

Fatigue Assessment in Night Shift Call Centre Workers

Deepak Kansal¹ & Prof. R. K. Gupta² & Dr. Kapil Dev³

¹Research Scholar, PCJ School of Management, Maharaja Agrasen University, HP.

²Vice Chancellor, Maharaja Agrasen University, HP.

³Assistant Professor, GGD SD College, Chandigarh.

Received: January 29, 2019

Accepted: March 06, 2019

ABSTRACT: *Businesses today are moving from one shift five days working to 24X7. To support this pace, call centres are also working day and night. However, night shift working interrupts the natural cycle of sleeping at night and working at day time. This interruption leads to physical and mental fatigue among workers. More to it, prolonged working in night shifts can also bring major disorders and diseases. Hence this study was conducted on a sample of 156 night shift workers working in call centres. The study noticed higher levels of physical as well as mental fatigue among workers. It also discovered that the level of fatigue is independent of any demographic characteristic. Hence, others do suggest following rotational shifts and allowing shorter duration naps during night shifts.*

Key Words: *Call Centre Workers, Fatigue, Circadian Rhythm, Night Shift Workers*

Introduction

Business scenario has been rapidly in 21st century for most of the country of the world and India has not been an exception to it. The credit for this unprecedented growth highly need goes to the revolution of Information Technology (IT). This has given rise to service centres like BPOs (Business Process Outsourcing) and call centres. A company that focuses on the core business processes only and lets its secondary operations like administration, or payment and customer care services be handled by other parties, these are termed as BPOs (Latha and Panchanatham, 2010). A call centre can be a part of a BPO which handles voice related services like handling telephone calls exclusively. India has witnessed a large growth of call centres. Primary reasons behind this growth are availability of less expensive workforce and also availability of multi skilled people and multilingual workforce particularly English speaking (Vaid, 2009). Since the scale of business is rising, these centres are bound to provide 24X7 service to business houses. This has resulted into shift work and workers are bound to work into multiple shifts, extended shifts and night shifts for call centres.

However, this shift work in general, and night shift or graveyard shift in particular is prone to many physical and psychological problems for the workers. Night shift work goes against the principle of circadian rhythm. Circadian Rhythm refers to the response of the physical body of human beings towards light and darkness. Human beings, by nature, tend to sleep at night and remain awake during daytime (Folkard, 2008). Shift hours which make people work at night and sleep at day time, interfere with the circadian rhythm. This invite many physical as well as psychological problems for the workforce. Initially, it interrupts sleep pattern and causes fatigue. However, prolonged working under night shift system can also be a cause of cardiovascular diseases, cancer or accidents (Knutsson, 2003).

By nature, our physical body as well as brain functions at a relatively lower pace at night. Performing duty at night shift makes it even more difficult to get enough sleep. Hence the result of sleep loss and also show the performance of body and brain at rather lower level will result in to Extreme fatigue and sleepiness at work. This can lead to performance of worker at low level and may force the worker to work against own body (Madide, 2003). This can lead to occupational accidents. To mention, even Bhopal gas tragedy had happened at night shift. Keeping in mind the night shift worker, the study has focused on two major indicators of the beginning of problems. These two indicators include feeling of sleepiness and fatigue. The idea is to understand the problem at an early stage so that a corrective action can be planned.

Review of Literature

Empirically, there have been a number of studies which studied the impact of shift work on the physical as well as mental health of workers. Matheson (2014) identified many physical problems in workers like imbalanced pattern of sleeping and waking, higher risk of cardiovascular diseases and symptoms of gastrointestinal disorders associated with workers continuously in the night shifts. Similarly, Black et al.

(2014) identified that due to night shift working, workers had developed symptoms of problems like an altered circadian rhythm of sleeping and waking up, insomnia, feeling of sleepiness during daytime and fatigue. In various studies, Schwartz JR (2010), Boivin (2014), and Matheson (2014) surveyed the night shift workers for physical and mental disorders. The affected proportion of night shift workers was ranging between 24.4% to 44.3% of the total workers.

Some of the research studies found a solution to this problem by allowing shorter naps and rotating shifts. This was mainly experimented with nurses and other hospital staff. Many of the researchers like Asaoka et al. (2013), Flo et al. (2014), and Burch (2005) therefore compared night shift workers with rotating shift workers. These all concluded that the overall quality as well as the quantum of sleep among workers in night shift exclusively was highly poor as compared to workers working purely in day shifts and workers working in night shifts on rotation. Josten et al. (2003), McGettrick and O'Neill (2006), and Samaha (2007) established association between sleep deprivation and alertness as well as job performance. They argued that night shift work forced sleep deprivation among workers which in turn lowered the level of job alertness and job performance and ultimately favoured fatigue. Going on similar lines, Akerstedt (2009) and Boivin (2014) found that lesser alertness, sleepiness and under performance at workplace was more in case of night shift workers than day shift workers. Edéll-Gustafsson et al. (2002), Ruggiero (2003), and Costa (2012) compared lower performance of night shift workers and established that the condition was primarily due to inadequate sleep the workers got and disruption of circadian rhythm.

The American Psychiatric Association (2014) in 5th Edition of Diagnostic and Statistical Manual of Mental Disorders covered sleep time changes which were due to shift work and specifically included sleep and wake disorders and irregular routines. It reported that about 5% to 10% of the responding night shift workers were facing such physical disorders. Korompeli et al. (2003) argued that chronic fatigue was the major outcome of sleep disturbance which commonly occurred in night shift workers. In a study conducted on nursing staff in Greece, the researchers found that nurses working in the night shift complained fatigue as a permanent disorder with them. Winwood et al. (2006) worked on the earlier symptoms of fatigue in night shift workers. We found that the symptoms like impaired concentration, sleepiness and lack of energy and feeling of discomfort were more prevalent in night shift workers as compared to their dayshift counterparts. Muecke (2006) worked on the rotational policy of night shift workers. The author concluded that fatigue due to night shift work can significantly increase the risk of human errors and occupational accidents. Besides, it also affects the quality of work undertaken negatively.

Many of the authors like Nakata (2004), d'Errico & Costa (2012), Lu (2012) and Stimpfel (2015) analysed the impact of fatigue among night shift workers. They argued that fatigue reduced job satisfaction and work performance among workers. Looking for the symptoms they concluded that absence due to illness, labour turnover, absenteeism from work and job attrition were found in specific. In some extreme cases fatigue even induced the use of psychotropic drugs among night shift workers. Shields (2002), Selvi et al. (2007) and Bjorvatn (2012) found that workers who were working in night shifts were high on all type of problems like physical, mental and psychological health problems. These problems were quite low in case of day shift workers. In case of night shift workers, major problems included obsessive compulsive disorder, altered mood, paranoid disorders, and interpersonal sensitivity. All these disorders were more prevalent in case of night shift workers. The study also concluded that these disorders have a significant negative impact on the psychological health as well as social life of night shift workers.

Gu (2015) conducted research on nurses working in rotating night shifts. The survey was conducted considering a very large sample of 75,000 nurses employed in USA. Researchers found the shocking fact that mortality rate due to cardiovascular diseases and other related diseases was significantly more in case of female nurses in rotating night shifts as compared to the ones working in pure day shifts. The survey considered those nurses who were working in night shifts for more than or at least five years. Researcher concluded that continuously working in night shifts has highly negative impact on the health as well as longevity of nursing staff. Similar results have also been found by Lin et al. (2015) who conducted a meta-analysis. The survey found a 2.7% increase in death rate of night shift workers due to cardiovascular diseases.

Thus, it can be empirically established that night shift workers face many physical, mental and psychological disorders more often than day shift workers. Primarily, studies have indicated that due to alteration in circadian rhythm of the sleep and wake up cycle, symptoms of fatigue arise like sleepiness or underperformance in job. However, persistent working in night conditions brings even worse scenario like cardiovascular diseases, irritation, gastro disorders etc.

Problem Definition

The changed business scenario across globe has virtually remove the geographical boundaries. Be it the 24X7 work culture, or the shifts designed to cater the customers of UK and USA, night shift Call Centres have become very popular. However, physical bodies of workers are not accustomed to working in night shifts due to circadian rhythm of sleep and waking up. This mostly results in sleepiness as well as fatigue. All these however, can be taken as symptoms which may result into major diseases for the workers. Hence it is at most important to study the level of fatigue among workers particularly in night shifts so that a corrective action can be taken well in time. This study has been an effort to measure the level of fatigue among workers working in night shifts.

Objective

The study attempts to achieve the main objective of assessing the level of fatigue among workers working in night shifts. The target is to find workers who are continuously working in night shifts and feeling sleepiness and fatigue. In general, if the level of fatigue found through the study is high or extreme, this can serve as a warning sign for both the workers and the call centres in night shifts.

Hypotheses

Taking a few from empirical studies, the hypothesis for the current study is that the workers working in night shifts are high on sleepiness and fatigue. Besides, the study has also considered three demographic characteristics of workers i.e. gender, age, and designation. However, since no evidence of any association between demographic characteristics and level of fatigue among night shift workers has been found empirically, the researchers have continued to hypothesise no association of demographic characteristics and level of fatigue.

Research Design

The study has been based on workers working in night shifts in three selected call centres located in the city of Chandigarh, Panchkula, and Mohali. The names of these call centres have not been shown here due to privacy concerns. In order to measure the level of fatigue among selected workers, Fatigue Assessment Scale (FAS) has been used (Refer Table-1). This scale was first designed and tested by Michielsen et al. (2003). Thereafter, the same scale has been put into use by many different studies. This scale is based on 10 statements. Five of the statements are related to physical health while remaining five are related to mental health. The sum of responses under all ten statements is considered as total fatigue level. Each item of the scale is answered using response ranging from never to always where never is given the weightage of 1 and always is given the weightage of 5. Two items number 4 and number 10 are reverse scored. Hence, the possible total fatigue level can range between 10 to 50. Standard norms claim no fatigue up to total score of 10. From 10 to 22, the level of fatigue is termed low. From 23 to 34, the fatigue level is assumed to be moderate. Finally, the fatigue level of 35 or more is considered extreme. For further analysis of physical and mental health, the scale values can be taken on their half.

Initially, 200 night shift workers were identified and requested to fill the questionnaire. A total of 170 respondents however responded up to the cut-off date. Out of these responses, 14 were found to be filled in consistently and eventually cancelled. Hence, a total of 156 responses have been analysed under the study. The data so gathered has been analysed with the help of descriptive statistics. In order to examine the association between fatigue level and demographic characteristics of respondents, cross tabulation has been done. In order to test the hypothesis, chi square test has been used in test of independence format.

Analysis and Interpretation

The scheme of analysis has been divided in three parts. First part presents the responses received from Night Shift workers in relation to physical and mental fatigue. Next part determines the level of fatigue experienced by workers. Finally, third part tries to establish relationship between demographic variables and fatigue levels experienced by workers. This part is based on cross tabulation and tables also show results of chi square test.

Response to Fatigue Assessment Statements

Table-2 covers responses of night shift workers in relation to Physical fatigue. About 64% of the respondents are mostly or always bothered by fatigue. 59% of the respondents have admitted that they get tired very quickly. More than 50% of the respondents have never or sometimes enough energy for everyday life. More than two-third of the respondents feel physically exhausted. About 56% of the respondents can never or rarely concentrate well when they are doing something. In brief, it can be observed that more than

half of the night shift workers have symptoms of physical fatigue. Table-3 deals with mental fatigue. 60% of the respondents have admitted that they do not do much during the daytime after spending time at night shift. 59% of the respondents mostly or always face problems when they start things. 64% of the respondents have indicated problems to think clearly. Similarly, 64% of the respondents also say that they feel no desire to do anything. Finally, 58% of the respondents feel mentally exhausted after night shift.

Fatigue Levels of Workers

After assessing individual responses, fatigue level of workers was calculated. Table-4 has shown the levels of fatigue experienced by night shift workers. Shockingly, none of the night shift worker has been found low on total fatigue. 35% of the workers have moderate level of total fatigue while 65% of the workers had extreme level of total fatigue. Total fatigue was then divided in two parts viz. physical fatigue and mental fatigue. 42% of the workers had moderate level of physical fatigue while 58% of the workers had extreme level of physical fatigue. Thereafter, 28% of the workers reported moderate level of mental fatigue while 72% of the workers reported extreme level of mental fatigue. An observation is that mental fatigue has been more than physical fatigue in case of night shift workers.

Demographics and Fatigue Level

Table-5 has explored the association between Gender and fatigue level. It is evident that the level of total fatigue has been similar in case of both male and female respondents. In case of physical fatigue, female respondents feel higher level of tiredness as compared to male respondents. Thereafter, mental fatigue has also been quite similar in case of male and female respondents. In order to test the significance of this association, chi square test has been used. However, results indicate that chi square test has been insignificant in all the three cases. Hence, it can be claimed that gender of the respondent has no significant role to play with the feeling of fatigue. Both male and female workers feel similar level of physical, mental, and total fatigue.

Table-6 establishes association between age and level of fatigue. In case of total fatigue, respondents belonging to the age group of more than 35 years tend to feel higher level of total fatigue than other age groups. Similar level has also been in case of physical fatigue. However, in case of mental fatigue, age group of 26 to 35 years has been witnessing more of mental tiredness than other age groups. Chi square test has been used to know the significance of this association. The results however, indicate that no significant association exists between age and level of fatigue. Table-7 tries to relate the designation of night shift workers with the level of fatigue experienced by them. The level of total fatigue has been more in case of junior and middle management and minimum in case of senior management. Even in case of physical fatigue, the results are no different. However, in case of mental fatigue, all three designations seem to be suffering badly. The results of Chi square test have again been insignificant. Thus, in spite of some difference is appearing, it can be claimed that designations of the workers do not help to reduce or increase the level of fatigue.

Conclusion

We, the human beings have a physical body which is based on circadian rhythm of sleeping and waking up. Any alteration in this cycle can cause problems related to physical and mental health of workers. However, night shift call centres work on schedules which induces the feeling of sleepiness and fatigue among workers. The efficiency levels are very low. Absenteeism is on high and it can also result in occupational accident. The present study conducted on the night shift call centre employees has shown that the level of both physical and mental fatigue is very high in such workers. All the workers in night shift call centres were found experiencing moderate or extreme levels of fatigue. Interestingly, no significant association was found between fatigue labels and demographic characteristics like gender, age, and designation. It further proves that irrespective of the demographic profile, all the night shift workers feel moderate or extreme levels of fatigue. This is high time when systems like rotation or allowing short naps can be introduced so that this sleepiness or fatigue does not advance to major disorders among workers.

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Tables

Table-1: Fatigue Assessment Scale (FAS)

	Never	Sometimes	Regularly	Often	Always
1. I am bothered by fatigue					
2. I get tired very quickly					
3. I don't do much during the day					
4. I have enough energy for everyday life					
5. Physically, I feel exhausted					
6. I have problems to start things					
7. I have problems to think clearly					
8. I feel no desire to do anything					
9. Mentally, I feel exhausted					
10. When I am doing something, I can concentrate quite well					

Table-2: Assessment of Physical Fatigue

	Weightage	Never 1	Sometimes 2	Frequently 3	Mostly 4	Always 5	Total
I am bothered by fatigue	Count	7	22	28	68	31	156
	%age	4%	14%	18%	44%	20%	100%
I get tired very quickly	Count	10	24	31	62	29	156
	%age	6%	15%	20%	40%	19%	100%
I have enough energy for everyday life.	Count	36	55	38	19	8	156
	%age	23%	35%	24%	12%	5%	100%
Physically, I feel exhausted.	Count	6	15	31	72	32	156
	%age	4%	10%	20%	46%	21%	100%
When I am doing something, I can concentrate quite well.	Count	32	54	41	23	6	156
	%age	21%	35%	26%	15%	4%	100%

Table-3: Assessment of Mental Fatigue

	Weightage	Never 1	Sometimes 2	Frequently 3	Mostly 4	Always 5	Total
I don't do much during the day	Count	5	18	39	66	28	156
	%age	3%	12%	25%	42%	18%	100%
I have problems to start things.	Count	10	27	26	58	35	156
	%age	6%	17%	17%	37%	22%	100%
I have problems to think clearly.	Count	8	23	26	70	29	156
	%age	5%	15%	17%	45%	19%	100%
I feel no desire to do anything.	Count	7	23	27	68	31	156
	%age	4%	15%	17%	44%	20%	100%
Mentally, I feel exhausted.	Count	5	26	34	60	31	156
	%age	3%	17%	22%	38%	20%	100%

Table-4: Different Fatigue Levels of Workers

	Individual Score	Scale	Count	%age
Total Fatigue	10-21	Low	0	0%
	22-34	Moderate	55	35%
	35 or more	Extreme	101	65%
		Total	156	100%
Physical Fatigue	5-10	Low	0	0%
	11-17	Moderate	65	42%
	18 or more	Extreme	91	58%
		Total	156	100%

Mental Fatigue	5-10	Low	0	0%
	11-17	Moderate	43	28%
	18 or more	Extreme	113	72%
		Total	156	100%

Table-5: Gender and Fatigue Level

		Gender					
		Male		Female		Total	
		Count	%age	Count	%age	Count	%age
Total Fatigue	Moderate	36	35%	19	35%	55	35%
	Extreme	66	65%	35	65%	101	65%
	Total	102	100%	54	100%	156	100%
Physical Fatigue	Moderate	46	45%	19	35%	65	42%
	Extreme	56	55%	35	65%	91	58%
	Total	102	100%	54	100%	156	100%
Mental Fatigue	Moderate	28	27%	15	28%	43	28%
	Extreme	74	73%	39	72%	113	72%
	Total	102	100%	54	100%	156	100%
Chi Square Test		Total Fatigue		Physical Fatigue		Mental Fatigue	
Chi-square		.000		1.427		.002	
df		1		1		1	
Sig.		.989		.232		.965	

Table-6: Age and Fatigue Level

		Age									
		Less than 18 years		18-25 years		26-35 years		More than 35 years		Total	
		Count	%age	Count	%age	Count	%age	Count	%age	Count	%age
Total Fatigue	Moderate	11	33%	31	40%	12	32%	1	13%	55	35%
	Extreme	22	67%	47	60%	25	68%	7	88%	101	65%
	Total	33	100%	78	100%	37	100%	8	100%	156	100%
Physical Fatigue	Moderate	18	55%	28	36%	17	46%	2	25%	65	42%
	Extreme	15	45%	50	64%	20	54%	6	75%	91	58%
	Total	33	100%	78	100%	37	100%	8	100%	156	100%
Mental Fatigue	Moderate	8	24%	28	36%	5	14%	2	25%	43	28%
	Extreme	25	76%	50	64%	32	86%	6	75%	113	72%
	Total	33	100%	78	100%	37	100%	8	100%	156	100%
Chi Square Test		Total Fatigue		Physical Fatigue		Mental Fatigue					
Chi-square		2.686		4.513		6.580					
df		3		3		3					
Sig.		.443		.211		.087					

Table-7: Designation and Fatigue Level

		Designation							
		Senior Management		Middle Management		Junior Management		Total	
		Count	%age	Count	%age	Count	%age	Count	%age
Total Fatigue	Moderate	4	50%	7	28%	44	36%	55	35%
	Extreme	4	50%	18	72%	79	64%	101	65%
	Total	8	100%	25	100%	123	100%	156	100%
Physical Fatigue	Moderate	6	75%	12	48%	47	38%	65	42%
	Extreme	2	25%	13	52%	76	62%	91	58%
	Total	8	100%	25	100%	123	100%	156	100%

Mental Fatigue	Moderate	2	25%	6	24%	35	28%	43	28%
	Extreme	6	75%	19	76%	88	72%	113	72%
	Total	8	100%	25	100%	123	100%	156	100%
Chi Square Test		Total Fatigue		Physical Fatigue			Mental Fatigue		
Chi-square		1.353		4.674			.234		
df		2		2			2		
Sig.		.508		.097			.889		