-square test was applied for Statistical analysis, and a p-value of less than 0.05 was considered as statistically significant.

RESULTS:

Among one hundred study participants, mean age (S.D) of the participants were 37.4± 10.4 years. Males were 74(74%) & females were 26(26%).

Table 1:- Distribution of the study participants based on Socio demographic & Environmental characteristics.

Characteristics		n(%)
Age	18-29 Years	26(26%)
	30-39 years	31(31%)
	40-49 years	29(29%)
	>50 years	14(14%)
Gender	Male	74(74%)
	Female	26(26%)
Education	Illiterate	6(6%)
	Primary	31(31%)
	Higher secondary	54(54%)
	Graduate	9(9%)
Socio economic status based on BG prasad scale 2023	Class I	3(3%)
	Class II	35(35%)
	Class III	42(42%)
	Class IV	20(20%)
Type of family	Nuclear	79(79%)
	Joint	21(21%)
Work experience	<3 years	51(51%)
	3-5 years	25(25%)
	>5 years	24(24%)

Travelling time	<1 hour	58(58%)
	1-2 hour	36(36%)
	>2 hour	6(6%)
Substance Abuse	Alcohol	42(42%)
	Smoking	24(24%)
	Tobacco chewing	17(17%)
	None	17(17%)
Working hours	<8 hours	55(55%)
	>8hours	45(45%)
Employment status	Temporary	40(40%)
	Permanent	60(60%)
Shift	Day shift	65(65%)
	Night/Rotating shift	35(35%)

Table 1 Distribution of the study participants based on Socio demographic & Environmental characteristics. Distribution of age of the study participants was as follows, 26(26%) study participants were present in the 18-29 years age group, 31(31%) were between 30-39 years, 29(29%) were between 40-49 years and 14(14%) were above 50 years. In terms of education, 6(6%) were illiterate, 31(31%) had primary level education , 54(54%) had a higher secondary education and 9(9%) graduates. The Socio economic status was assessed by modified BG Prasad Socioeconomic scale 2023 which showed majority of study participants belonged to the Class III middle class (42%) and class II upper middle class(35%). About 79(79%) belonged to nuclear family remaining 21(21%) belonged to the joint family. 51(51%) study participants had less than 3 years of experience while 25(25%) participants had 3 to 5 years of experience and 24(24%) participants had worked more than 5 years.

Based on travelling time on day to day basis from households to industry, 58(58%) participants commuted less than one hour, for 36(36%) participants it took between 1-2hours, while for 6 (6%) participants it took more than 2 hours. A total of 45% worked more than 8 hours per day, and 40% were temporary workers. The study also noted that 42% of participants consumed alcohol, 24% smoked, and 17% used chewing tobacco, with 17% reporting no substance abuse. 55 participants worked ≤ 8 hours per day, while 45(45%) worked more than 8 hours per day. 60(60%) participants were employed on regular basis while 40(40%) participants worked on temporary basis.

Table 2:- Distribution of the study participants based on Insomnia Severity Index (ISI) questionnaire responses

Q.no	ISI Category	Insomnia scoring				
		0	1	2	3	4
1	Difficulty falling a sleep	68	8	16	5	3
2	Difficulty staying a sleep	73	5	12	6	4
3	Problems waking up	53	15	17	8	7
4	Satisfaction with sleep pattern	82	5	6	5	2
5	Impairing quality of life	17	18	5	35	25
6	Worried/Distressed about current sleep problem	6	24	32	28	20
7	Interference with daily functioning	7	23	27	33	10

Note:-
Q.no, 1,2,3-Scoring is 0-None, 1- Mild, 2- Moderate, 3- Severe, 4 – very severe
Q.no, 4- Scoring is 0-Very satisfied, 1-Satisfied, 2- Moderately satisfied, 3- Dissatisfied, 4- Very Dissatisfied
Q.no 5,6,7-Scoring is 0- Not at all noticeable, 1-Little, 2- Somewhat, 3-Much, 4-Very much noticeable
Table 2 Shows distribution of the study participants based on Insomnia severity index questionnaire responses. Out of the total 100 study participants. A significant majority 68(68%) participants reported no troubles falling asleep and 73(73%) had no difficulty staying a sleep throughout night. Over half of the participants 53(53%) also had no issues waking up too early.

However on looking at the broader impact of sleep problems, While 82(82%) of participants expressed satisfaction with sleep, many reported that their sleep difficulties affect daily lives. Specifically 60(60%) of the participants felt their quality of life was ‘much’ or ‘very much’ affected by sleep problems. This distress was evident with responses with 48(48%) reported that they were ‘much’ or ‘very much’ worried about current sleep issues. Finally, effects of

this sleep problems were noticeable in their day to day routines. A total of 43(43%) participants said their sleep interfered with their daily activities.

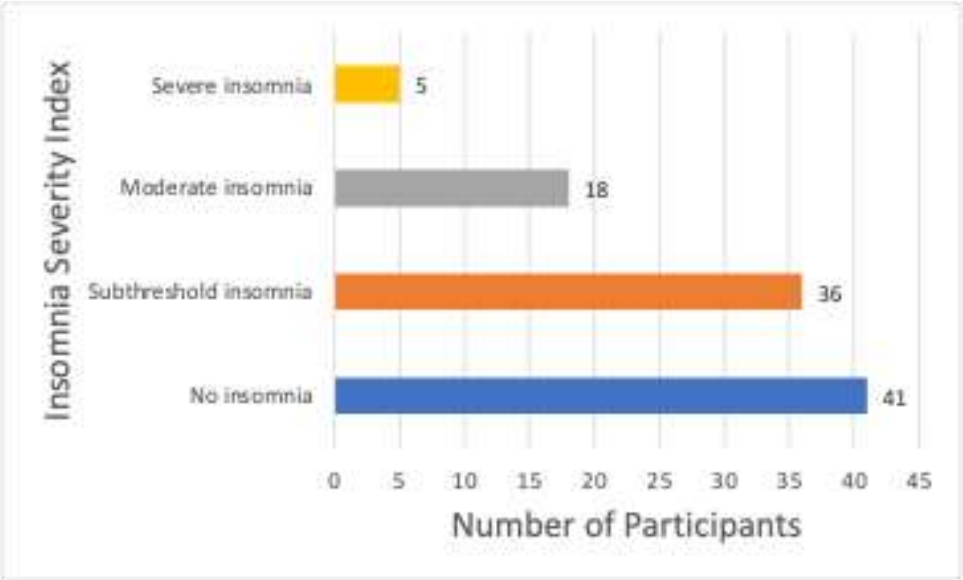

Figure 1. Prevalence of the insomnia among study participants categorised as mild, moderate, subthreshold and no insomnia.

Figure 1 illustrates the prevalence of the insomnia among study participants categorised as mild, moderate, subthreshold, no insomnia based on ISI scores. Mean Insomnia index severity score(ISI) among the study participants was 9.8±4.5. The overall prevalence of clinical insomnia was 23%, with 18% reporting moderate (ISI Scores 15-21) and 5% reporting severe insomnia(ISI Scores 22-28) . Additionally, 36% of the participants were classified as having subthreshold insomnia(ISI Scores 0-7). Only 41% of the total study participants had no clinically significant insomnia

Table 3:-Association between Sociodemographic characters, environmental factors and Insomnia

Characteristics		Insomnia present	Insomnia absent	Odds ratio (95%CI)	P-Value
Age	>40	33	10	3.9(1.6-9.4)	<0.001
	<40	26	31		
Gender	Female	20	6	2.9(1.0-8.2)	<0.03077
	Male	39	35		
Years of working	<3years	34	17	0.57(0.2-1.3)	0.1849
	>3years	25	24		
Travelling time	>1hour	28	14	5.6(2.0-15.41)	<0.001
	<1hour	31	27		
Substance Abuse	Yes	48	35	1.20(0.56, 2.57)	0.6219
	No	11	6		
Hours of Work	>8hours	33	12	3.06(1.3-7.1)	<0.001
	<= 8 hours	26	29		
Employment status	Temporary	29	11	2.6(1.1-6.2)	0.02502
	Permanent	30	30		
Shift status	Night/Rotating shift	29	6	5.6(2.0-15.41)	<0.001
	Dayshift	30	35		

Table 3 shows Association between socio demographic and lifestyle characteristics and presence of insomnia were done by chi square test with OR and CI. Individuals over 40 years old were 3.9 times more likely to experience insomnia on comparison to younger workers with (OR= 3.9(95%CI =1.6-9.4)). Female workers had a nearly threetimes increased risk of insomnia compared to male (OR=2.9,95%CI=1.0-8.2). A daily commute of more than one hour was strongly associated with the higher risk of insomnia (OR=5.6,(95%CI= 2.0-15.41). Similarly working more than 8 hours/day showed higher odds of having insomnia compared to those working less than 8hours a day with (OR= 3.067, 95%CI=1.3-7.1). Temporary workers were more than twice as likely to have insomnia compared to permanent workers (OR=2.6,95%CI=1.1-6.2). Similarly Night/rotating shift workers had a higher odds of insomnia compared to day shift workers (OR=5.6(95%CI=2.0-15.41).No statistically significant association was found between insomnia & years of work experience or self-reported substance abuse.

DISCUSSION:

This cross sectional study was conducted to estimate the prevalence of insomnia among workers in an industry utilising asbestos containing materials. In Our study the overall prevalence of insomnia among asbestos industry workers was 23% with 18% reporting having moderate insomnia and 5% reporting severe insomnia. 36% of the study participants reported subthreshold insomnia. Prevalence of insomnia in our study population suggests the increasing burden of sleep related issues in occupational settings & highlights the need for interventions to promote better sleep which may lead to positive and better health.

Our Study findings are consistent with the existing literatures on sleep disorders in industrial and occupational populations in Globally and India. A Global meta-analysis by Sohrab Amirin on industrial workers found prevalence of Insomnia as 22% which was comparable to our study.[19]A cross-sectional study among industrial workers in Assam by Krishnatreya M et al reported a 34% prevalence of insomnia in industrial workers[20] which was slightly higher compared to our study**.** A study among security guards in Delhi-NCR also found a high prevalence, with 48% of night shift workers and 32% of day shift workers reporting insomnia.[21] These consistent findings across different industrial populations in India suggest that Insomnia is not an individual problem but a widespread issue within demanding work environments.

In our study, Participants over 40 years of age had a higher risk of insomnia, which is consistent to study results of a longitudinal aging study in India that reported an increased prevalence 52% of sleep disturbance in older age groups.[22] The probable reason would be debts, familial issues, responsibilities highlighting the risk of insomnia among higher age groups regardless of the work environment. It was also found that females had a three-fold increased risk of having insomnia compared to males which was consistent to previous studies done by La-yk et al,[23]Sreepedha et al[22] showing that insomnia is more common among females, which may be due to factors such as hormonal fluctuations, as well as the high prevalence of anxiety and depression in women.[24,22] In our study, 42% of participants consumed alcohol, 24% smoked &17% reported chewing or smoking tobacco. These findings are consistent with numerous studies that identify substance abuse, including the use of alcohol and tobacco, as a significant contributor to sleep disorders.[25,26]

Participants who commuted daily for more than one hour duration had higher risk of insomnia which was consistent to findings from similar studies.[27] Prolonged travel time to and from work decreases available time for recreational physical activity, and the lack of regular exercises has been associated with a higher prevalence of insomnia.[28,29] Night shift workers had high odds of having insomnia compared to day shift workers which was consistent with existing literatures[20,21] which may be due to disturbances in Circadian rhythm, melatonin and cortisol secretion due to altered sleep patterns.[30]

CONCLUSION

In conclusion, Our study shows prevalence of insomnia among workers in an industry utilizing asbestos-containing materials with 23% participants reporting clinical insomnia with 36% reporting subthreshold symptoms. These results suggest a need for occupational health programs that include screening for sleep disorders and mental health support.

Statistically significant associations between insomnia and several factors, including age, gender, travel time, and working hours were found in our study. These findings suggest that addressing these specific occupational and demographic variables could be key to improving the sleep health of this population and reducing the overall public health burden of insomnia.

Future research is needed to explore these associations in detail through longitudinal cohort studies with objective measures of both exposure and sleep quality to inform the development of effective interventions for this high-risk population.

Approval of Institutional Ethical Review Board:-Data collection was conducted following approval from the Institutional Ethical Board SMC/IEC/2022/01/008

Conflict of Interest: Nil

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Authors contribution:- DK conceived and designed the study and was responsible for data collection. Data analysis was carried out by DK, MBK, GDK, NK. DK prepared the first draft of the manuscript, while MBK, GDK & NK provided critical revisions. All authors reviewed and approved the final version of the manuscript.

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