

Sleep Patterns and Their Impact on Lifestyle, Anxiety and Depression in BPO workers

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Indian J Sleep Med 2007; 2.2, 64-70

Abstract

Introduction: Business process outsourcing (BPO) is the contracting of a specific business task, such as payroll, to a third party service-provider. It involves work schedules pertaining to extreme forms of shift-work. Circadian rhythm sleep disorders (CRSD) are not infrequently seen amongst shift workers who, in turn, comprise a large segment of the population employed in the BPO industry. The pattern of sleep, prevalence of anxiety and depression and the overall impact of the nature of their employment on their lifestyle were studied in a segment of BPO workers employed in the call centers around New Delhi.

Material & Method: One hundred and eighty-one individuals employed in the BPO industry (call centers) around New Delhi, and a similar number of age and gender matched subjects not thus employed, serving as controls, were included in this study. A questionnaire was submitted to each of them. It included a set of 42 questions, responses to which would yield information pertaining to items related to sleep, lifestyle, anxiety, depression and personal particulars. Appropriate statistical methods were applied to analyze the data.

Results: The sleep pattern of BPO workers was found to be markedly different from normal. They were sleepier (ESS of 10-14 was found in 51.4% in the BPO group as against 20.5% in the control group) (p value <0.001); Total sleep time values were found to be in the similar range amongst the BPO workers as well as in the control group population. They were more depressed (imperative depression was observed in 62.9% as against only 4.6% in the control group)(p value < 0.001); they were also seen to suffer more from anxiety disorder (an imperative anxiety disorder was found in 33.9% of BPO workers as against 1.4% of the control group) and the use of stimulants (tea, coffee, and cola), other substances (alcohol, narcotics) was also commoner in this group than in controls (p value <0.002). Significant correlation was observed between sleep score and depression (p value <0.001), sleep score and stress at work (p value <0.001), sleep score and abuse of alcohol (p <0.060), sleep score and abuse of narcotics (p value <0.016), Sleep score was also found to correlate with lack of exercise (p value <0.049).

Conclusions: The present study has highlighted some of the redeeming features associated with sleep patterns, depression, anxiety and lifestyle that are noted in the BPO workers.

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Introduction

Business process outsourcing (BPO) is the contracting of a specific business task, such as payroll, to a third party service-provider.¹ The most common examples of BPO are call centers, human

resources, accounting and payroll outsourcing. India has one of the largest pools of low-cost English speaking scientific & technical talent, thus making it an obvious choice to outsource to multinational companies. The total revenue from BPO market is projected to increase from \$110,167 in the year 2002 to 173,070 in 2007.¹ Concern has been expressed over the health problems of the largely young population employed in this industry. The various health issues in the call-center industry include those related to stress, sleep disorders, digestive system, depression, eyesight problems, ear problems, personal habits, discipline & behavioral issues and interpersonal relationships etc.²

Circadian rhythms are physiological or behavioral cycles with a period of approximately 24 hours produced by an endogenous pacemaker, evidently the supra-chiasmatic nucleus (located in the hypothalamus) being the master circadian clock of the body^{3,4}. Circadian rhythm sleep disorders (CRSD) are not infrequently seen amongst shift workers who, in turn, comprise a large segment of the population employed in the BPO industry. The individual's circadian rhythm is normal but challenged because the sleep-wake internal clock setting is at odds with the sleep wake cycle of the shift work schedule.

Insomnia, excessive sleepiness, impairment of occupation, academic or social, psychological and psychiatric functioning may be the presenting symptoms of a CRSD. There are six primary CRSDs according to the International classification of Sleep Disorders⁵. They include delayed sleep phase syndrome, advanced sleep phase syndrome, non-24-hour sleep-wake syndrome (also termed as "non-entrained type" or "free-running type"), irregular sleep-wake syndrome, shift work sleep disorder and jet lag syndrome⁶.

Majority of individuals who perform night duties or shift work are unable to sleep adequately during daytime and hence develop cumulative sleep debt leading to significant sleep deprivation. Features characterizing sleep deprivation include fatigue, mood changes (depression, erratic behavior, irritability), decreased cognitive functioning (attention, focus, memory, concentration), poor executive functioning (decision making, fading of judgment, decreased productivity), impaired vigilance and a predisposition to infections.

Sleep disorders in the chosen segment of population in this study (namely BPO workers), may be associated with features of anxiety, depression and an impairment

in the lifestyle. It is with a view to decipher comprehensively the pattern of sleep in this population, the prevalence of anxiety and depression and the overall impact of the nature of their employment on their lifestyle, that this study was conducted. The principal instrument used in this study was a questionnaire. It may be added that the BPO industry is peculiar to this part of the developing world and not many studies have looked into the sleep-related aspects of morbidity in this population.

Material and Method

One hundred and eighty individuals employed in the BPO industry (call centers) around New Delhi, and a similar number of age and gender matched subjects not thus employed, serving as controls, were included in this study. A written informed consent was obtained from each participant. A questionnaire was submitted to each of them. The subjects and their employers were informed of the objectives and methodology used during the survey. Complete confidentiality was guaranteed. The telephone number and email ID of the principal investigator were provided for help in completing the questionnaire. The subjects were also intimated that they were free to consult the Department of Pulmonary, Critical Care & Sleep Medicine, VMMC & Safdarjung Hospital, New Delhi in order to investigate the sleep disorders they reported.

The questionnaire recorded the following information:

- Age, gender, marital status.
- Working conditions particularly related to shift work, which included whether they have to often work more than 10 hrs a day or more than 6 days a week, number of years and months working rotating shifts.
- Sleep habits and problems related to sleep and sleepiness (including Epworth Sleepiness Score)
- A validated anxiety questionnaire⁷
- A validated depression questionnaire⁷
- A validated stress and lifestyle questionnaire⁷
- Consumption of tea, coffee, colas, cocktails, narcotics & substance abuse.
- History of having accidents because of sleepiness

The total number of questions was forty-two. Groups of items aimed to detect various sleep parameters were bunched together. They included sleep (10 questions

and the Epworth sleepiness score), depression (15 questions), anxiety (8 questions), stress at work and lifestyle (9 questions). Sleepiness was scored by the Epworth Sleepiness Scale (ESS)⁸. The values of ESS score greater than 10 were considered as indicative of excessive sleepiness (1-6 = normal, 7-9 = average, >18 = very sleepy). The anxiety questionnaire comprised eight questions; an answer in the affirmative to ≥ 3 of the 8 questions was taken as “probable” anxiety and that to ≥ 5 as presence of “imperative” anxiety where the individual would benefit by a seeking psychiatric consultation. As regards the depression questionnaire, which comprised 15 questions, affirmative answers in ≥ 4 and ≥ 6 questions were taken as “possible” and “imperative” depression respectively. Imperative depression was taken as situation where the individual would probably derive benefit by seeking professional help.

Sleep deprivation was determined in every subject by calculating an “index of sleep deprivation”. This index was derived by the following formula: “average sleep debt as reported” multiplied by “number of months reported as spent in the shift duty”. (Table 3) To cite the example of an individual who has been in the profession for two years (24 months) and has reported to be sleeping for an average of 6 hours on any weekday, the “average sleep debt” would be 2 hours (8 minus 6 hours); the “index of sleep deprivation” would be 48 (2 multiplied by 24).

Appropriate statistical methods were applied.

Results

There were one hundred and eighty one individuals included in the test group of population, namely those employed in the BPO industry. There were 149 (82.3%) males and 32 (17.7%) females. The age ranged from 19 years to 37 years. A similar number of individuals with matching age and gender distribution, who were not BPO employees, served as the control group.

The sleepiness score (measured by the ESS) of 10-14 was found in 51.4% in the BPO group as against 20.5% in the control group. A score of 15-19 was observed in 14.5% in the test group compared to 2.1% in the control group. Normal sleepiness score (0-9) was found in only 30.7% of the individuals in the test group as against 77.4% in the control group. An extremely high sleepiness score (≥ 20) was found in 3.4% of the BPO employees but none of the individuals in the control group. These differences were all statistically very significant (p value

Table 1: Depression, anxiety, sleep-score, sleep-time in BPO workers and control group (p value <0.05)

		BPO	Others	p value
Depression	No	18.9%	85.4%	<0.001
	Possible	18.3%	10.0%	
	Imperative	62.9%	4.6%	
Anxiety	No	27.2%	92.3%	<0.001
	Possible	38.9%	6.3%	
	Imperative	33.9%	1.4%	
Sleep score	0-9	30.7%	77.4%	<0.001
	10-14	51.4%	20.5%	
	15-19	14.5%	2.1%	
	≥ 20	3.4%		
Sleep time	4.0	4.0%	.7%	<0.001
	5.0	11.3%	5.6%	
	6.0	13.9%	17.4%	
	7.0	20.5%	24.3%	
	8.0	22.5%	36.1%	
	9.0	18.5%	12.5%	
	10.0	5.3%	2.8%	
	11.0	1.3%		
	12.0	2.0%		
	13.0	.7%		
	14.0			

Table 2: Lifestyle parameters in BPO workers

	BPO	Others	p value
Stress at work	58.3%	19.3%	<0.001
Smoke Cigarettes	40.6%	7.5%	<0.001
Drink tea, coffee or colas	65.7%	49.7%	<0.001
Drink more than 2 cocktails	35.9%	2.1%	<0.001
Abuse any narcotics	27.6%	4.1%	<0.001
Exercise less than twice a week	35.4%	17.4%	<0.001
Work more than 10 hrs or 6 days	50.8%	31.7%	<0.001
Dissatisfaction in a no-win situation	48.1%	22.1%	<0.001
Sleep disturbance	37.8%	9.6%	<0.001

Table 3: Value of different parameters(%) according to sleep score and p-value for significance of difference

Parameter	sleep score(ESS)			p-value
	<=5	6-9	10+	
Depression	20.0%	52.5%	67.7%	.001
anxiety	20.0%	32.5%	35.5%	.467
Stress at work	13.3%	55.0%	63.7%	.001
Smoke Cigarettes	33.3%	27.5%	45.2%	.110
Drink tea, coffee or colas	86.7%	57.5%	66.9%	.120
Drink more than 2 cocktails	13.3%	27.5%	40.3%	.060
Abuse any narcotics		20.0%	32.3%	.016
Exercise less than twice a week	13.3%	27.5%	41.1%	.049
Work more thank 10 hrs or 6 days	60.0%	47.5%	50.8%	.711
Dissatisfied in a no-win situation	33.3%	42.5%	51.6%	.290
Sleep disturbance	13.3%	40.0%	39.5%	.120

< 0.001) (Table 1 & Figure 3)

Total sleep time values were found to be in the similar range amongst the BPO workers as well as in the control group population.

Based on the questionnaire for depression, majority of individuals in the control group (85.4%) were found to be free of any depressive symptoms as against only 18.9% of the BPO workers. Amongst the test group, imperative depression (i.e. ≥ six questions answered as “yes”) was observed in 62.9% as against only 4.6% in the control group. A possible depression (i.e. ≥ four question answered as “yes”) was noticed in 18.3% of the BPO workers as against 10% in the control group (Table-1). These observations were statistically very significant (p value <0.001).

The anxiety questionnaire also revealed interesting data. A majority of the control group population (92.3%) was free of any anxiety symptoms as against only 27.2% of the test group. An imperative anxiety disorder (answer of “yes” to ≥ 5 questions) was found in 33.9% of BPO workers as against 1.4% of the control group. A possible anxiety disorder (answer of “yes” to ≥ 3 question) was noticed in 38.9% of BPO workers compared to only 6.3% of the control population (Table-1). These observations were statistically very significant (p value <0.001).

Cigarette smoking was reported in 40.6% and coffee/tea/cola beverage use in 65.7% of BPO workers as against 7.5% and 49.7% respectively in the general population (p value <0.001). Abuse of narcotic drugs was reported by 27.6% of BPO workers compared to 4.1% of the normal population (p value <0.001). Among BPO workers, 35.9% of drank more than 2 cocktails per week

as against only 2.1% of the normal population (p value <0.001). About 35.4% of the BPO workers exercised less than twice a week compared to 17.4% of the control group population (p value <0.001) (Table-2).

About 50.8% of the BPO workers often worked more than 10 hrs/day or 6 days in a week compared to 31.7% of the control group (p value<0.001). About 58.3% of the test population reported stress at work compared to 19.3% of control group (p<0.001). When faced with a no-win situation, 48.1% of the BPO workers reported dissatisfaction compared to 22.1% of the control group (Table-2) (p<0.001).

Relationships amongst sleep score and other parameters (anxiety, depression & lifestyle) were also analyzed by Pearson Chi-Square method, likelihood ratio was obtained and linear-by-linear associations were studied (Table 3, figures 1 & 2). Significant correlation was observed between sleep score and depression (p value <0.001), sleep score and stress at work (p value <0.001), sleep score and abuse of alcohol (p<0.060), sleep score and abuse of narcotics (p value<0.016), Sleep score was also found to correlate with lack of exercise (p value<0.049).

Discussion

Sleep patterns

Analysis of data from a large and heterogeneous group of French workers has revealed the increase of sleep disorders in relation to age, female gender and shift working^{9,10}. The prevalence of excessive sleepiness (ESS

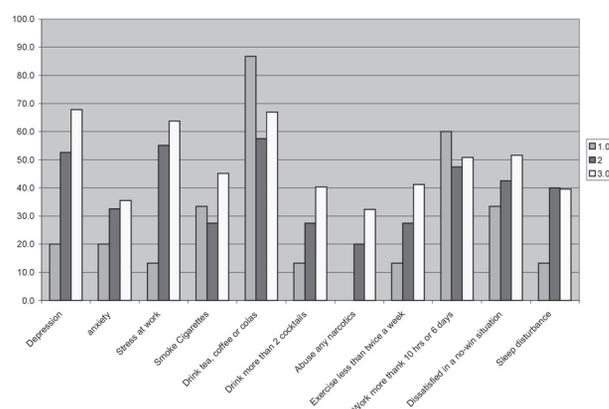


Fig 1: Correlation of severity of sleepiness score with depression, anxiety and various lifestyle parameters within the BPO worker group. (1=ESS<5, 2=ESS 6-9, 3=ESS≥10)

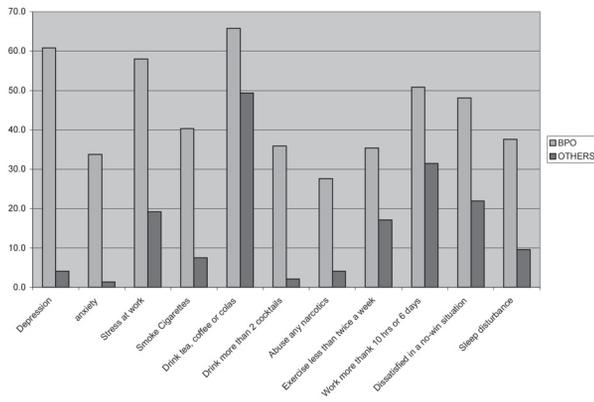


Fig 2: Correlation of sleepiness score with depression, anxiety and various lifestyle parameters amongst BPO workers and control group.

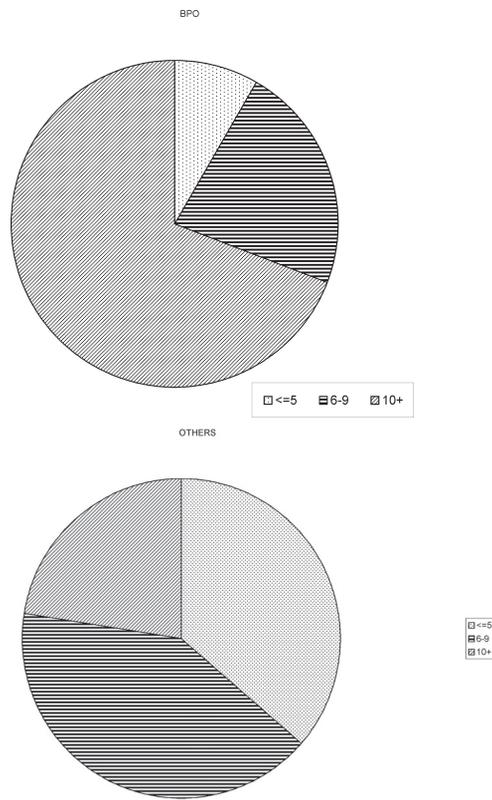


Fig 3: Proportion of subjects in various categories of sleepiness scores among BPO workers (top panel) and control group (bottom panel); inset showing shade-coding of various categories of sleepiness scores (ESS).

> 10) has been shown to be 44.8% in night workers, 35.8% in rotating workers and 32.7% in day shift workers¹⁷. The present study has revealed that the sleep pattern of BPO workers is markedly different from

normal. They were sleepier as assessed by ESS (a sleepiness score (measured by the ESS) of 10-14 was found in 51.4% in the BPO group as against 20.5% in the control group; a score of 15-19 was observed in 14.5% in the test group compared to 2.1% in the control group. The highly significant difference in sleepiness scores between BPO workers and control population can be attributed to the nature of their vocation which involves long stretches of night duties.

Despite a highly significant difference in sleepiness scores between the BPO workers and control population, sleep time values were, however, found to be in the similar range amongst the two groups. It may be concluded that “total sleep time” as reported by the respondent in the questionnaire is actually synonymous with “time in bed”, during most part of which the BPO worker has either not been sleeping or had a very poor quality of sleep. This has probably not been capable of restoring the sleep debt faced after a night-shift and resulted into excessive sleepiness.

A study on a group of Italian police officers has found that shift-work conditions and seniority may enhance sleep disorders and may favor sleep-related accidents¹¹. The effects of shift work on sleepiness, performance and safety are profound. Examples include greater incidence of truck accidents at night, errors in meter-readings in gas works during night shift, telephone operators connecting calls more slowly at night, speed of spinning threads in a textile mill going down during the night, poorer mental arithmetic and reduced reaction time during a night shift, nuclear disaster at Chernobyl, the Three Mile Island reactor accident and reduced medical mistakes in interns following improvement in rest conditions¹⁹. In the BPO group of the present study subjects, 32% reported of having had an accident or near-accident because of sleepiness compared to only 4.8% of the controls. This is very serious observation and may have disastrous consequences.

Shift-work sleep disorder typically manifests as insomnia or excessive sleepiness that occurs with the work schedule¹². A majority of shift workers experience difficulties after a night shift and quite a few may have problems with early morning start-times, sleep being typically curtailed by 1 to 4 hours¹². Various animal and human models of sleep deprivation have demonstrated that clinical disorders that cause either sleep curtailment or fragmented sleep resulting in functional sleep deprivation result in excessive daytime

sleepiness¹³. Variations have been observed in the ability of an individual to cope with shift work, which is influenced by several factors that include age, domestic responsibilities, commute times, diurnal preference and other sleep disorders¹⁴. Treatment of shift work sleep disorders have traditionally centered on good sleep hygiene, bright light, melatonin and short-term use of sleep medication¹⁴⁻¹⁶

Shift rotation and sleep schedule

Several studies have reported high degree of sleepiness during night shift with no sleepiness at all during the day shifts¹⁹. In one study involving 60 paper-industry workers in an extremely rapidly rotating shift system with very short rest in between shifts (night shift → 8 hrs off → afternoon shift → 8 hrs off → morning shift → 56 hrs off), it was seen that sleepiness rose to high levels during the first night shift, fell to intermediate levels during the afternoon shift and reached high levels again during the morning shift. Sleepiness was back to normal on the first recovery day¹⁸. Adjustment to night shifts does not normally occur because of the exposure to daylight while returning home from the night shift which counteracts the expected delay of the circadian clock, when light is not interfering, however (e.g. when night shift workers are provide with strong sunglasses for the morning commute home) adjustment occurs²⁰. Amongst BPO workers included in this study, 57.8% individuals maintained a regular sleep schedule as compared to 71.2% amongst controls. Sixty percent of the BPO workers and 29% among controls felt exhausted during the day. Among BPO workers 61.9% felt that excessive sleepiness interfered with their work and social life as against only 17.8% of the controls. About 43% of the BPO workers napped during working hours compared to only 10.1% of the controls, the mean duration of the nap being 15 minutes in the former and 12 minutes in the latter. Rotation of shifts was reported by 56.7%. Similar findings, perhaps on a smaller scale, are also found in most other shift-workers like police personnel and factory-workers. BPO work may therefore be considered as an extreme form of shift work.

Anxiety & depression

A higher prevalence of ulcers, depressive, sleepiness-related accidents, missed workdays and missed family or social events was observed in those shift workers

suffering from insomnia or excessive sleepiness¹⁷. The BPO workers in this study were also observed to be more depressed (imperative depression was observed in 62.9% as against only 4.6% in the control group). They were also seen to suffer more from anxiety disorder (imperative anxiety disorder was found in 33.9% of BPO workers as against 1.4% of the control group).(Table 1)

Lifestyle parameters

Peculiar practices adopted by BPO employees may predispose them to various health problems. Heavy foods during night, skipping breakfast, eating lunch in the evening are some of them²¹. Frequent headaches, fatigue, sleepiness, diminution in reflexes and work efficiency may occur. The individuals also become irritable and unsociable. In the present study, use of stimulants (tea, coffee, and cola), other substances (alcohol, narcotics) was also commoner in the BPO workers' group than in controls. Longer working hours, stress at work, lack of physical exercise and dissatisfaction was also observed in a larger proportion of this population than in controls. Another study that included 400 shift workers found that the proportion with a very negative attitude to work hours constituted 8% and were mainly characterized by marked sleepiness and sleep complaints¹⁸.

Insomnia has been defined as difficulty falling asleep, staying asleep, or non-restorative sleep for at least one month and it must be associated with a work period that occurs during the habitual sleep phase and excessive sleepiness¹⁹. Working in a BPO is an extreme form of shift-work. It is often associated with long working hours during night (occasionally at a stretch), awkward working hours (e.g. "UK-USA shift", "graveyard shift") and frequent unpleasant interactions with clientele (that may not always be particularly friendly to talk to over the telephone).

Correlations between various parameters

Significant correlation was observed between sleep score and depression (p value <0.001), sleep score and stress at work (p value <0.001), sleep score and abuse of alcohol (p<0.060), sleep score and abuse of narcotics (p value<0.016), Sleep score was also found to correlate with lack of exercise (p value<0.049). (Table 3, Figures 1&2) Depression may be precipitated in a predisposed individual who is excessively sleepy as well as exposed to

stressors at work that may be peculiar to the nature of BPO work (occasional unpleasant interactions with a client over telephone). The other lifestyle parameters like abuse of alcohol & narcotics, lack of exercise and stress at work might also be directly impacted by excessive sleepiness as evident from these observations.

The quality of sleep may be abnormal even if the total sleep time is somehow compensated (e.g. increase in arousals, decrease in slow-wave and REM sleep etc.). In such individuals in whom total sleep time is not significantly different from normal, a qualitative variation in sleep (like deficient slow-wave and REM sleep) may impact on the lifestyle parameters mentioned above.

Conclusions

The present study has only highlighted some of the redeeming features associated with sleep patterns, depression, anxiety and lifestyle that are noted in the BPO workers. This segment of the workforce is undergoing tremendous increase in magnitude. The healthcare issues in this sector are of prime importance. The BPO industry in the developing world in general, and in India in particular, is destined to witness a phenomenal growth. A healthcare policy aimed at finding remedial measures to issues pertaining to the health status of this category of workers would invariably result into healthy growth and prosperity of this industry. More studies involving a larger number of subjects that are aimed to look into these and other morbidities, followed by interventional measures to mitigate these problems as mentioned earlier, in this section of shift-workers in greater detail are therefore recommended.

Acknowledgements

The authors are thankful to Dr. Tulsi Adhikari, Senior Research Officer, ICMR Institute for Research in Medical Statistics, New Delhi for the help rendered in the statistical analysis of this data.

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