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Original Research Article

A Study on Sleep Pattern among Diabetic Shift Workers in Chennai, India- A Comparative Analysis

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ABSTRACT

The present study explored the sleep pattern of general and rotation shift workers with diabetes mellitus. Adopting purposive random sampling technique 200 diabetic subjects who were working on general and rotation shift were selected. Interview schedule was used to collect the information on the sleep pattern of the subjects and comparisons were made. Obtained information was subjected to statistical analysis and the results were interpreted. The results showed that majority of the General shift workers slept immediately after going to bed whereas rotation shift workers took more than one hour to get sleep. About 54% of the general shift workers had sound sleep than the rotation shift counterparts. Somnolentia was reported more among General shift diabetic workers whereas day time napping was more among rotation shift workers. It is concluded that sleep is considered as vital to maintain the blood glucose levels among the diabetic workers. Sufficient rest with sound sleep should be practiced by the diabetic workers during non- working hours to maintain a healthy mind and body and also to prevent diabetic related complications in future.

Keyword: circadian rhythm, Somnolentia, napping, sound sleep, onset of sleep, duration

INTRODUCTION

After industrialization, lifestyle has changed considerably as well as sleep habits. [1] Sleep deprivation is now a public health epidemic. Sleep deprivation has been shown to decrease the insulin sensitivity and impair glucose tolerance. Very short sleep duration has also been suggested to increase the odds of diabetes in longitudinal studies. [2] Nilsson et al. reported that difficulties in falling asleep and the use of hypnotic drugs are associated with an increased risk of developing diabetes mellitus. [3]

In an increasingly globalized 24/7 society, shift work has become essential to keep many systems running in an urbanized and industrialized environment. Non-traditional daytime work necessitates a disruption of the body's circadian timing system and an inability to cope with social and biological challenges leading to poor health conditions including abnormalities of glucose metabolism. In these workers, poor adaptation and transformations in lifestyle which ultimately leads to poor diet, inadequate exercise, smoking habits, disordered sleep, family and psychosocial stress are important mechanisms for disease development. [4]

Sleep disturbances are common among individuals with diabetes. Persons with diabetes report higher rates of insomnia, poor sleep quality, excessive

daytime sleepiness, and higher use of sleeping medications. [5]

Epidemiological data have suggested higher risk of obesity and type 2 diabetes is reported in individuals with shorter sleep duration (<5–6 hours per night) as well as those of poor sleep quality. [6] Acute sleep deprivation whether total or partial is associated with an elevation of evening cortisol concentration. Spiegel et al demonstrated impaired glucose tolerance with chronic sleep deprivation. Sleep apneas are significantly more in persons with diabetes and correlate highly with obesity. In fact, a strong association exists between obesity, impaired glucose tolerance, insulin resistance, and Sleep Disordered Breathing. [7]

In a recent meta-analysis, Gan et al conclude that shift work is significantly associated with diabetes. This diabetogenic effect was shown to be more severe among men when compared with women. In addition, workers on a rotating shift had a greater risk for diabetes than those on night, mixed, evening or unspecific shifts. [8] Due to a circadian misalignment, shift work is associated with reduced total energy expenditure after dinner, boosting energy stores and long-term increase in BMI. [9]

MATERIALS AND METHODS

The study was conducted among 200 diabetic ESI beneficiaries. Subjects were selected using purposive random sampling method. The Diabetic ESI beneficiaries were equally categorized as General shift workers and rotation shift workers. Permission from Hospital authorities was initially obtained to conduct the study. Written consent was also obtained from the study participants and they were briefed about the study methodology. Interview schedule was used to collect the information. The questions such as onset of sleep, sound sleep, frequency of Somnolentia, day time napping was included in the interview schedule. The obtained details were coded and subjected to statistical analysis and results were interpreted.

RESULTS AND DISCUSSION

Table-1: ***Onset of sleep***

Onset of sleep	General shift N=100	Rotation shift N=100	Total N=200
Asleep immediately	25	16	41 (20.5)
within half an hour	32	31	63 (31.5)
One hour	1	-	1 (0.5)
More than one hour	42	53	95 (47.5)

When the onset of sleep pattern was analysed, nearly 50% of diabetic workers slept after more than one hour after going to bed. Among them 26.5% were rotation shift diabetic subjects and 21% were General shift diabetic subjects. About 31.5% diabetic workers slept within in half an hour after going to bed. It is interesting to note that more number (12.5%) of general shift workers sleep immediately when compare to Rotation shift workers (8%). This is because of the regularised timing of the general shift workers and irregular clock pattern of the rotation shift workers which made rotation shift workers to delay in the onset of sleep. About 0.5 % slept in one hour. Improper sleep pattern is one of the reasons for uncontrolled blood sugar levels among diabetics. Rotation shift workers should be insisted for proper sleep to maintain their blood glucose levels.

Individuals with diabetes have a significantly increased risk of developing depression when compared to their nondiabetic counterparts and depression is one of the important factors contributing to poor sleep in this population. Diabetes itself has multiple impacts on central nervous system causing alterations involving neurobehavioral and neurotransmitter functioning and autonomic functions, and can adversely affect endocrine functions, and hence itself cause sleep disturbances. [6]

Table-2: ***Sound sleep***

Sound sleep	General shift N=100	Rotation shift N=100	Total N=200 (%)
Yes	55	46	101 (50.5)
No	45	54	99 (49.5)

Our study reported that about 50.5% reported to have a sound sleep. Among them

more number of General Shift Diabetic subjects had sound sleep whereas only 23% of rotation shift workers had sound sleep. The above table clearly depicts that sound sleep is more among General Shift Diabetic subjects than the rotation shifts diabetic subjects.

A similar study showed that there is no correlation between sleep quality and glycemic control in people with diabetes. [10] Byberg found that poor sleep quality to be associated with earlier alterations in glucose homeostasis, including insulin sensitivity and beta-cell function, but not with later alterations in glucose homeostasis, i.e. HbA1c, which was related only with sleep duration. [11]

Table-3: ***Frequency of Somnolentia***

Frequency of Somnolentia	General shift N=100	Rotation Shift N=100	Total N=200 (%)
Once a night	34	24	58 (29)
Twice a night	26	24	50 (25)
More than twice a night	13	10	23 (11.5)
Never	27	42	69 (34.5)

It is disgusting to note that about 65% of the diabetic workers reported Somnolentia. It is clear from the above table that the frequency of Somnolentia is reported more among General shift workers than Rotation shift workers. 17% and 12% General and rotational shift diabetics reported Somnolentia once a night. Frequency of twice a night Somnolentia was reported among 13% and 12% general and rotational shift diabetics respectively. More than twice a night Somnolentia frequency also reported more among General shift diabetics (6.5%) than rotation shift diabetics (5%). Whereas about 13.5% general shift workers and 21% rotation shift workers do not had Somnolentia.

Table-4: ***Day time napping***

Day time napping	General shift N=100	Rotation shift N=100	Total N=200
Yes	53	74	127 (63.5)
No	47	26	73 (36.5%)

Day time napping was adopted by 63.5% of the diabetic workers. Among them majority were Rotational shift workers (37%) whereas only 26.5% General shift workers underwent day time napping. Since General shift workers will work from morning to evening with short lunch break, it is not possible for General shift workers to nap in the lunch, whereas Rotation shift workers spend half of their day time on off duty, rotation shift diabetics had more time for day napping.

Daytime napping is associated with increased risk of diabetes. Xue et al. followed a cohort of 10,143 normal participants and reported that daytime napping is associated with a higher risk of developing diabetes in a follow-up period of around nine years. [12]

Table-5*: Duration of sleep*

More than five hours of sleep per day	General Shift N=100	Rotation shift N=100	Total N=200 (%)
Yes	45	58	103 (51.5)
No	55	42	97 (48.5)

Many studies reported that sleep for more than six hours per days helps to reduce blood glucose levels. Among our study participants, only half of them (51.5%) slept for more than five hours per day. Among them 22.5% were General shift diabetics and 29% were Rotation shift diabetics.

Total sleep duration was linearly correlated with better glycemic control. [2] A Danish population based study showed a one-hour increment in sleep duration was associated with a 0.3% (3 mmol/mol) decrement in HbA1c. [11]

Table-6: ***Timing of Going to sleep***

Timing of going to sleep	General shift N=100	Rotation shift N=100	Total N=200
Day / night rotation	-	16	16 (8)
Morning	-	3	3 (1.5%)
Night	100	81	181 (90.5)

About 90.5% of the diabetic subjects go for sleep at night. Among them 50% belong to General shift and 40.5% belong to rotation shift. About 1.5% (all belong to rotation shift) goes to sleep in the morning and 8% rotation shift diabetics goes to sleep in day and night rotation.

CONCLUSION

Sleep is vital to maintain the blood glucose levels among the diabetic workers. Sufficient rest with sound sleep should be practiced by the diabetic workers to maintain a healthy mind and body and also to prevent diabetic related complications in the future. Diabetes and sleep disorders often coexist. Our diabetic workers deprive of sleep due to their personal or workplace stress. But it is essential for them to take adequate sleep daily. Diabetic workers must be educated regarding good sleeping habits like regular relaxing pre-sleep routine (talking with the family, singing, reading books). Early to bed and early rising up should be ensured by the workers. Performing mild exercises daily and switching off the mobile and other gadgets an hour before sleep helps to induce relaxed sleep. Consumption of caffeinated and carbonated beverages must be avoided before sleep. A good sleep makes a diabetic relaxed and fresh. Improper sleep pattern also affects the work place environment. Thus it is essential for the employers to screen their employees annually for sleep disorders especially if they are diabetic. This helps workers to overcome sleep disorders and provide a productive output in their workplace and the nation.

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