ORIGINAL ARTICLE

Observational study of sleep patterns in industrial workers employed in the Organised Sector

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Abstract

Introduction: Industrial workers are exposed to various aspects of sleep deprivation resulting into accidents and other morbidities. This pilot survey was done to see the status of sleep and other effects in the organized sector industrial population of India.

Objective: Paucity of data from our country in organized sector from a social security scheme ESIC (Employees State Insurance Corporation) on this important but neglected topic prompted us to conduct this study .

Methodology: Observational questionnaire based study.

Results: This questionnaire-based survey of non-shift organized factory workers (N=179; male - 65, female-114, age ranging from 21 to 68 years) revealed that two-thirds of this study population was suffering from some type of sleep-related disorder. Snoring was found to be significantly associated with day time tiredness (p=0.016) and excessive daytime sleepiness (EDS) (p=0.0035). Workers with frightening dreams were significantly suffering from EDS [out of 9 (5.03%) subjects with frightening dreams, 5 had EDS (p=0.041)]. Grinding teeth during sleep was significantly associated with snoring (out of 11 (6.15%) of the subjects who has bruxism, 7 (63.64%) reported to have snoring (p=0.003)). Bruxism was also associated with EDS significantly (EDS was present in 9 (81.82%) p=0.00006).

Conclusion: To the best of our knowledge, this is probably the first such sleep survey of workers who are earning there monthly wages < Rs.15000 . The findings of the study clearly outlines that despite normal body weight /body mass index ; sleep related breathing disorders and other sleep ailments are a genuine problem.

Effect on day time activity; because of sleep, has a great bearing in the industrial production and harmony between workers and supervisors of the industrial population. Thus this could be a starting point in translational research to be undertaken in this nascent field amongst this susceptible and vulnerable population.

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Key words: Sleep disturbance, Organised sector, Insomnia.

Considering the large population of our country these data are substantial and triggers the need for increasing the awareness, among the patients as well as health professionals, about this neglected but very significant medical health problem which leads to development of several other medical diseases

Introduction

Sleep disorder /deprivations are unmet public health problems. Most adults spend about one-third of most 24 hour days in paid employment, and another third of those 24 hours sleeping. However, our understanding of the links between experiences at work and sleep quality is limited. Biomedical studies have suggested an association between workplace conditions and sleep, but have focused on specific employee populations, mainly shift workers. In the social scientific literature, there is substantial evidence that stressful working conditions are linked to poorer health, while paid employment involving positive aspects like autonomy and creativity are associated with better health and functioning[1]

Sleep related disturbances are associated with a number of psychiatric disorders, i.e., depression, anxiety disorders, and substance use disorders. Many psychiatric patients report symptoms such as insomnia, tiredness, fatigue, and excessive sleepiness. Despite their known negative impact on daytime functioning and quality of life, less than 10% of individuals with these symptoms visit physicians specifically for their sleeping problems[2].

One of the important sleep related disorders, namely shift-work disorder (SWD) and its defining symptoms, can negatively affect health, quality of life, and work performance. The gravity of these consequences necessitates vigilance for the symptoms of SWD by even primary care physicians. The economic costs of untreated SWD are likely to be huge[3].

The call center industry is one such industry, a burgeoning sector which is characterized by unique job requirements that render workers susceptible to high attrition rates and negative health concerns. One such study[4] examined the relationship between job stress from interpersonal factors, job stress from work factors, coping, inadequate sleep, and negative physical health reports among call center shift workers (n = 239), a relatively under-researched population. Inadequate sleep and job stress from interpersonal factors were associated with negative physical health outcome for the participants in this study. Also, shift workers who engage in night work may try to modify their health behavior to cope with sleep problems. Such modifications may be a risk factor for heavy drinking[5].

A questionnaire based survey was conducted to determine the prevalence of common sleep related disorders in the adult population of organized industrial workers in the social security scheme of India (ESIC).

Sleep-related disorders (SRDs), though frequent, are under-reported and their implications are often neglected .The reported rates of SRDs varied between 20.0% and 34.2% depending on the instrument used in the questionnaire. Insomnia, sleep-related breathing disorders (SRBD), narcolepsy, and restless legs syndrome (RLS) were reported by 18.6%, 18.4%, 1.04% and 2.9%, respectively as reported[6] in a recent paper by Panda S [(ref)].

Why this study in employees state insurance corporation?

ESIC is a social security scheme under The Employees' State Insurance Act, 1948 that applies to non-seasonal factories employing 10 or more persons. The ESI Scheme is financed mainly by contributions from employers and employees. Employers coming under the purview of ESI Act, 1948, are absolved of their liabilities under the Employees' Compensation Act, 1923 and the Maternity Benefit Act, 1961, as these social security provisions become the responsibility of the ESI Scheme Out of the total work force of about 459 millions in India, 27.55 million workers are in the organized sector, (17.67 million in public sector and 9.87 million in private sector) and the rest are in the unorganized sector. The ESI Act covers workers in the organized sector only. At present about 15.5 million workers (i.e. 56.26% of organized sector) are covered under the Employees' State Insurance Act, which represents only about 3.37% of the total work

force in the country. The Employees' State Insurance Scheme provides comprehensive medical care to Insured Persons and also to their dependants.

ESI Corporation has set up five zonal occupational diseases centre to work as apex Institute in occupational health thus having pan India presence.

By virtue of their job all industrial workers are exposed to various kinds of occupational hazards. they attend the outdoor and inpatient of the hospitals with various complaints through dispensaries throughout India .

We have selected our zonal occupational diseases center along with a remote centre in Kollam (Kerala) ESIC superspeciality hospital in this first pilot study to look Into the sleep pattern and to find out whether our workers are suffering because of improper sleep and poor sleep hyeigine and any associated disorder. The follow up interventional study is also planned and data collection is already in process.

Material and Method

Participating centres

Kerala – Kollam Super speciality ESIC Hospital . In collaboration with Institute Of Occupational Health And Environment Research (IOHER) ESIC Delhi.

Duration : **October 2012 – December 2012.**

Interviewer –Doctor (Either undergraduate or post graduate trained in pulmonary medicine) . Data was collected during the factory premises visit which happens to be a routine practice in promotive health care practice in ESIC**.**

Inclusion criteria

All our insured persons who have valid IP number.(unique insurance number provided by the corporation to each worker) were interviewed with the questionnaire (components listed else where in this article)

Exclusion criteria

1. Invalid IP no.
2. Uncooperative patient .

The questionnaire

The questionnaire used for the purposes of this study was adapted from those by Chervin and the Stanford Sleep Clinic questionnaire[7] It included questions pertaining to demography, any past and present medical problem, family history of snoring, sleep terror, nightmare. It also included questions pertaining to snoring, excessive daytime sleepiness (Epworth sleepiness score), sleep disordered breathing, disorders of initiation and maintenance of sleep, restless legs syndrome and sleep deprivation. The total number of questions in the questionnaire was 52 in addition to questions pertaining to past/present medical problems, if any.

Result and Interpretation

179 Subjects were interviewed and results tabulated and analysed using Epiinfo 7 software

Subjects characteristics:

1.**Age** – 21-68 yrs

*2.***SEX**

Sex	Frequency	Percent
Female	114	63.69 %
Male	65	36.31 %
TOTAL	179	100.00 %

Category	BMI	Number of subjects
Underweight	<18.5	4
Normal	18.5-24.9	113
Overweight	25-29.9	47
Obesity	>30	15

Discussion

Epidemiology of sleep disorders in the general population has been a subject that has generated immense interest ever since major sleep disorders were initially described. Prevalence of sleep related disorders in general and that of specific sleep disorders, in particular, has been found to be variable in different parts of the world , amongst various age groups of the population and has often been

Table 1

S.NO.	QUESTIONS	RESPONSE - YES	RESPONSE - NO
1	ARE YOU TRIED DURING DAY TIME?	64(35.75%)	115(64.25%)
2	DID YOU EVER DRIVE A CAR /ANY VEHICLE FOR A PERIOD OF TIME AND LATER REALIZED THAT YOU WERE MISSED MOMENTS OR A NAP ?	23(12.85%)	156(87.15%)
3	DID YOU AWAKEN TOO EARLY IN THE MORNING?	126(70.39%)	53(29.61%)
4	DO YOU EVER EXPERIENCE OR HAVE YOU EVER EXPERIENCED A EPISODE ?	15(8.38%)	164(91.62%)
5	DO YOU EXPERIENCE ANY ABNORMAL LIMB MOVEMENT DURING SLEEP?	7(3.91%)	172(96.09%)
6	DO YOU HAVE DIFFICULTY IN FALIING ASLEEP ?	56(31.28%)	123(68.72%)
7	DO YOU HAVE FRIGHTENING DREAMES ?	9(5.03%)	170(94.97%)
8	DO YOU HAVE HALLOCINATION OR DREAMELIKE IMAGES WHEN NOT ACTUALL ?	9(5.03%)	170(94.97%)
9	DO YOU HAVE TO WAKE UP DURING NIGHT TO PASS URINE?	28(15.64%)	151(84.36%)
10	DO YOU OFTEN FEEL TRIED WHEN YOU AWAKEN IN THE MORNING ?	78(43.58%)	101(56.42%)
11	DO YOU SNORE ?	42(23.46%)	137(76.54%)
12	DOES YOUR SNORING BOTHER OTHER PEOPLE ?	36(20.11%)	143(79.89%)
13	HAVE YOU EVER AWAKENED IN THE MORNING AND FOUND YOU WERE ANABLE TO MOVE YOUR FEET ?	48 (26.82%)	131 (73.18%)

observed to have definite patterns of distribution based on gender, socio-economic status and several other factors.

The research in the field of prevalence of sleep disorders would, logically depend to a large extent on the specific validated instrument that has been used to determine it.

Snoring

Snoring was associated significantly with tiredness during the day out of 42 (23.46%) of the subjects. 22 (52.38%) subjects reported having tiredness (p=0.016). Snoring and sleep apnea are reportedly associated with morbidity. In an Australian study[8] of snoring and sleep apnea in 294 men aged 40 to 65 yr from the volunteer register of the Busselton (Australia) Health Survey, it was found that 81% snored for more than 10% of the night and 22% for more than half the night.

The overall prevalence of snoring was found to be 23.6% in the present study. In comparison to a cross sectional survey[9] of 370 adults living in Nigeria, where the overall presence of snoring was 31.6%, habitual snoring (14%) and moderate snoring (17%) .

Snoring in our study was significantly associated with EDS (Tables 2 to 9) ; out of 42 (23.46%) snorers ,18 (42.85%) reported EDS (p=0.0035).Snoring in other studies was significantly associated with male sex, old age, increased BMI and cigarette smoking. The severity of snoring was also associated with a higher ESS score, daytime symptoms and other co morbidities. A retrospective analysis[10] conducted at two dental practices, using questionnaire responses obtained from 175 men and 156 women, 46% of the men and 19% of the women reported snoring frequently or always Over 80% of Australian middle aged men have been reported[11,12] to snore for more than 10% of the night

Table 2: Cross – tabulation
Snoring- frightening dreams

	DO YOU HAVE FRIGHTENING DREAMS ?		
DO YOU SNORE ?	Y	N	Total
N Row % Col %	5 3.65 % 55.56 %	132 96.35 % 77.65 %	137 100.00 % 76.54 %
Y Row % Col %	4 9.52 % 44.44 %	38 90.48 % 22.35 %	42 100.00 % 23.46 %
Total Row % Col %	9 5.03 % 100.00 %	170 94.97 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	2.3229		0.1285538073
Chi-square - Mantel-Haenszel	2.3099		0.1285538073
Chi-square - corrected (Yates)	1.2556		0.2624901832
Mid-p exact		0.0833435665	
Fisher exact 1-tailed		0.1326758312	0.2172058660

Table 3: Cross – tabulation

DO YOU SNORE ? -: ARE YOU TIRED DURING DAY TIME ?

	ARE YOU TIRED DURING DAY TIME ?		
DO YOU SNORE ?	Y	N	Total
N Row % Col %	42 30.66 % 65.63 %	95 69.34 % 82.61 %	137 100.00 % 76.54 %
Y Row % Col %	22 52.38 % 34.38 %	20 47.62 % 17.39 %	42 100.00 % 23.46 %
Total Row % Col %	64 35.75 % 100.00 %	115 64.25 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	6.6043		0.0103876128
Chi-square - Mantel-Haenszel	6.5674		0.0103876128
Chi-square - corrected (Yates)	5.6924		0.0170396556
Mid-p exact		0.0062405233	
Fisher exact 1-tailed		0.0091912243	0.0160393097

Table 4: Cross – tabulation

DO YOU SNORE ? -: DO YOU AWAKEN TOO EARLY IN THE MORNING ?

	DO YOU AWAKEN TOO EARLY IN THE MORNING		
DO YOU SNORE ?	Y	N	Total
N Row % Col %	93 67.88 % 73.81 %	44 32.12 % 83.02 %	137 100.00 % 76.54 %
Y Row % Col %	33 78.57 % 26.19 %	9 21.43 % 16.98 %	42 100.00 % 23.46 %
Total Row % Col %	126 70.39 % 100.00 %	53 29.61 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	1.7619		0.1856163983
Chi-square - Mantel-Haenszel	1.7521		0.1856163983
Chi-square - corrected (Yates)	1.2864		0.2567099376
Mid-p exact		0.0943238477	
Fisher exact 1-tailed		0.1273465041	0.2464499563

Table 5: Cross – tabulation

DO YOU SNORE ? - DO YOU EXPERIENCE ANY ABNORMAL LIMB MOVEMENT DURING SLEEP?

	DO YOU EXPERIENCE ANY ABNORMAL LIMB MOVEMENT DURING SLEEP ?		
DO YOU SNORE ?	Y	N	Total
N Row % Col %	4 2.92 % 57.14 %	133 97.08 % 77.33 %	137 100.00 % 76.54 %
Y Row % Col %	3 7.14 % 42.86 %	39 92.86 % 22.67 %	42 100.00 % 23.46 %
Total Row % Col %	7 3.91 % 100.00 %	172 96.09 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	1.5257		0.2180481361
Chi-square - Mantel-Haenszel	1.5172		0.2180481361
Chi-square - corrected (Yates)	0.6088		0.4352412829
Mid-p exact		0.1312904318	
Fisher exact 1-tailed		0.2089932664	0.3572459429

Table 6: Cross – tabulation
DO YOU SNORE ?- HAVE YOU EVER FALLEN ASLEEP WHILE DRIVING/ON JOB ?

	HAVE YOU EVER FALLEN ASLEEP WHILE DRIVING?/ON JOB		
DO YOU SNORE ?	Y	N	Total
N Row % Col %	4 2.92 % 80.00 %	133 97.08 % 76.44 %	137 100.00 % 76.54 %
Y Row % Col %	1 2.38 % 20.00 %	41 97.62 % 23.56 %	42 100.00 % 23.46 %
Total Row % Col %	5 2.79 % 100.00 %	174 97.21 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	0.0344		0.8533442950
Chi-square - Mantel-Haenszel	0.0342		0.8533442950
Chi-square - corrected (Yates)	0.1224		0.7264782245
Mid-p exact		0.4618255789	
Fisher exact 1-tailed		0.6655721578	1.0000000000

Table 7: Cross – tabulation
DO YOU SNORE ? - DO YOU OFTEN FEEL TIRED WHEN YOU AWAKEN IN THE MORNING ?

	DO YOU OFTEN FEEL TIRED WHEN YOU AWAKEN IN THE MORNING		
DO YOU SNORE ?	Y	N	Total
N Row % Col %	56 40.88 % 71.79 %	81 59.12 % 80.20 %	137 100.00 % 76.54 %
Y Row % Col %	22 52.38 % 28.21 %	20 47.62 % 19.80 %	42 100.00 % 23.46 %
Total Row % Col %	78 43.58 % 100.00 %	101 56.42 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	1.7305		0.1895809810
Chi-square - Mantel-Haenszel	1.7209		0.1895809810
Chi-square - corrected (Yates)	1.2943		0.2552670725
Mid-p exact		0.0979151504	
Fisher exact 1-tailed		0.1277965097	0.2151801564

Table 8: Cross – tabulation
DO YOU SNORE? -: DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP?

	DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP		
DO YOU SNORE?	Y	N	Total
N Row % Col %	26 18.98 % 59.09 %	111 81.02 % 82.22 %	137 100.00 % 76.54 %
Y Row % Col %	18 42.86 % 40.91 %	24 57.14 % 17.78 %	42 100.00 % 23.46 %
Total Row % Col %	44 24.58 % 100.00 %	135 75.42 % 100.00 %	179 100.00 % 100.00 %

Chi-square	1-tailed p	2-tailed p
9.8871		0.0016655539
9.8319		0.0017162842
8.6410		0.0032879413
	0.0014191217	
	0.0022181441	0.0035419186

Table 9: Cross – tabulation
Snoring – Male, Female

	SEX		
DO YOU SNORE?	F	M	Total
N	93	44	137
Row %	67.88 %	32.12 %	100.00 %
Col %	81.58 %	67.69 %	76.54 %
Y	21	21	42
Row %	50.00 %	50.00 %	100.00 %
Col %	18.42 %	32.31 %	23.46 %
Total	114	65	179
Row %	63.69 %	36.31 %	100.00 %
Col %	100.00 %	100.00 %	100.00 %

Sleep-disordered breathing (SDB)

Obstructive sleep apnea (OSA) with daytime impairment, that is, OSA syndrome, is estimated to occur in 1 out of 20 adults; minimally symptomatic or asymptomatic OSA is estimated to occur in 24% of the population[13] Twenty five percent of middle aged men and 10% of women in Australia have OSA, defined as more than 5 obstructed breathing events per hour of sleep [12,13] . In a questionnaire based study of 402 adults in the Netherlands, 5.7% had complaints pertaining to apnea (cited in Suri.et al [20]). Apnea was reported in about 2% of the respondents while the presence of clinically suspected OSA (CSOSA) was 1% (1.9% in males and 0.5% in females) in the Nigerian study[14].). Based on a validated questionnaire, 33% of the men and 6% of the women attending a dental clinic were predicted to have moderate or severe sleep apnea [15] Epidemiological studies[16], in general, have revealed a prevalence of SDB of up to 20% and that of OSAS of 4-5% of middle aged population. Similar observations can be drawn in this population as well. However a complete polysomnography and a larger population study to get the actual prevalence in the industrial worker community is desirable after this pilot study. .A meta-analysis of 12 studies of OSA prevalence in western populations estimated that 1 to 5% of adult men have OSA syndrome[17] (i.e. frequent apnea and hypopnea episodes and daytime sleepiness) Another meta-analysis of nine studies, that used two-stage sampling procedures in which sleep studies were conducted on subsets of participants drawn from large sample surveys, observed the prevalence of undiagnosed OSA syndrome[18] to range from 0.3 to 5% .

From a survey sample of Hong Kong men, 30 to 60 years of age, Ip and colleagues[19] estimated the prevalence of OSA (defined as an AHI of 5 or more plus excessive daytime sleepiness) to be 4%. Obesity, a strong risk factor for OSA, is commoner in white populations than in Asian countries. Ip and colleagues[19] also observed that correlations between BMI (and other measures of body habitus) and prevalence of OSA were weaker in the Hong Kong study than those seen in studies of white subjects

A possible explanation provided by the authors was that other strong risk factors for OSA (such as cranio-facial features that compromise the upper airway that are more prevalent in the Chinese relative to Western population) must exist. Similar findings were observed signifying two different phenotypes of OSA in the study of Suri et al [20]. High BMI (and a body habitus favoring OSA) is also less prevalent amongst Indians as compared to the Western population. Thus, perhaps, two different phenotypes of OSA may exist; one with an increased BMI and the other with cranio-facial features conducive to the occurrence of OSA but with a normal BMI.

Sleep deprivation

Insufficient sleep can have serious [21,22,23] and sometimes fatal consequences for fatigued workers and others around them Several factors that may be responsible for sleep deprivation have been traditionally identified. They include conditions like poor sleep hygiene, improper sleeping environment, and illness, work (shift work and frequent traveling), other sleep disorders (sleep apnea PLMS and snoring), medications, personal choice,

parenting of babies etc The 2002 National Sleep Foundation Poll revealed that 39% of American adults reported sleeping less than seven hours.[24]

According to National Health Interview Survey (NHIS) data from 2004–2007, the prevalence of self-reported short sleep duration (d"6 hours per day) among U.S. workers increased over the past 2 decades and varied by industry and occupation; however, 2010 was the first year that the NHIS included a question about the usual shift worked.[44]

In the study of Suri et al, about 10.7% subjects reported to have met with an accident in the past few years. The prevalence of accidents in the general population was found to be very high. It strongly correlated with consumption of sleeping pills and rising social strata. Many of these accidents could have been due to sleep related disorders such as SDB (OSA) and sleep deprivation[20].

Nightmare

Nightmares[26], which are REM sleep parasomnias, have been reported to occur at least once a week in approximately 5% of the adult population. Fifty percent of adults[27] have occasional nightmares and 1% frequent nightmares (>1 a week). The prevalence of nightmares in the adult population in the present study was 4.39% in female and 6.15% in males. (Table 10)

Table 10: Cross – tabulation

DO YOU HAVE FRIGHTENING DREAMES? - DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP IN NIGHT?

	DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP		
DO YOU HAVE FRIGHTENING DREAMS?	Y	N	Total
N Row % Col %	39 22.94 % 88.64 %	131 77.06 % 97.04 %	170 100.00 % 94.97 %
Y Row % Col %	5 55.56 % 11.36 %	4 44.44 % 2.96 %	9 100.00 % 5.03 %
Total Row % Col %	44 24.58 % 100.00 %	135 75.42 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	4.9043		0.026791182 7
Chi-square - Mantel-Haenszel	4.8769		0.027219710 2
Chi-square - corrected (Yates)	3.3028		0.069162764 6
Mid-p exact		0.024510478 1	
Fisher exact 1-tailed		0.041465643 7	0.041465643 7

In a Danish study[28], the relative risk of being admitted to hospital due to ischaemic heart disease was measured in a cohort . Information on occupation was used to classify each subject into different shift work exposure categories. The results showed that, compared with occupational groups having day work only, men in occupations with frequent night and early morning work had an excess standardized hospitalization ratio of 193, occupational groups with late evening work had an excess risk of 216, and groups working in rosters covering 24 h services had an excess risk of 174.

Disorders of initiation and maintenance of sleep (DIMS) & consumption of sleeping pills

Insomnia is one of the most common health problems and has recently been re-termed 'Disorders of Initiating and Maintaining Sleep', or DIMS. (Table 13)

In most studies, about 32 to40 percent of adults have been reported to experience one or more symptoms of insomnia over periods ranging from past 30 days to 12 months[25].

Difficulty in falling sleep and maintenance of sleep was associated with EDS in our study where out of 56 (31.28%) of those having difficulty in falling asleep 26 (46.43%) had EDS.(p=0.00001).The prevalence of insomnia found in the general population has been reported to vary among previous studies from 1.4% (DIMS) in central Sweden[29] to 32.1% (DIMS) in the USA[30].

A high prevalence of self reported sleep problems and related drug consumption was observed in the cross sectional study of 7629 wage earners studied by Jacquinet-Salord snd collegues[31] The prevalence of sleeping tablet consumption was 6.1% and 11.3% respectively for men and women. Sixteen percent of men and 26% of women stated that they had sleep disturbances ($p < 0001$). In both sexes, drug consumption and sleep disturbances increased with age and were highest among

Table 11: Cross – tabulation
HAVE YOU BEEN TOLD YOU GRIND YOUR TEETH DURING SLEEP? -DO YOU SNORE?

	DO YOU SNORE ?		
HAVE YOU BEEN TOLD YOU GRIND YOUR TEETH DURING SLEEP ?	Y	N	Total
N Row % Col %	33 20.83 % 83.33 %	133 79.17 % 97.08 %	168 100.00 % 93.85 %
Y Row % Col %	7 63.64 % 16.67 %	4 36.36 % 2.92 %	11 100.00 % 6.15 %
Total Row % Col %	42 23.46 % 100.00 %	137 76.54 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	10.5326		0.0011740606
Chi-square - Mantel-Haenszel	10.4737		0.0012120114
Chi-square - corrected (Yates)	8.2839		0.0040090955
Mid-p exact		0.0021979126	
Fisher exact 1-tailed		0.0039094051	0.0039094051

Table 12: Cross – tabulation
HAVE YOU BEEN TOLD YOU GRIND YOUR TEETH DURING SLEEP ? -: DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP IN NIGHT.

	DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP		
HAVE YOU BEEN TOLD YOU GRIND YOUR TEETH DURING SLEEP ?	Y	N	Total
N Row % Col %	35 20.83 % 79.55 %	133 79.17 % 98.52 %	168 100.00 % 93.85 %
Y Row % Col %	9 81.82 % 20.45 %	2 18.18 % 1.48 %	11 100.00 % 6.15 %
Total Row % Col %	44 24.58 % 100.00 %	135 75.42 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	20.7115		0.0000065085
Chi-square - Mantel-Haenszel	20.5958		0.0000068411
Chi-square - corrected (Yates)	17.5526		0.0000291164
Mid-p exact		0.0000320614	
Fisher exact 1-tailed		0.0000610271	0.0000610271

individuals aged 55 years and more. No association between working conditions (exposure to noise, assembly line working, or physical workload) and sleep disturbances or drug consumption was found. An increase in the prescription and use of hypnotic drugs has been observed with increasing age[32].

Accidents and sleep deprivation

The prevalence of EDS ranges from 4% to 31% in different studies [33 to 37]. Excessive daytime sleepiness (EDS) denotes a propensity to doze off or fall asleep unintentionally during the day, particularly in passive situations [38 to 40]. Major influencing factors are poor quality nocturnal sleep and sleep disorders, such as sleep apnea, narcolepsy, idiopathic central nervous system hypersomnia, and circadian rhythm disturbances [35,41,42] in a study of 532 non shift day time workers Melmed and collegues. Of the workers studied 22.6% had EDS. Most of those (96.3%) indicated that they had experienced this propensity for the past two years or more and 56% of them had experienced it for 10 years or more and concluded that EDS is a prevalent phenomenon in non-shift daytime workers. Workers with EDS had over a two-fold higher risk of sustaining an occupational injury [43].

Conclusion

In this questionnaire-based observational survey, of non shift workers working in factories, approximately two third of the population of the study was observed to have some type of sleep-related disorders in which:

1. Snoring was significantly associated with day time tiredness (p=0.016) and EDS (p=0.0035).
2. Subjects with frightening dreams was significantly related with EDS ; out of 9(5.03%) subjects with

Table 13: Cross – tabulation
DO YOU HAVE DIFFICULTY IN FALLING ASLEEP? - DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP IN THE NIGHT.

	DO YOU FEEL EXCESSIVELY SLEEPY OR HAVE SUDDEN SLEEP ATTACKS DESPITE ADEQUATE SLEEP		
DO YOU HAVE DIFFICULTY IN FALLING ASLEEP?	Y	N	Total
N Row % Col %	18 14.63 % 40.91 %	105 85.37 % 77.78 %	123 100.00 % 68.72 %
Y Row % Col %	26 46.43 % 59.09 %	30 53.57 % 22.22 %	56 100.00 % 31.28 %
Total Row % Col %	44 24.58 % 100.00 %	135 75.42 % 100.00 %	179 100.00 % 100.00 %

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi-square - uncorrected	20.9827		0.0000058037
Chi-square - Mantel-Haenszel	20.8655		0.0000060961
Chi-square - corrected (Yates)	19.3027		0.0000123239
Mid-p exact		0.0000054156	
Fisher exact 1-tailed		0.0000091516	0.0000107273

frightening dreams 5 has EDS , p=0.041. However the number is too small.

3. Grinding teeth (Table11,12) during sleep was significantly related with snoring. Out of 11 (6.15%) of the subjects who had bruxism, 7 (63.64%) reported to have snoring (p=0.003). Also its association with EDS was significant i.e EDS was present in 9 (81.82%) ,p=0.00006.

This indicates that the impact of sleep disorders on the morbidity profile of this segment of industrial population is of a huge proportion. It also reflects the phenomenal burden of undiagnosed sleep disorders in this segment of the industrial population, as well as its impact on social, mental, physical and economic health of the society. Much needs to be done in innovating ways and means to design cost-effective strategies suitable to screen the population and develop adequate manpower and infrastructure to treat these disorders. The task is a real challenge. Also, greater emphasis needs to be placed in training and education at various levels that include undergraduate & postgraduate medical curricula, paramedical courses and nursing syllabi, as far as sleep medicine is concerned. There is ample scope for future translational research so as to correct this reversible phenomenon.

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