

## Assessment of work pattern of the rotational workers of the railway industry

DIVYA SINGH and SEEMA KWATRA

*Department of Family Resource Management, College of Home Science, G..B. Pant Agriculture University and Technology, Pantnagar – 263145, (U. S. Nagar, Uttarakhand)*

**ABSTRACT :** The present study was carried out to assess the work pattern of rotational workers working at reservation counter and also find out the job satisfaction amongst rotational workers of railways industry. A sample of forty respondents was taken at reservation counter for descriptive data and it was collected with the help of interview schedule. The results revealed that all respondents were having irregular shift system and they spent 48 hours average time in each week. More than half of the respondents (60 per cent) were involved in rotating shift with night work pattern. Whereas 27.5 per cent respondents were feeling always difficulties in falling asleep between their successive night shifts and 17.5 per cent people ever felt tired in night shifts due to rotational job demand. To cope up with these problems a manual entitled “Shift Workers Guide” was prepared. This suggests different guidelines to the individual and organization as how to cope better to the job demand. This would then enhance job satisfaction, health status and lifestyle of the employees at domestic level and official front.

**Key words:** Shift work, fatigue, coping, rotational task, stress

The move to 24 hour, 7 day (continuous) operations across industries is also increasing the pressure for work outside daytime hours. This trend has been accompanied by pressure from employers to eliminate traditional penalty rates for night work, overtime and weekend work – in effect, to treat all hours the same and pay for the work that is done, not when it is done. Employees’ lives beyond work can be greatly influenced by rosters. The more shift work (particularly night work) and extended working hours that people are exposed to per day, per week and so on, the greater the effect on the quality of off-duty periods. To survive and remain healthy, the human body has to keep a balance between different processes within the organism (Ader *et al.* 1990; Anisman *et al.* 1996). This regulation involves many systems that interact on various levels (Besedovsky *et al.* 1999), and we have evolved intricate processes to keep the different systems within certain boundaries. These are so called, “homeostatic systems” (homeostasis referring to “balance” or steady state) are vital and allows the individual to retain a physiological and behavioral stability despite environmental fluctuations (McEwen, 1998).

Humans and animals have precise and persistent rhythms in many behavioral, physiological, metabolic, cellular, and molecular parameters that, although influenced by the environment, are generated by an internal clock (Aschoff 1978; Meijer *et al.* 1989; Klein *et al.* 1991; Takahashi, 1993). This clock runs, even in the absence of external time cues such as light, with a period of approximately 24 hours, and has thus been named the “circadian clock” (circadian = around a day) (Czeisler *et al.* 1999). It is the reliable alterations of day and night of the earth that most living organisms, e.g. animals, plants and even bacteria, have adjusted their behavior and physiology function (Ishida *et al.* 1999; Panda *et al.* 2002; Hastings *et al.* 2003). Rotating shift work has well-known harmful effects on human health and well-being. It disturbs sleep, wakefulness, eating patterns, social life and in the long run, often results in gastrointestinal diseases. The purpose of combining ergonomics with railway industry worker is to reduce occupational health hazards of the workers. Railway is an important industry where large numbers of human resources are involved in rotational task. A

number of studies have demonstrated that Shift work/ Rotational work disrupts the body's circadian rhythms, that is, its daily cycle. It also affects the quality and quantity of sleep a person gets and disrupts family and social life. This impact on the health of the shift worker can potentially cause tiredness, mental stress, cardio-vascular diseases, gastro-intestinal disorders, menstrual disorders, poor performance and increased accidents. Quite a good number of studies have been conducted abroad on different areas of rotational work. But there is very little information available in the literature on rotational task in the railway industry in India. Therefore there is need to study the type of activities performed by the railways workers in the 24 hours of the day. The study assessment of work pattern of the rotational workers of the railway industry was planned to study the work pattern of rotational workers working at reservation counter and to assess the sleeping disorder amongst rotational workers of railways industry.

## **MATERIALS AND METHODS**

A research design is the arrangement of conditions for collection and analysis of data with the aims to combine relevance to the research purpose with economy in procedure. Experimental and descriptive research design was planned in order to achieve the objective of study. Descriptive research design is concerned with hypothesis formulation, its testing, analysis of the relationship among variables and generalization. A descriptive research enumerates the existing conditions in which the researcher has no control over the variables and can report only actual conditions. In experimental research design certain variables are carefully controlled or manipulated and focus is on relationship among the variables. Experimental and descriptive research design were planned in order to achieve the objective of study. Total sample size were 40 selected on random sample basis. Under descriptive research design pre-coded interview schedule was used for the present study for collection of data, related to shift work pattern and health related problems.

## **RESULTS AND DISCUSSION**

Significant results of the selected respondent's profile with respect to the different personal variables, family variables of the respondents are described under this section.

### **Personal Variables**

Age determines the maturity of an individual and has a bearing on the thinking, experience and exposure of a person that are achieved at different stages of life. The age of the respondents were categorized into three categories viz. 25 – 35 years, 35 – 45 years, and 45 – 55 years. Table 1 clearly envisages that a total of 30 per cent respondents were found to be in the age group of 25 – 35 years followed by 45 per cent respondents in the age group of 35 – 45 years and 25 per cent respondents in the age group of 45 – 55 years. In the male category, it was found that majority of the respondents (25 per cent) were under the category of 35 – 45 years followed by (22.5 per cent) in the age group of 45 – 55 years. Majority of the female respondents (20 per cent) were under category of 35 – 45 years, followed by 17.5 per cent in the category of 25-35 years and very few (2.5 per cent) fall under the category of 45 – 55 years of age.

With regard to education, more than half (70 per cent) respondents were found having a qualification upto graduate and 30 per cent respondents were postgraduates. Nearly 42.5 per cent respondents of the males category were having a graduate degree and rest 17.5 per cent respondents had educational qualification of postgraduate. Majority of female respondents (27.5 per cent) were graduate degree and only 12.5 per cent respondents had educational qualification of postgraduate. None of the respondents were under the category of intermediates. On the whole all the respondents male 60 per cent and female 40 per cent were married. None of the respondents were found in category of widowhood. With reference to income of the rotational workers engaged in reservation counter of the railway industry, results revealed that cent per cent of the respondents had monthly income between 10,000 – 15,000. Maximum respondents (92.5 per cent) travelled by public transport and only few (7.5 per cent) respondents traveled by a combination of public and private transport. More than half of the male and female respondents 57.5 per cent, 35 per cent respectively travelled by Private transport and the remaining travelled by combination of public and private transport. None of the respondents travelled by foot.

The data pertaining to work related details of the rotational workers involved is shown in the Table 2 with respect to number of working years, average time spend per week and off periods per month of the

workers. Tabulating the responses with respect to total number of working years, it was found that 20 per cent respondents were found to be in the 5–10 working years, 50 per cent respondents were found to be in the 10–15 working years and 30 per cent respondents were found to be in the 15–20 working years. Twenty five per cent of the male respondents were found to have an experience of 5–10 years and 15–20 years respectively in this particular work area. Similar responses were given by women i.e. an experience of 10–15 years as reported by 25 per cent female respondents and 5 per cent were having 15–20 years of job experience. All the respondents, male (60 per cent) and female (40 per cent) group had to spend an average time of 48 hours per weeks. They all performed their duties 8 hours /day for a period of 6 days in a week. None of the respondents performed their duties less than 48 hours per weeks. On the whole, it was found that all respondents of the railway industry had 4 days off period per month. None of the respondents had less or more than 4 days off period per month.

Shift details of the sample respondents include the work pattern, regularity of shift systems, advance notice

of roster, length of shifts per day as shown in Table 3. All the selected male respondents 60 per cent performed rotating shifts with night and all female 40 per cent workers performed rotating shift without night. None of the respondents performed permanent night shift. All respondents of the reservation counter were involved in Irregular shift systems. None of the respondents were involved in regular and flexible shift systems. On the whole, all respondents male and female received two day advance notice of roster. In railway industry there were no facilities to provide advance notice of roster before one month to their employees. Selected respondents of the railway performed their shift duties for a length of 8 hours per day. None of the respondents were involved less or more than 8 hours length of shifts per day.

The data in Table 4, discusses sleep pattern of the shift workers. Thirty five per cent male and 27.5 per cent female respondents frequently wake up early between successive morning shifts and 25 per cent male and 12.5 per cent female almost always wake up early between successive morning shifts. Intended wake up

**Table 1: General profile of the rotational workers (N = 40)**

S. No.	Variables	Males	Females	Total
<b>A</b>	<b>Age</b>			
	25 – 35 years	5 (12.5)	7 (17.5)	12 (30)
	36 – 45 years	10 (25)	8 (20)	18 (45)
	46 – 55 years	9 (22.5)	1 (2.5)	10 (25)
<b>B</b>	<b>Education</b>			
	Intermediate	-	-	-
	Graduate	17 (42.5)	11 (27.5)	28 (70)
	Postgraduate	7 (17.5)	5 (12.5)	12 (30)
<b>C</b>	<b>Marital status</b>			
	a) Married	24 (60)	16 (40)	40 (100)
	b) Widowed			
	a) Public transport			
	b) Private transport	23 (57.5)	14 (35)	37 (92.5)
	c) Combination of public and private	1 (2.5)	2 (5)	3 (7.5)
	d) By foot	-	-	-

**Note:** Figures in parentheses indicate the percentage of total respondents in the category.

**Table 2: Work details of the rotational workers (n = 40)**

S. No.	Variables	Males	Females	Total
<b>A</b>	<b>Working years</b>			
	5 – 10	4 (10)	4 (10)	8 (20)
	10 – 15	10 (25)	10 (25)	20 (50)
	15 -20	10 (25)	2 (5)	12 (30)
<b>B</b>	<b>Average time spend each weeks</b>			
	a) 36 hours*	-	-	-
	b) 48 hours**	24 (60)	16 (40)	40 (100)
	c) 60 hours***	-	-	-
<b>C</b>	<b>Off period per month</b>			
	a) 3 days	-	-	-
	b) 4 days	24 (60)	16 (40)	40 (100)
	c) 5 days	-	-	-

\* 36 hours = 6 hours/day (6 days); \*\* 48 hours = 8 hours/day (6 days); \*\*\* 60 hours = 10 hours/day (6 days)

**Note:** Figures in parentheses indicate the percentage of total respondents in the category.

**Table 3: Shift details of workers (n = 40)**

S. No.	Variables	Males	Females	Total
<b>A</b>	<b>Work pattern</b>			
	Rotating shifts with night	24 (60)	-	24 (60)
	Rotating shifts without night		16 (40)	16 (40)
	Permanent night shifts	-	-	-
<b>B</b>	<b>Regularity of shifts systems</b>			
	Regular	-	-	-
	Irregular	24 (60)	16 (40)	40 (100)
	Flexible	-	-	-
<b>C</b>	<b>Advance notice of roster</b>			
	Two days notice	24 (60)	16 (40)	40 (100)
	Week notice	-	-	-
<b>D</b>	<b>Length of shifts per day</b>			
	8 hours	24 (60)	16 (40)	40 (100)
	10 hours	-	-	-

**Note:** Figures in parentheses indicate the percentage of total respondents in the category.

timings between successive afternoon shifts reveal that 12.5 per cent males and 2.5 per cent female respondents rarely wake up early and 20 per cent male and 15 per cent female sometimes and 25 per cent male and 22.5 per cent female frequently wake up early in the morning. Only 2.5 per cent male respondents almost always wake up early in the morning. Male workers only were involved in rotating shift with night. 10 per cent male respondents said that they almost never wake up early in the morning and 50 per cent responded that they rarely wake up in the morning between successive night shifts. In support of the above facts similar results have been reported by

Tepas and Mahar (1989). Thirty per cent male and 22.5 per cent female respondents rarely wake up early in the morning on successive off days, followed by 17.5 per cent male respondents said that they almost never wake up early in the morning. Few respondents got up early in the morning even on off days. Thirty per cent males and 27.5 per cent females felt sometimes difficulty in falling asleep and 7.5 per cent males and 10 per cent females could frequently fall asleep between their morning shifts whereas very few had rarely difficulty in sleeping between successive morning shifts. Approximately half of the sample respondents revealed that 45 per cent

**Table 4: Sleep Related Problems (N=40)**

Statements	Responses										Total
	Almost never		Rarely		Sometimes		Frequently		Almost always		
	M	F	M	F	M	F	M	F	M	F	
Do you ever wake up early than you intend to between successive:											
Morning shifts							14 (35)	11 (27.5)	10 (25)	5 (12.5)	40 (100)
Afternoon shifts			5 (12.5)	1 (2.5)	8 (20)	6 (15)	10 (25)	9 (22.5)	1 (2.5)		40 (100)
Night shifts	4 (10)		20 (50)								24 (60)
Days off	7 (17.5)	1 (2.5)	12 (30)	9 (22.5)	3 (7.5)	4 (10)	1 (2.5)	2 (5)	1 (2.5)		40 (100)
Do you have difficulty in falling asleep between successive											
Morning shifts			1 (2.5)	1 (2.5)	20 (30)	11 (27.5)	3 (7.5)	4 (10)			40 (100)
Afternoon shifts			18 (45)	13 (32.5)	5 (12.5)	3 (7.5)	1 (2.5)				40 (100)
Night shifts							13 (32.5)		11 (27.5)		24 (60)
Days off	16 (40)	16 (40)	8 (20)								40 (100)
Do you ever feel tired on:											
Morning shifts			23 (57.5)	7 (17.5)	1 (2.5)	8 (20)		1 (2.5)			40 (100)
Afternoon shifts			5 (12.5)	4 (10)	19 (47.5)	5 (12.5)		7 (17.5)			40 (100)
Night shifts					4 (10)		13 (32.5)		7 (17.5)		24 (60)
Days off	24 (60)	16 (40)									40 (100)

**Note:** Figures in parentheses indicate the percentage of total respondents in the category.

males and 32.5 per cent females felt rarely difficulties in falling asleep and 12.5 per cent males and 7.5 per cent females had sometimes difficulties in falling asleep between their afternoon shifts. Cent of male rotational workers had difficulty in falling asleep between their successive night shifts. None of the total respondents, male or female respondents felt difficulties in falling asleep between successive days off. Amongst the total sample, 57.5 per cent males and 17.5 per cent females rarely felt tired between successive morning shifts and 2.5 per cent males and 20 per cent female felt sometimes rarely tired on successive morning shifts.

Feeling of tiredness between successive afternoon shifts was reported sometime by 47.5 per cent male and 12.5 per cent female respondents. This was followed by 17.5 per cent female respondents frequently feeling tired in between afternoon shifts. Night shift is responsible for imbalance in the biological rhythm of the human being thus adding to tiredness in the body. Similar results have been reported by Monk (1998) that desynchronization of circadian system affects the mental and physical health, longevity of the worker as well as public safety. Ten per cent male respondents interviewed that they feel tired between successive night shifts and

**Table 5: Coping strategies followed by the rotational workers (n=40)**

Statements	Coping strategies										Total
	Not used		Used a little		Used some what		Used quite a often		Used a great deal		
	M	F	M	F	M	F	M	F	M	F	
Strategies used for problems with social life											
Work on solving the problems							3 (7.5)	4 (10)	21 (52.5)	12 (30)	40 (100)
Talk to someone about how I am feeling			4 (10)	1 (2.5)	7 (17.5)	11 (27.5)	12 (30)	4 (10)	1 (2.5)		40 (100)
Criticize myself for what is happening	20 (50)	10 (25)	4 (10)	6 (15)							40 (100)
Spend more time alone	24 (60)	16 (40)									40 (100)
Strategies when for problems in domestic life											
Work on solving the problems							3 (7.5)	4 (10)	21 (52.5)	12 (30)	40 (100)
Talk to some-one about how I am feeling			24 (60)	13 (32.5)			3 (7.5)				
Criticize myself for what is happening	21 (52.5)	13 (32.5)	3 (7.5)	3 (7.5)							
Spend more time alone	24 (60)	16 (40)									

**Note:** Figures in parentheses indicate the percentage of total respondents in the category.

32.5 per cent male workers complained that they frequently feel tired on successive night shifts and 17.5 per cent male respondents said that they almost always tired during successive night shifts. On the whole, all respondents were of opinion that they almost never feel tired between successive days off period.

Table 5 depicts different types of coping strategies followed by the rotational workers. Shift workers used different strategies to solve their problems on domestic and social fronts. Almost half of the total respondents used a great deal coping strategies on solving the problems in the situation. Followed by 7.5 per cent males and 10 per cent females used quite often a way out to solve the situation. Sharing the feeling as one of

the coping strategies was used a great deal by 30 per cent male and 10 per cent of female respondents thus feeling light whereas males (17.5 per cent) and (27.5 per cent) females used it quite often and 10 per cent male, 2.5 per cent female respondents used a little this strategy to solve problems at social front. One half of the total sample population almost never criticized themselves for what is happening and rest blamed themselves to a certain extend. None of the respondents had spent the time alone for finding solve to the problem. More than 50 per cent male and 30 per cent female respondents used a great deal when they worked on solving the problems in the domestic situation and rest used it quite often. Majority of the respondents did not like sharing their feeling, followed by only 7.5 per cent female used



quite often this strategy to solve problem at domestic level. More than half of the total respondents did not blame themselves for the situation of domestic level. None liked spending time alone to find a situation to the problem.

### Conclusion

The circadian rhythm is a major body rhythm with regular ups and downs in the 24-hour day. Many systems in the body are very active at certain times of day, and not active at all at other times of day. Shift workers and Night workers usually get the least amount of sleep. Evening shift workers get the most sleep, and day shift workers get a medium amount of sleep. Night workers are forced to sleep during the day, when their circadian rhythm makes them feel more awake. Disruptions to normal sleep routines are often associated with shift work and night work, where the major difficulty is getting adequate undisturbed sleep during the day. Extended hours which carry into the night period may create a several problem. The cumulative result of these disruptions is lack of sufficient sleep, which may lead to what is called sleep debt. Most social and family events happen during the evening or on weekends, because shift workers are on the job in the evening or on weekends, or because they sleep during the day, they often miss out on social or family activities.

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