

Shift work and Risks in Pregnant Women

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Abstract— *Varying work schedules are suspected of increasing risks to pregnant women and to fetal well being. In particular, maternal hormonal disturbance arising from sleep deprivation, circadian rhythm disruption might impair fetal growth or lead to complications. This review was based on few high quality studies.*

Keywords— *Occupational exposures, shiftwork, risks to pregnant women.*

I. INTRODUCTION

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; and Mason, 1959). This regulation involves many systems that interact on various levels (Ader et al, 1995; Besedovsky and del Rey, 1999) and have evolved intricate processes to keep the different systems within certain boundaries. These, so called, “homeostatic systems” are vital and allows the individual to retain a physiological and behavioral stability despite environmental fluctuations (Mc Ewen, 1998). Furthermore, the homeostatic systems are regulated by several endogenous biological rhythms.

Although shift work has frequently been shown to have detrimental effects on the health of employees, it is becoming increasingly prevalent in contemporary life (Harma 1998; Smith et al, 1999.). Various studies (Schor 1991; Tarumi et al, 1992; Harrington 1994; Maruyama et al, 1995; Maruyama and Morimito, 1996; Spurgeon et al, 1997; Sparks et al, 1997) have reported that long hours of work are one of the possible risk factors, which may cause health defects in employees working in varying shift schedules of time.

Physiological disruptions are some of the major problems for the shift workers. Shift work has been shown to develop impaired metabolism and impaired tolerance or response to medications (Philips et al, 1991). Rutenfranz and co-workers have concluded that “Perhaps the most important physiological problem regarding shift work particularly, shift work which includes night work, is the problem of the resynchronization of physiological functions after a phase shift of working and sleeping times (Rutenfranz et al, 1977). The poorly adapted night workers suffers from a potentially

progressive state of chronic fatigue, which may be manifest in episodes of irritability, loss of drive, depression, loss of appetite, constipation and other disturbances (Pheasant, 1991). Railways being one of the vital sectors that need to ensure safety of not only their employees, but also the public, their customers, at large, a review of the shift pattern in terms of work load and distribution compatible to the biological clock. Working women make up a substantial proportion of the workforce worldwide, and many continue during pregnancy, when they may be exposed to various occupational hazards. (Chamberlain GV, 1993, Gabbe et al 1997). Several authors have suggested that varying work schedules (including rotating shifts and night work present special risks to pregnant working, including neuroendocrine changes as a consequence of slow or disrupted circadian rhythms affecting fetal growth and the timing of parturition. Pregnancy induced hypertension was defined as hypertension in a previously normal tensive woman different thresholds among studies. Hypertension was defined alternatively as having blood pressure mmHg on at least two occasions occurring from 20 weeks of gestation onwards (Haelterman E, 2007.)

Completeness of reporting was evaluated as proposed by Ariens et al and by Van et al with modifications for studies of pregnancy outcomes (Bonzini et al 2007). As demonstrated by Croteau et al the proportion of women exposed decreases over the course of pregnancy. In eight cohort studies (Niedhammer et al., Abeyseena et al., Stinson et al., 2003, Zhuy et al .,2004, Bonzini M et al 2009, Misra DP et al 1998, Pompeii LA et al., 2005, Xu X et al 1994) exposure was ascertained prospectively during pregnancy and these studies did not report timings of exposure during pregnancy. But the types of shiftwork considered relevant varied some comparing night worker (Haelterman E., 2007 , Bonzini M, 2009, Pompeii LA, 2005) and others investigating workers on rotating shifts (Zhu JL et al., 2004, Xu X et al 1994). Sorri and Sorri did not provide information about methods of exposure assessment, inclusion period of pregnancy for which exposure was assessed. In two studies, both exposure and relevant health outcomes were self reported delivery (Bodin L et al., 1999, Luke B et al., 1995). Various maternal characteristics have

been recognized as risk factors for PTD (extremes of maternal weight, height and ethnicity, socio economic status, smoking, and alcohol intake, diabetes, preeclampsia, bacterial infections during pregnancies and other diseases). Croteau et al presented risk estimates separately for night workers and for day workers (both compared with fixed day time workers) and found that risk were more amongst rotating shift workers. The mechanisms whereby shiftwork might result in adverse (through disturbance of circadian rhythm) and indirect (through psychosocial stresses disruption) mechanisms have been proposed to explain a causal relationship between shiftwork and complication that are inherently multifactorial in nature.

In view of the above, the present work entitled ““Shiftwork and Pregnancy Risks” has been contemplated with the following objectives:

1. To assess the different types of stress associated with the Women shift staff and understand the impacts on health;
2. To evaluate the present shift pattern with special reference to their impacts on health and to suggest the optimal pattern.
3. To provide an updated review of the association of shiftwork Varying work schedules are suspected of increasing risks to pregnant women and to the fetal wellbeing.

II. METHODOLOGY

The study followed “Syndrome Approach” to realize the objectives of the by adopting a combination of the methods of obtaining data on the study respondents. The focus of the study begins the health problems associated with the shift work; sampling was carried out by selecting the employees. The Standard Shift Work Index developed by the Shift Work Research Team MRC/ERSC Social and Applied Psychology Unit was used as well the data abstraction for each paper that met our inclusion criteria, we abstracted a standard set of information year of study location, timing of investigation, study design, strategies for exposure assessment and period in which exposure occurred, method of outcome assessment..

III. RESULTS

DESCRIPTION OF THE SAMPLE DISTRIBUTION

The sample selected for the present study is described here under. The distribution of the different age-sex groups in the sample reflected their proportional distribution among the railway employees of Visakhapatnam division. About 3-5% of the population was selected as samples that constitute 300 individuals.

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).

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Distribution of Age Groups:

The population was stratified in to four Age groups, with an interval of 10 years, as shown in **Table 1:**

Table.1: Distribution of Age Groups

No.	Age Group Name	Age in Years	Number Sampled
1.	AG-1	Up to 30	120
2.	AG-2	31 to 40	99
3.	AG-3	41 to 50	56
4.	AG-4	51 and above	25

About 40% (120) of the individuals were in AG-1, while AG-2, AG-3, and AG-4 account for 33% (99), 18.67% (56) and 8.33% (25), respectively (**Fig.1**). The average age of the AG-1 was at 25.5 years; similarly, the average ages for the AG-2, AG-3, and AG-4 were at 36.8 years, 44.4 years and 54.9 years, respectively.

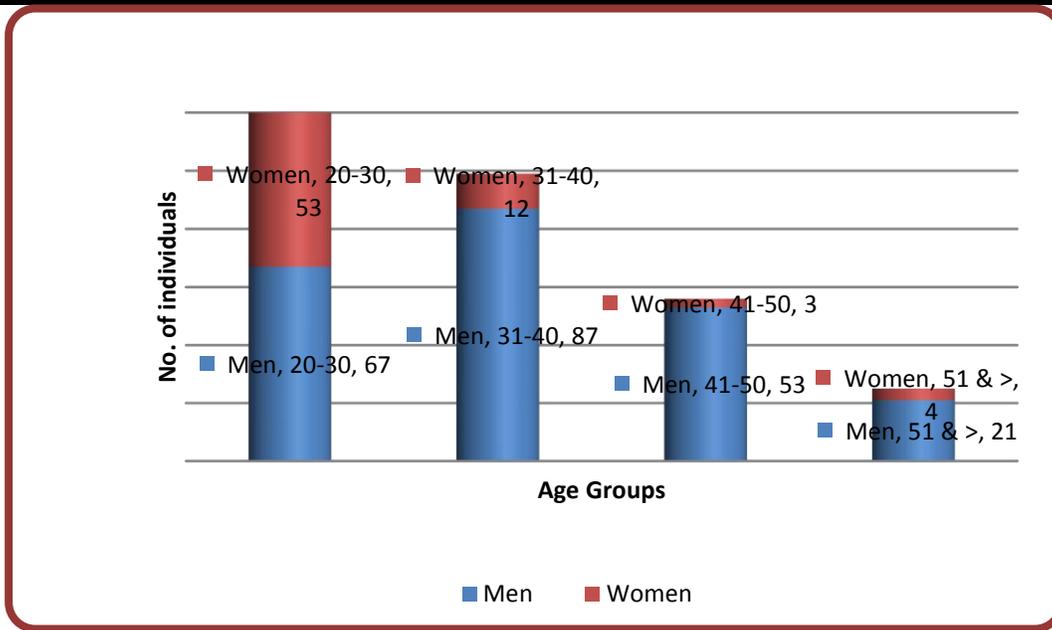


Fig.1: Age-Sex Groups distribution of the SW Sample

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 2**.

Table.2: 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

Gender Distribution:

On the whole, about 228 (76%) of the individuals were Men; and 72 (24%) were women. Among different age groups, the gender composition varied and the women’s ratio has declined in the higher age groups. (**Table 3**).

Table.3: Gender Distribution of the respondents

S.No.	Gender	AG-1		AG-2		AG-3		AG-4		TOTAL	
		N	%	N	%	N	%	N	%	N	%
1	Men	67	29.39	87	38.16	53	23.25	21	9.21	228	76
2	Women	53	73.61	12	16.67	3	4.17	4	5.56	72	24
3	Total	120	40.00	99	33.00	56	18.67	25	8.33	300	

Of the total individuals in AG-1, Men constituted 55.83% and women account for 44.17%; In AG-2, Men constituted 87.88% and women account for 12.12%; In AG-3, Men constituted 94.64% and women account for 5.36%; In AG-

4, Men constituted 84% and women account for 16%. The distribution of the men and women in different age groups is illustrated in Fig. 3 showing their actual numbers.

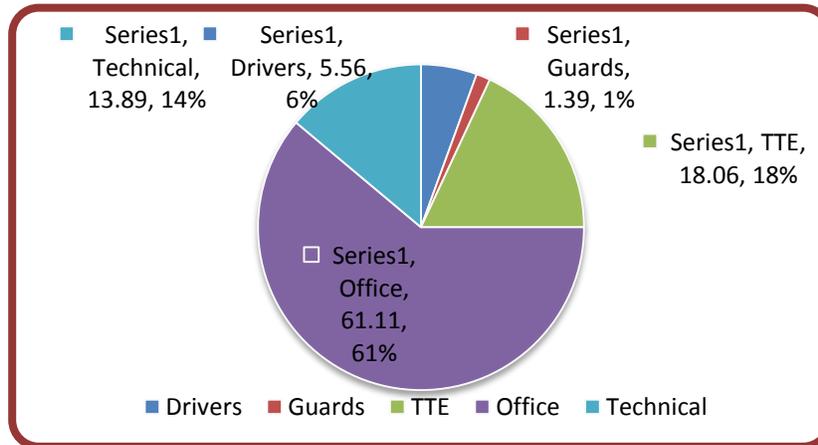


Fig. 3: Womens representation in the Employee Types

The Body mass Index of all the respondents together has a range from 16.12 to 39.22, with a mean of 24.59 ± 3.78 . It varied slightly between the men and women, and also among the different age groups (Table 4).

Table.4: Body mass Index of the respondents

S.No.	Age Gr.	Body mass Index		
		Men	Women	Total
1	AG-1	24.51 ± 3.31	22.40 ± 3.71	23.58 ± 3.64
2	AG-2	25.50 ± 3.55	24.56 ± 3.42	25.58 ± 3.53
3	AG-3	25.50 ± 3.96	24.81 ± 2.95	25.47 ± 3.90
4	AG-4	24.34 ± 4.22	24.33 ± 3.94	24.34 ± 4.09
5	All	25.10 ± 3.66	22.97 ± 3.71	24.59 ± 3.78

The respondents were categorized in to four weight categories: (1) Underweight Category with BMI less than 20; (2) Acceptable weight category with BMI ranging from 20 – 24.9; (3) Excess weight category with BMI ranging from 25 – 27; and (4) Overweight Category with BMI > 27. The Underweight and Overweight categories are considered as Vulnerable by Underweight and Vulnerable by Overweight types, who are prone to get health disorders or diseases with greater probability.

Of the 300 respondents, 114 (38%) were found to be Vulnerables. Among them 73.68% were men and 26.32% were women. However, among the men, 36.84% were Vulnerables; while among women 41.67% were Vulnerables. Among the total Vulnerables, Underweight

category accounts for 28.95% only, and of these, 54.54% were women. Among the Overweight category, 85.19% were men.

Of the Underweight Men respondents, 40.02% were in the AG-1, 26.68% in AG-2; 26.68% in AG-3; and 6.67% in AG-4. Of the Underweight Women respondents, 88.8% were in the AG-1, 5.55% in AG-2 and AG-4, while there were none in the AG-3.

Of the Overweight Men respondents, 23.2% were in the AG-1, 42.05% in AG-2; 30.45% in AG-3; and 4.35% in AG-4. Of the Overweight Women respondents, 58.31% were in the AG-1, 24.99% in AG-2; and 8.33% each in AG-3 and AG-4 (Fig 4).

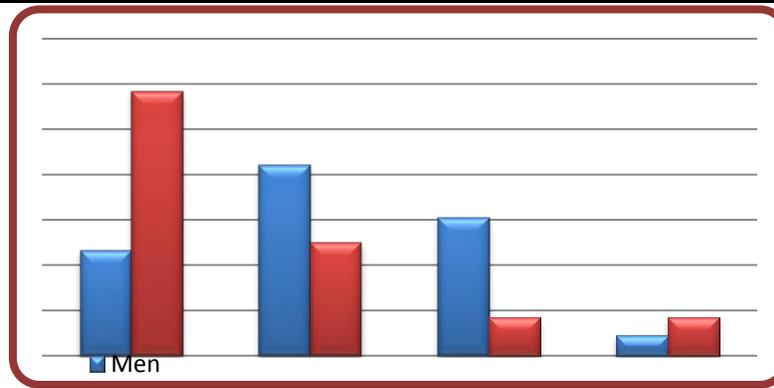


Fig.4: Frequency of Overweight Vulnerable Men and Women in different Age Groups.

IV. CONCLUSION

The study was based on few high quality studies. Varying work schedules are suspected of increasing risks to pregnant women and to fetal wellbeing. In particular, maternal hormonal disturbance arising from sleep deprivation, circadian rhythm disruption might impair fetal growth or lead to complications.

Further investigation is needed to ascertain whether and to what extent disruption of circadian rhythms and day light, night working cycles poses a significant threat to pregnant women fetuses.

On balance the review currently available about the investigated birth outcomes does not make a case for mandatory restrictions on shift working in pregnancy. Further studies are needed to address whether adverse birth outcomes are related to different types of rotating work schedules separating night and day time shifts, or to fixed night work.

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