

Study of Insomnia, Day Time Sleepiness and Sleep Quality among South Indian Nurses

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ABSTRACT

Introduction: Good quality and adequate sleep is important for good cognitive, psychological and physical health. Nurses who work closely with patients need to have sound mental and physical health for proper health care delivery.

Aim: To evaluate the incidence of insomnia, day time sleepiness and sleep quality among South Indian nurses.

Materials and Methods: The present cross-sectional study was conducted at NRI Medical College, Vishakhapatnam, Andhra Pradesh, India and Vijaya Hospital, Belgaum, Karnataka, India during the period of August to December 2016. One hundred and ninety nurses were included in the study. Among 190 nurses, 42 were males and 148 were females. Three questionnaires namely, Epworth Sleepiness Scale (ESS), Regensburg Insomnia Scale (RIS) and Pittsburgh Sleep Quality Index (PSQI) were included in the study. These questionnaires were distributed among the nurses and the questions were explained to them in their local

language. Measures of central tendency, dispersion and chi-square tests were used for analysis of the data.

Results: Significant higher values of sleep disorders were found. On analysis the PSQI and RIS scoring were significant whereas ESS scoring was found to be insignificant. In the present study 77 (40.5%) out of 190 nurses were found to be suffering from insomnia. 88 (46.31%) nurses had poor sleep quality and 48 (25.26%) nurses were suffering from daytime sleepiness whereas 30 (15.78%) of nurses had borderline daytime sleepiness. The highest number of cases was seen in nurses having one to three years of experience.

Conclusion: The present study suggests that a large fraction of South Indian nurses were found to be suffering from insomnia and poor sleep quality. Adequate number of nursing staff, shorter shift durations and meticulously planned night shifts are needed to improve the sleep health and well being of nurses which in turn will result in better and more efficient patient care.

Keywords: Epworth sleepiness scale, Night duty, Pittsburgh sleep quality index, Regensburg insomnia scale

INTRODUCTION

In modern "24 hours society" there are very few occupations which do not require round the clock performance. Sleep is a very powerful but under-rated health miracle of all. Sleep has been proven to be the single most important factor in predicting longevity, more influential than diet, exercise or heredity [1]. Sleep deprivation affects the cardiovascular system, gastrointestinal system, endocrine function, immunity as well as mental and social well being which increase the risk of obesity, diabetes, road traffic accidents and machine operation accidents [2].

Nurse's work frequently involves dealing with sufferings, pain and agony of the patients, which could be a source of suffering for the nursing professionals themselves. Nurses working in rotating shift duties suffer from several health issues like Gastrointestinal Tract (GIT) disorder, tiredness, depression, Cardiovascular Diseases (CVD) and emotional disorders [3,4]. These sufferings are aggravated by the rotating shift duties. Night shifts leads to difficulties in maintaining sleep, shortened total sleep time and subsequent feeling of not having enough sleep compared to other shifts like those in the morning and evening [5].

Numerous studies have analysed the deleterious effects of sleep deprivation on medical staff in various specialties. The present study intends to include nurses, who play a vital role in health care delivery system. The present study intends to analyse the effects of night duties on the sleep quality, insomnia and daytime sleepiness among nurses, which might have long term consequences on efficiency and general well being.

MATERIALS AND METHODS

A cross-sectional study design using the ESS, RIS and PSQI to assess the parameters of daytime sleepiness, insomnia and sleep quality respectively. A brief set of demographic and health

related questions were also included. All questionnaires were self administered.

The study protocol was approved by the Institutional Ethical Committee and written consent was obtained from all the participants after explaining them the study intention and procedure.

This study was conducted in NRI Medical College, Visakhapatnam, Andhra Pradesh, India and Vijaya Hospital, Belgaum, Karnataka, India during the period of August to December 2016. The study was conducted on the staff nurses on rotating shift duties in the study hospitals. The nurses were interviewed at a convenient time therefore, their work was not affected. The questionnaires were explained to them in their local language and were asked to complete a number of self reporting standardised questionnaires.

One hundred and ninety nurses (190) were included in the study. Nurses were divided into four groups according to duration of their work experience (<1 year, 1-3 years, 3-6 years and >6 years). Sample size was calculated to be 183 based on the prevalence of previous studies in which 53.8% of nurses were found to have sleep problems. Apparently healthy staff nurses doing night duties were included in the study.

Nurses with personal or family history of sleep disorder, drugs that may interfere with sleep, pregnant or breast feeding women were excluded from the study.

Following data was collected:

- Sociodemographic profile: name, gender, age and marital status;
- Anthropometric data: height, weight and Body Mass Index (BMI) (calculated using Quetlet's Index) [7,8];
- Work schedule: duration of work (total work experience), shift timing, total number of night shifts in the last month;

- All nurses were apparently healthy. No history of fever, common cold, past history of chronic illness;
- Questionnaires.

a. Epworth Sleepiness Scale: The ESS is an eight item questionnaire that measures a person's level of daytime sleepiness and propensity to doze off or fall asleep in eight various daily situations which is scored on a four point scale (0-3). 0 (would never doze off) to 3 (a high chance of dozing off). The total score is a summation of the various categories with a final score between 0-24. A high score represents a greater amount of daytime sleepiness score: 0-9 was considered normal; 10, 11 (borderline) and scores ≥ 12 (case) [9,10].

b. Pittsburgh Sleep Quality Index: The PSQI was developed to provide a reliable and valid measure of sleep quality, pattern and identify good from bad sleepers. It consists of 19 items grouped into seven components, scored on a 0-3 point scale, 0 (not in past month) to 3 points (3 or more times per week). These components are sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. These seven scores are totaled to give a global PSQI ranging from 0-21. A score >5 indicates poor sleep quality; with a diagnostic sensitivity of 89.6% and specificity of 86.5% for determining the good from the poor quality sleepers. The PSQI demonstrates the ease of use and a high internal consistency across the seven components [11].

c. Regensburg Insomnia Scale: Except first five questions which has no scoring, next eight questions were scored from 0 (never) to 4 (always). A score ≥ 11 is considered to be abnormal. Five items are selected to cover quantitative and qualitative sleep parameters: (i) sleep latency; (ii) sleep duration; (iii) sleep continuity; (iv) early awakening; and (v) sleep depth. Four items ask about the psychological aspects of Insomnia such as: (vi) experience of sleepless nights; (vii) focusing on sleep; (viii) fear of insomnia; (ix) daytime fitness; (x) sleep medication. It is a short rating scale for psychological symptoms and sleep in insomnia [12].

STATISTICAL ANALYSIS

Microsoft Office Excel was used for data storage, tabulation and the generation of descriptive statistics. Chi-square (χ^2) test, unpaired t-test were used to find the association between various scales. Confidence interval of 95% and p-value of <0.05 was considered statistical significant.

RESULTS

Due to the simplicity of the questionnaires, all the returned surveys were able to be used for final analysis. Three-quarters of respondents were females 148 (77.8%) and 42 (22.1%) were males. The highest number of nurses were in the age group of 21-24 years 103 (54.21%) are females and 09 (4.74%) are males, followed by 25-29 years age group where 37 (19.47%) of the total nurses were females and 10 (5.26%) males. More than 30 years age group contains 23 (12.1%) males and 08 (4.21%) females. Among 190 nurses 78 (41.05%) were

Age and sex distribution (n=190)				
Age group	Male	Female	Confidence intervals (95%)	p-value
21-24 (112)	09 (4.74%)	103 (54.21%)	0.0411-0.1475	<0.001***
25-29 (47)	10 (5.26%)	37 (19.47%)	0.1180-0.3509	
>30 (31)	23 (12.10%)	08 (4.21%)	0.5654-0.8651	
Marital status (n=190)				
	Married 78 (41.05%)	Unmarried 112 (58.9%)	0.3430-0.4816	<0.01**

[Table/Fig-1]: Sociodemographic profile.
Chi-square test was used, Data are presented as percentage, confidence interval and p-value *Indicates the level of significance, $p>0.05$ =Not significant, $p<0.05$ =Significant, *** $p<0.001$ =highly significant

Anthropometric variables (BMI) according to service experience (n=190)				
Service experience	BMI <25	BMI >25	Confidence intervals 95%	p-value
<1 year (36)	33 (17.37%)	03 (1.58%)	0.7743-0.9787	<0.001***
1-3 years (88)	77 (40.53%)	11 (5.79%)	0.7882-0.9304	
3-6 years (36)	27 (14.21%)	09 (4.74%)	0.5874-0.8644	
>6 years (30)	14 (7.37)	16 (8.42%)	0.3023-0.6386	

[Table/Fig-2]: Comparison of anthropometric parameters.
Chi-square test was used, Data are presented as percentage, confidence interval and p-value. *Indicates the level of significance, $p>0.05$ =Not Significant, $p<0.05$ =Significant, *** $p<0.001$ =highly significant
BMI: Body mass index

married and 112 (58.94%) are unmarried. Most employees reported having night shift work between 1-3 years (88/190), followed by those working 3-6 years (36/190) and <1 years (36/190) describing the sociodemographic and anthropometric values are found to be significant in all their values [Table/Fig-1,2]. Values of BMI >25 were found to be more in 39 (20.52%) of the nurses.

The PSQI score was used for evaluation of sleep quality. The PSQI is known to evaluate sleep quality during the month preceding the study. Highest number of cases with PSQI scoring was seen in nurses with 1-3 year's experience; i.e., 49 out of total 190 nurses (25.7%). Overall 77 (40.5%) nurses are suffering from insomnia, in accordance with the RIS. But the highest significant value was seen in nurses with an experience of 3-6 years (20.5 \pm 4.36) [Table/Fig-3]. The present study

Experience (Years)	Sample size (%)		Mean \pm SD		95% CI	p-value
	Normal	Case	Normal	Case		
Pittsburg Sleep Quality Index (PSQI)						
<1 (36)	23 (12.1%)	13 (6.8%)	1.7 \pm 1.98	7.5 \pm 1.98	-6.848 to -4.75717	<0.001***
1-3 (88)	39 (20.5%)	49 (25.7%)	2.71 \pm 1.02	6.83 \pm 1.87	-4.7825 to -3.4575	<0.001***
3-6 (36)	17 (8.9%)	19 (10%)	3.23 \pm 0.97	6.57 \pm 2.03	-4.4391 to -2.2409	<0.001***
>6 (30)	23 (12.1%)	7 (3.68%)	3.13 \pm 0.86	7.52 \pm 3.30	-5.7996 to -2.7804	<0.001***
Regensburg Insomnia Scale (RIS)						
<1 (36)	27 (14.2%)	9 (4.7%)	6.8 \pm 2.98	15 \pm 1.87	-10.35 to -6.0417	<0.001***
1-3 (88)	52 (27.3%)	36 (18.9%)	7.63 \pm 2.91	17.36 \pm 3.68	-11.1286 to 8.3312	<0.001***
3-6 (36)	21 (11%)	15 (7.89%)	8.80 \pm 2.60	20.5 \pm 4.36	-13.66 to -9.1396	<0.001***
>6 (30)	13 (6.8%)	17 (8.9%)	6.23 \pm 2.97	20.3 \pm 3.99	-16.7783 to -11.3617	<0.001***

[Table/Fig-3]: Comparison using sleep parameters.
Unpaired t-test was used, Data are presented mean \pm SD, as percentage and confidence interval. *Indicates the level of significance, $p>0.05$ =Not Significant, $p<0.05$ =Significant, *** $p<0.001$ =highly significant. [PSQI score >5 Poor sleep quality, <5 Normal; RIS- 0-12 Normal, >12 Insomnia]

Epworth Sleepiness Scale (ESS)							
Experience (years)	Normal	Borderline	Case	Total	χ^2	df	p-value
<1 Year	18 (9.47)	07 (3.68)	11 (5.79)	36 (18.95)	5.1024	6	>0.05
1-3 Years	49 (25.79)	17 (8.95)	22 (11.58)	88 (46.31)			
3-6 Years	25 (13.16)	03 (1.58)	08 (4.21)	36 (18.95)			
>6 Years	20 (10.52)	03 (1.58)	07 (3.68)	30 (15.79)			
Total	112 (58.95)	30 (15.78)	48 (25.26)	190 (100.0)			

[Table/Fig-4]: Sleep parameters based on severity.
Chi-square test was used, Data are presented as percentage and confidence interval. *Indicates the level of significance, $p>0.05$ =Not significant, $p<0.05$ =Significant, *** $p<0.001$ =highly significant. [ESS Score 0-9 Normal, 10-11 Borderline, 12-24 Case]

found day time sleepiness insignificant as p-value was >0.05 for the ESS. A total of 112 (58.95%) nurses are found to be normal, whereas 30 (15.78%) are borderline and 48 (25.26%) are cases [Table/Fig-4].

We found significant changes in PSQI and RIS values among nurses whereas ESS scores in the nurses were found to be insignificant.

DISCUSSION

Sleep and productivity go hand in hand and are important factors for general well being. Sleep is disturbed by night shift and causes overall reduction of sleep duration among night workers because of the disturbances in sleep during the morning hours owing to disturbance in the sleep/wake cycle and normal biological circadian rhythm and also, as the surrounding conditions are unfavourable (light, noise, temperature) during daytime [13,14].

Majority of nursing professionals almost 98% who worked in both the study hospital participated which gives a good representation of the sample. Anbazhagan S et al., have done their study on 130 female nurses and Giri PA et al., have done the sleep habit study on 150 medical students, whereas the present study has included 190 subjects which might have given more reliable results with greater precision and statistically significance [6,15].

In the present study, sociodemographic and BMI values were found to be significant among the groups. Values of BMI >25 were found to be more in 20.52% of nurses. A study by Veldi M et al., also found that BMI was related to snoring and daytime sleepiness [16]. The lesser the sleep duration and quality greater will be the daytime sleepiness. Similar findings were shown by Nojomi M et al., where they found that, regular exercise and BMI play an important role in physical and mental well being of students [17]. The effects of life style on sleep quality have been examined by several studies and most of them identified an association between BMI and sleep disturbances [18]. The PSQI score was used for evaluation of sleep quality. The PSQI is known to evaluate sleep quality during the month preceding the study. Highest number of cases with PSQI scoring was seen in nurses with one to three year's experience; i.e., 49 out of total 190 nurses (25.7%) as seen in [Table/Fig-3]. Boughattas W et al., found the overall PSQI score significantly higher and they found it to be significantly associated with age [19]. We have also found the PSQI score to be highest (7.52±3.3) in nurses with >6 year's experience. Rutenfranz J et al., found that almost 70% of night workers complain of sleep disorders, describing their sleep as insufficient, unsatisfactory and little restorative [20]. Chan MF, also found that more than 70% of the nurses have insufficient sleep [21]. In the present study shift duty has been found to affect sleep quality significantly. In the present study 88 (46.31%) nurses are suffering from poor sleep quality.

Studies have shown that sleep quality is related to two aspects, quantitative aspects which include sleep duration, time taken to fall asleep (sleep latency) and number of arousals during sleep and subjective aspects which include restfulness or perceived 'depth' of sleep [22]. Their study found that both insomnia and normal sleepers group defined sleep quality by tiredness on waking and throughout the day and the number of awakenings they have experienced in the night. Their study results suggested that a complete assessment of sleep quality for patients with insomnia would require additional questions to assess "on waking" and "daytime" sleep quality variables [22]. To avoid this scenario we have used daytime sleepiness assessment scale in the present study that is; ESS.

Studies indicate that bad sleep quality led to adaptation problems and confusion. Studies have even indicated that sleepiness or poor sleep quality tend to increase work accidents which may be very dangerous in medical profession [23,24].

Overall 77 (40.5%) nurses were suffering from insomnia, in accordance with the RIS. However, the highest significant value was seen in nurses with an experience of three to six years (20.5±4.36)

as per [Table/Fig-3]. Øyane NM et al., study on insomnia has shown that nurses with current or previous night work experience more cases of insomnia than nurses with no night shift experience [25]. Associations between night work and insomnia reflects that employees after night work often go to bed when the diurnal rhythm promotes wakefulness resulting in shortened sleep duration. A study by Härmä M et al., concluded that insomnia is more common among two and three shifts workers compared to regular day workers [26].

The present study found day time sleepiness insignificant as p-value was >0.05 for the ESS. A total of 112 (58.95%) nurses are found to be normal, whereas 30 (15.78%) are borderline and 48 (25.26%) are cases. Boughattas W et al., and Øyane NM et al., did not find any significant increase in daytime sleepiness among the nurses either [19,23]. Suzuki K et al., found the incidence of day time sleepiness in hospital nurses to be 26% and not having occupational accidents during the past 12 months and excessive daytime sleepiness [27].

LIMITATION

In the present study, since, male nursing staff was less in number in the hospital than the female nurses; therefore, gender based analysis was not possible. Cause and effect relationship could not be established because of the cross sectional design of the study owing to time constraints. Variables associated with the duration and quality of sleep and usage of mobile, tablets or laptops in bed and consumption of tea, coffee, alcohol and smoking habits were not evaluated which are the limitations for this study design.

CONCLUSION

In the present study the nursing staffs have high level of sleep related disorder, though, day time sleepiness is not so significant in the present study. Adequate and good quality sleep is essential to human health and is a necessity for nurses. Nurses are the backbone of health care system and it involves lot of hard work and commitment. Work ability in health care system relies heavily on human cognition, conation, executive function and communication. All these might be affected by insomnia that results mostly due to exhaustive work hours and inadequate resting periods. Nurses must have meticulously planned working hours with adequate rest periods in between to have maximum work efficiency and to eliminate threat to patient safety. Sleep is basic human need which repairs the damage of wakefulness. It's high time that we realise the importance of sleep sooner than later.

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