

Shift Workers and Their Academic Profile

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Abstract—Disturbance of circadian rhythms can affect concentration, motivation, and reaction time, particularly at night. This combination can result in an increased risk of accidents and injury and health problems. There is extensive evidence that shift work including night work, increases the risk of developing psychological and physiological health problems. It has also been rigorously demonstrated that very often shift workers suffer from internal desynchronization. It may produce disastrous chronopharmacologic effects such as impaired metabolism and impaired responsiveness to medications. There is also sufficient evidence to prove that rotational shift work affects human health and performance by disrupting circadian rhythms and by causing numerous alterations in human behavior and physiology. It is essential that employees involved in shift duties need to ensure that their eating habits and timings are regulated to minimize the vulnerability to the gastrointestinal problems. Further, it is essential that an ideal rotation of the shifts be adopted so as to reduce the sleeplessness and fatigue among the shift workers.

1. INTRODUCTION

Long hours bring about unhealthy lifestyle changes such as smoking, alcohol, abuse, and lack of physical activity, sleeplessness, poor eating habits and fewer chances for medical examination. This in turn enhances the gastric problems. Among the total sample the Men and Lower age-group people are known to neglect relatively more than the higher age-group individuals. In the present study it was found that among the individuals affected, 81.94% belonged to the two lower age groups and 97% were Men. Therefore it is essential that employees involved in shift duties need to ensure that their eating habits and timings are regulated to minimize the vulnerability to the gastrointestinal problems. Further, Johnson and Sharit, (2001) observed that workers who were on 12 hr fast rotation shift had fewer gastrointestinal complaints when compared with those on 8 hr fast three shift rotation.

There is extensive evidence that shift work including night work, increases the risk of developing psychological and physiological health problems (Andlauer 1960; Koller 1983; Bohle and Tilley 1989; Scott *et al*, 1997). Moldofsky, (1995) suggests that disorganization or disturbance of the sleep wake system interferes with the immunological, neuroendocrine and thermal systems and contributes to pathological processes and

is evident in diseases, such as infections etc. One such common disorder is diabetes.

It has also been rigorously demonstrated that very often shift workers suffer from internal desynchronization. (Reinberg *et al*, 1984 and 1989; Pati and Saini, 1991; Gupta and Pati, 1993). Toth, (1995) brings about a common perception that lack of sleep lowers resistance to infection and infections develop during or after periods of sleep loss suggest that sleep deprivation is likely to impair immune functions. Brown *et al*, (1989) provides evidence to support the view that lack of sleep lowers resistance to infection and that during periods of sleep deprivation, respiratory tract infections occur more frequently.

In view of the above, the present work entitled “Shift workers and their Academic Profile” has been contemplated with the following objectives:

1. To understand the occupational health problems among shift staff of different age groups with varying service experience;
2. To identify the different health disorders or diseases associated with the shift staff and the incidences of these health problems;
3. To assess the different types of stress associated with the shift work and understand the impacts on health;
4. To evaluate the present shift pattern with special reference to their impacts on health and to suggest the optimal pattern.

2. METHODOLOGY

The study followed “*Syndrome Approach*” to realize the objectives of the study, by adopting a combination of the methods of obtaining data on the study respondents. The focus of the study being the health problems associated with the shift work, sampling was carried out by selecting the employees.

The selection of the employees for the study was random. Based on the proportional distribution of the 5 types of employees, and based on their distribution in the Visakhapatnam division, the proportion of the samples for each type was determined.

The *Standard Shift Work Index* developed by the Shift work Research Team MRC/ERSC Social and Applied Psychology Unit was used in the present study with few modifications to suit the local conditions. This Shift Work Index is a questionnaire which aims to identify the shift schedules, sleep habits, eating patterns if any psychological effects for an initial survey of the health which might be expected to increase or decrease the effects on health.

3. RESULTS

Distribution of Employees Types:

Of the 300 individuals examined in the study, Drivers (Loco Pilots) accounted for 41.33%; Train Guards have accounted for 7% and the TTEs have accounted for 6.67%. Thus, Travel mode shift employees altogether constitute 55% of the total individuals examined. Stationary employees i.e. Technicians and Office accounted for 22.67% and 22.33%, respectively (Fig. 1).

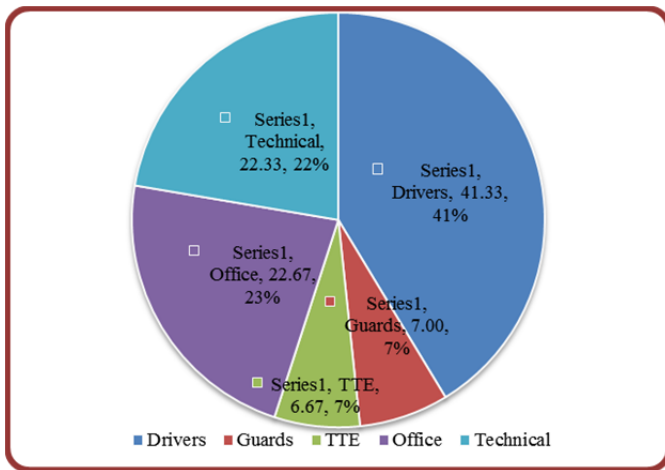


Fig.1. Employees types distribution in the sample

By gender, among the Loco Pilots (LP), Guards (GD), TTEs, Office staff (OS) and Technicians (TN) women account for 3.23%, 4.76%, 65%, 64.7% and 14.9%, respectively. The distribution of the employee types in to different age-sex groups was presented in Table 1.

Table 1: Distribution of Employees Types

S. No	Employee Types	AG-1		AG-2		AG-3		AG-4		TOTAL	
		N	%	N	%	N	%	N	%	N	%
LOCO PILOTS											
1	Men	4	91.67	4	100	2	100	7	100	12	96.77
2	Women	4	8.33	0	0	0	0	0	0	4	3.23
3	Total	4	38.71	4	37.90	2	17.74	7	5.65	12	12.43

TRAIN GUARDS											
1	Men	1	90.91	0	0	5	100	5	100	20	95.24
2	Women	1	9.09	0	0	0	0	0	0	1	4.76
3	Total	1	52.38	0	0	5	23.81	5	23.81	21	21
TRAIN TICKET EXAMINERS											
1	Men	1	8.33	4	80.00	0	0	2	100	7	35.00
2	Women	1	91.67	1	20.00	1	100	0	0	13	65.00
3	Total	1	60.00	5	25.00	1	5.00	2	10.00	20	20
OFFICE STAFF											
1	Men	5	14.29	1	66.67	1	33.33	0	0	24	35.29
2	Women	3	85.71	9	33.33	2	66.67	3	100	44	64.71
3	Total	3	51.43	2	39.71	3	4.41	3	4.41	68	68
TECHNICAL STAFF											
1	Men	7	50.00	1	90.00	2	100	7	87.50	57	85.07
2	Women	7	50.00	2	10.00	0	0	1	12.50	10	14.93
3	Total	1	20.9	2	29.8	2	37.3	8	11.9	67	67

Women’s presence in different employee types in the sample reveals that their numbers is very low in LP and GD types. Of the total 72 women in the sample, 5.56% were LPs, 1.39% were GDs, 18.06% were TTEs, 61.11% were OS, and 13.89% were TNs (Fig. 2).

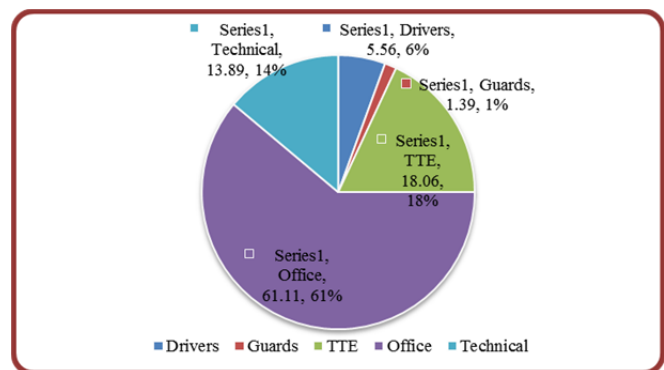


Fig. 2: Womens representation in the Employee Types

By Age groups, LPs have more or less equal representation in the AG-1 and AG-2 groups with 38.71% and 37.90%, respectively. However, the older age groups were represented by lower numbers and account for 17.74% by AG-3 and 5.65% by AG-4. (Fig.3). Among the GDs, maximum numbers (52.38%) were in AG-1, while there was no representation from AG-2, AG-3 and AG-4 had equal representation with

23.81% each (Fig.3). Among the TTEs, also maximum representation was by AG-1 with 60%, followed by AG-2 with 25% representation, while AG-3 and AG-4 were with 5% and 10% representation, respectively (Fig. 3).

A similar trend of maximum representation in the AG-1 followed by the AG-2 was recorded in case of the OS type also. The AG-1 and AG-2 had representation by 51.47% and 39.71%, respectively, while the AG-3 and AG-4 were represented by 4.41% each (Fig.3). Among the TN type, relatively more even type of distribution was observed and AG-1 had a representation of 20.90%, while in case of AG-2, AG-3 and AG-4 were represented by 29.85%, 37.31% and 11.94%, respectively (Fig. 3).

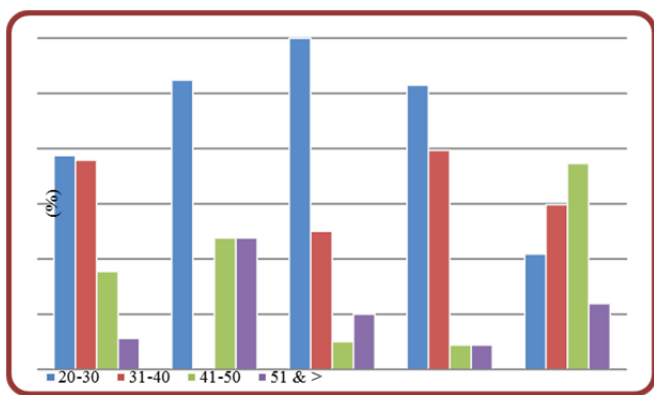


Fig. 3: Frequency of different Age groups within Employee Types

4. MARITAL STATUS:

Married respondents comprised of 54% and the single respondents comprised of 46%. Amongst these the largest number of respondents within the age group 21 to 30 years (AG-1) are single, followed by 31-40 age range (AG-2) where both the groups are almost similar, followed by 41-50 age group (AG-3) where the married were comparatively more than single. On contrary in the age group 51-60 (AG-4) there were fewer single than married respondents who have filled in the questionnaire. Table 2 illustrates the marital status of the respondents in relation to their age groups.

Table 2 - Marital Status of the respondents

S No.	Age	Total population	% of population	Married	Single
1	21-30	120	40%	50	70
2	31-40	99	33%	42	57
3	41-50	56	18.66%	48	8
4	51-60	25	8.33%	22	3

5. ACADEMIC BACKGROUND:

Educational levels of the respondents were also examined. With respect to educational level 12% of the respondents have completed their high school; 60% of the respondents have completed their ITI, 20% of the respondents have completed

their Diploma courses where as 8% of the respondents are still pursuing or just completed their B Tech. The academic background of the respondents is as shown in Table 3

Table 3: Academic background of the respondents

S No.	Academic Background	No. of respondents	% of respondents
1	High school	36	12%
2	ITI	180	60%
3	Diploma	60	20%
4	B Tech	24	8%

6. EMPLOYMENT HISTORY

Data on employment history for the respondents who were interviewed reveals that 30.6% of the total sample population have experience less than five years, 46.6% of the sample population have six to ten years of experience and 22.6% of the sample population have work experience of fifteen years and more as shown in Table 4.

Table 4: Employment History of the respondents

S No.	Years employed	No. of respondents	% of respondents
1	0-5 years	92	30.66%
2	6-10 years	140	46.66%
3	11-15 years	68	22.66%

7. QUANTITATIVE WORK LOAD OF THE RESPONDENTS:

Of the total respondents interviewed the quantitative workload of the subjects working 8 hours or less per day is 34.66%, followed by subjects working 8-16 hours is 65.33% and the subjects working more than 16 hours per day are nil (Table 5).

Table 5: Quantitative work load of the respondents

S No.	Work schedule	No. of respondents	% of respondents
1	<8hrs	104	34.66
2	8-16 hrs	196	65.33
3	>16 hrs	0	0

The work load is also classified according to the different age groups and inferred that within the age group 41-50 more respondents are working less than or equal to 8 hours per day, and in contrary within the age group 51-60 more respondents were working 8-16 hours per day as shown in Table 6.

Table 6: Quantitative work load of the respondents in different age-sex groups

Age Code	Age Group	No. of Respondents		% of respondents	
		< 8 hrs/d	8 – 16 hrs/d	< 8 hrs/d	8 – 16 hrs/d
AG-1	21-30	47	73	39.16	60.83
AG-2	31-40	22	77	22.22	77.77
AG-3	41-50	32	24	57.14	42.85
AG-4	51-60	3	22	12.00	88.00

8. SHIFT PATTERN:

In the Indian Railways of Visakhapatnam Division, employees working on shift duties had broadly two types of Shift systems. (1) Those who are working on Rotation of Shifts (RS); (2) Those who are working only during night shift, i.e. Permanent Night Shift (PN).

Of the total 300 respondents, the number of workers within the age group 21-30 are 120. Amongst these number of workers who worked in rotational shift work with nights is 76.67%, rotational shift work without night is 8.33%, and permanent nights is 15%. Similarly within the age group 31-40, the number of respondents is 99. Amongst these the workers who worked in rotational shift work with nights is 85.86%, rotational shift work without night shift is 10.10% and those who worked permanent nights is 4.04%. Within the age group 41-50 the number of respondents is 56. The respondents who worked rotational shift work with nights are 67.86% those who worked rotational shift work without night is 21.43%. Those who were on permanent nights are 10.71%. Within the age group 51-60 the number of respondents are 25. The number of respondents who worked in rotational shift work with night are 72% and the workers who worked rotational shift work without night is 20% and those who worked permanent nights is 8% as shown in the given **Table 7**.

Table 7: Shift Pattern of the respondents

S. No.	Age Gr.	Respondents in Shift Types					
		RS with NS		RS without NS		PN	
		No.	%	No.	%	No.	%
1	AG-1	92	76.67	10	8.33	18	15.00
2	AG-2	85	85.86	10	10.10	4	4.04
3	AG-3	38	67.86	12	21.43	6	10.71
4	AG-4	18	72.00	5	20.00	2	8.00

9. CONCLUSION:

Kawakami *et al* (1999) reported that 50 or more hours of *overtime/ month* increased the risk for development of diabetes mellitus as compared with those worked for 25 hrs or less over time. Nakanishi *et al* (2001 a) reported that 11 hrs or more work a day was associated with a reduced risk as of developing diabetes mellitus compared with less than 8 hrs. Diabetes is one of the highly prevalent disorders among the Indian population, and it is also known to be hereditary. However, under normal circumstances, the disease affects only the middle-aged and above age groups.

The stress induced by long working hours and disturbance of the physiological biological clock affects the circulatory system. Hyashi *et al*, (1996) observed increased Blood Pressure in groups of white collar employees working 84 to 96 mean hours of overtime per month as compared with those working 25 to 43 mean hours of overtime. Iwasaki *et al* (1998) reported significantly elevated systolic blood pressure in older sales men (aged 50-60)) whose work hours exceeded 61 hrs

per week compared with sales men working 57 hrs or less. Others who established links existing between shift work and increased risk of blood pressure and cardiovascular problems include Knutsson *et al*, (1986); Kristensen, (1989); Tuchsén *et al*, (1994); Uehata (1994); Kawachi *et. al.* (1995); Hayashi (1996); Tenkanen *et al* (1997); Iwasaki (1998); Sokejima, Kagamimori (1998); Tenkanen *et al* (1998); Boggild and Knutsson (1999); Van Amelsvoort *et al* (2001); Lipscomb *et al* (2002).

As evident in the foregoing review of the studies on shift workers, it is unequivocal that shift work is linked to a series of acute and chronic effects on human beings. It is essential that an ideal rotation of the shifts be adopted so as to reduce the sleeplessness and fatigue among the shift workers, ideally limiting the total work hours to less than 50hrs/week and night shift hours to less than 8hrs/week. Thus, the intensity of the stress reduces and the physical ability to cope up increases.

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