



## A STUDY ON SLEEP HYGIENE & ASSOCIATED HEALTH HAZARD IN SHIFT WORKERS

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### ABSTRACT

Shift workers are being targeted to work for >10hrs in emergency medical services to cover 24 hours service, who is prone for sleep deprivation. Sleep is regulated by the balance between circadian rhythm and Homeostatic mechanism. Circadian misalignment which is an altered biological clock, lead to chronic physical illness like obesity, Hypertension, Diabetes mellitus, Ischemic Heart disease & mental illness like Depression, insomnia & Obstructive sleep apnoea in night shift workers. So this prospective study was conducted with 100 night duty nurses (males-50 and females-50) by a pretested questionnaire to reveal the sleep hygiene, unhealthy sleep related behaviors & physical & mental distress. Data was analysed with Descriptive statistics using SPSS software 21. Night Shift workers are suffering from Excessive sleepiness, snoring, overweight, obesity H/O occupational error due to difficulty in concentration due to lack of sleep.

**KEYWORDS:** Circadian Rhythm, shift work disorder, sleep hygiene and sleep deprivation



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## INTRODUCTION

Sleep is controlled by the suprachiasmatic nucleus of the Hypothalamus also known as circadian Rhythm, an internal biological clock. Circadian Rhythm means approximately one day, which are generated to adapt the 24-h light–dark cycling<sup>1</sup>. This clock controls sleep as well as many biological processes, including Hormone production, metabolism, core body temperature variations, and cell regeneration with high synchronization to the external environment continuously<sup>2</sup>. Loss of this synchrony results in circadian desynchronisation<sup>3</sup> and sleep disorders. Since sleep is under control of balance between two powerful processes, i.e., circadian and homeostatic mechanism<sup>4</sup>. According to The National Sleep Foundation adults need 7–9 hours of sleep in night per 24 hour cycle day. “Roster work” or rotating shifts are used to denote schedules, which are more irregular to cover most of the 24 hours<sup>5</sup>. Roster work is more common in transport, work and health care. In roster shift workers due to rapid shifts in diet & sleep, Circadian desynchronisation may result from disruption in sleep–wake cycle results in problems like Excessive sleepiness during shifts even after taking rest in daytime. Insomnia & snoring. Shift workers are prone to develop chronic diseases such as cardiovascular disease, Diabetes, Depression, and obesity due to hormonal & metabolic alteration<sup>6-8</sup>. Sleep deprivation stimulates excess food intake and early fatigue due to reduced leptin level which promotes weight gain.<sup>9,10</sup> Impaired secretion of Growth Hormone & cortisol in–sleep deprived shift workers results in Insulin resistance and prediabetes & Type2 DM. Shift workers are prone to acquire diseases like Hypertension, Ischemic Heart Diseases and coronary artery disease due to stress<sup>11</sup> induced change in hormone secretion. So this study focused the sleep hygiene & its implication on mental & physical health in sleep deprived night shift workers.

## MATERIALS AND METHODS

After getting approval from Institutional Ethical committee & obtained the written consent from the participants, this Observational study based on questionnaire was conducted in the Department of Physiology Chennai medical college Hospital & Research centre, Irungalur, Trichy, for a period of six months. We have included 100 night shift staff working in emergency health care services (25-40 years of age, males and females) of our hospital with minimum 2 years of service experiences for this study. We have excluded subjects with Hypothyroidism and chronic renal failure. Age, sex, Height, Weight, BMI, pulse rate, Blood pressure were measured as per the standard methods. Overweight & obesity were classified as per WHO classification for Indians. Pre tested Questionnaire containing questions relevant to the sleep hygiene and health risk behavior due to sleep deprivation like details total number of sleeping hours /24 hrs, excessive sleepiness & performance at work, fatigue, insomnia, snoring, & h/o occupational errors during shift was given to all the participants. Apart from that they were been enquired for their co morbid illness like Hypertension, Ischemic Heart diseases & Diabetes mellitus in the questionnaire. Participants were requested to fill it carefully & return the questionnaire. The data were collected and analysed. Result: mean age of the study group is 34±20. prevalence of overweight & obesity was 35% & 28%, The mean blood pressure is systole-138±45, Diastole- 98±25. Details of duration of sleeping hours sleepiness, fatigueness, snoring, muscle cramps & h/o occupational error were given in Table-1 & prevalence of comorbid illness like obesity & overweight, Type 2DM, Hypertension, Ischemic Heart diseases & Coronary artery diseases are given in Table-2.

## DISCUSSION

The analysis of data from this current study, it is revealed that the sleep hygiene of night shift worker were altered. Among the night shift workers 58% had revealed that they had sleep deprivation ie they could sleep for <8hrs /24hrs period which is similar to the previous study done by leng Y,et al(2014).<sup>12</sup> Disturbed sleep was reported as the dominating problem in shift workers by the previous study<sup>13</sup>. Night shift workers had to sleep during the biological day when they supposed to be active which is difficult, as there is a conflict between the day oriented circadian physiology and the requirement for work and sleep at the “wrong” biological time of day. Previous studies revealed that even in normal persons with adequate sleep there is a decline in alertness pattern in the night, so the shift workers experienced excessive sleepiness, showed impaired performance and had history of occupational errors<sup>14,15</sup>.previous studies also supported the same by reporting that disturbed sleep seems to be the decisive factor with respect to attitude to one’s work hours.<sup>16</sup> due to difficulty in adjusting the circadian rhythm because of exposure to daylight during their sleep hours ie, the day, which counteracts the delay of circadian clock<sup>17</sup>.The current study revealed that among the night shift workers 60% felt excessive sleepiness during their shift and 57% had fatigue, occupational error12% and muscle cramps37%.<sup>18</sup> This study reveals that the prevalence of overweight and obesity are 54% and 14% in shift workers with increased prevalence of early fatigue in females. Sleep deprivation causes lowered leptin & increased Ghrelin causing excessive

food intake and obesity. Spiegel K. et al. have found that the Ghrelin-to-leptin ratio was 70% higher when the subjects slept less<sup>19</sup>. There was also a strong relationship between increased hunger during sleep restriction and increased Ghrelin: leptin ratio<sup>20</sup>. In the current study the prevalence of snoring is 43%, which is a symptom of increased upper airway resistance during sleep and generally considered a marker for obstructive sleep apnoea which can cause sudden death as a result of Hypoxia induce by disturbed sleep<sup>21</sup>. Circadian misalignment cause metabolic dys regulation gives hostile cardiovascular risk environment through pathways involving sympathetic overstimulation, Hormonal imbalance, and subclinical inflammation, leading to obesity, DM, Ischemic Heart Disease, Depression and Decreased work efficacy. The prevalence of Type2Diabetes mellitus was 38%, Hypertension-23%, Ischemic heart diseases & coronary artery diseases-8%.<sup>22</sup> A Swedish study reported increased relative risk for ischemic heart disease (RR = 2.8) as compared to daytime workers.<sup>23</sup>Shift workers had excessive secretion of catecholamine & cortisol due to stress, which causes Hypertension & cardiovascular diseases. Iyer et al described the existence of a relationship amongst sleep, OSA, obesity, insulin resistance.<sup>24</sup>The prevalence of Type2 DM is in our study is 38% due to the excessive sympathetic stimulation &altered hormonal balance like glucagon and cortisol secretion leading to Insulin resistance &Type2 Diabetes. The prevalence of Type 2DM was only 30% reported by the previous studies<sup>25</sup>.

**STATISTICAL ANALYSIS: Descriptive statistics was used with SPSS 21 Software.**

<b>Table-1 Health risk behavior in shift workers</b>			
<b>N=100</b>	<b>Total (%)</b>	<b>Male (n=50)%</b>	<b>Female (n=50)%</b>
No.of Sleeping hours/24hrs, less than 8hrs (Mean±std)	58 6.45±24	8 7.15±3	20
Excessive sleepiness	60	28	32
Fatigue	57	22	35
Snoring	43	28	15
Difficulty in concentration	34	16	18
Occupational error	12	5	7
Muscle cramps in lower legs	37	12	25

*Sleeping hours /24 hrs, excessive day time sleepiness, fatigue, insomnia, snoring, occupational errors.*

<b>Table-2 Disease prevalence in shift workers</b>			
	<b>Total %</b>	<b>Male %</b>	<b>Female %</b>
Overweight	54	24	30
Obesity	14	5	9
Type2DM	38	24	14
Hypertension	23	13	10
IHD & CAD	8	6	2

**COUNTER MEASURES**

We can create awareness, to avoid frequently rotating shifts. During employment, flexibility and influence on scheduling can be insisted along with Strategic distribution of rest days, which will improve alertness which is an efficient barrier to increased occupational error risk & fatigue. Awareness to keep the workplace brightly lighted to promote alertness. Creating awareness to limit the phone calls and visitors during sleep hours & to limit caffeine.

**CONCLUSION**

As suggested in Healthy People 2020, Promoting sleep health, including optimal sleep durations, and reducing the prevalence sleep disorders, it is mandatory to consider factors like sleep environment type, scheduling, and duration of work in employment & to do early screening of associated health risk behaviors such as physical inactivity, and chronic conditions such as obesity and depression.

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