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# A descriptive study to assess the shift work disorder among staff nurses working at selected hospitals, Bangalore

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## Abstract

**Background:** Staff nurse works during night time and sleep during day time because of their work schedule. This affects the normal phenomena of natural circadian rhythm cycle which results shift work disorder. Shift work disorder (SWD) is a sleep disorder characterized by sleepiness and insomnia, which can be attributed to the person's work schedule.

Objectives:

- To assess the shift work disorder among staff nurses
- To find the association between shift work disorder and socio-demographic variables.

**Method:** A descriptive survey design was used to assess the shift work disorder among 185 staff nurse working in three shift duty in Ramaiah hospital by using non probability convenient sampling technique. The study was carried out from 8th April to 4th March 2019 by using three symptom based question and Bergen Shift work sleep Questionnaire.

**Result:** The study result shows that 47.6 % of the subjects were reported symptoms indicative of shift work disorder. Whereas around 40.5%, 38.4%, 60.5% and 15.1% subjects were having morning shift insomnia , evening shifts insomnia , night shift insomnia and rest day insomnia respectively.

**Conclusion:** The study concluded that staff nurses worked at critical area had more risk for shift work disorder as compare to general wards and study finding also showed that there is a statistical association between shift work disorder and Area of work (p=0.00001), Years of work experience (p=0.010), and Number of cups of coffee and tea drink per 24 hours (p=0.0.20).

**Keywords:** Shift work disorder, staff nurses, circadian rhythm

## Introduction

"Sleep is the golden chain that ties health and our bodies together" -- Thomas Dekker

Circadian rhythm is a 24 hour internal biological clock which is running in the background of the brain and cycles between sleepiness and alertness at regular intervals. The circadian rhythm of the human body causes the person to be alert during the day and to sleep at night. It is also known as sleep/awake cycle[1].

Sleep is a condition of body and mind which typically recurs for several hours every night, in which the nervous system is inactive, eyes are closed, postural muscles are relaxed, and consciousness is practically suspended.[2]

Sleep timing is controlled by the circadian clock and sleep awake homeostasis. The circadian clock is an inner timekeeping, temperature-fluctuating, enzyme-controlling device which works in tandem with adenosine. Adenosine is a neurotransmitter that inhibits many of the body processes associated with wakefulness. Adenosine is secreted throughout the day and at high level, it leads to sleepiness.[1]

Human's sleepiness can vary by age, type of work and among individual to individual. Certain people works during night time and sleep during day time because of their work schedule. This affects the normal phenomena of natural circadian rhythm cycle which results shift work disorder. Disturbances in sleep patterns are the hallmark of shift work disorder. These disturbances can range from not being able to sleep, waking too early, and also getting poor quality of sleep.[3]

Shift work disorder (SWD) is a sleep disorder characterized by sleepiness and insomnia, which can be attributed to the person's work schedule. The diagnostic criteria for SWD, as defined by the American Academy of Sleep Medicine (AASM)'s International Classification of Sleep Disorders-2 (ICSD-2) , include: (i) complaints of insomnia or excessive sleepiness temporally associated with a recurring work schedule in which work hours overlap with the usual time for sleep, (ii) symptoms must be associated with the shift work schedule over the course of at least one month, (iii) sleep log and /or Polysomnography monitoring for ≥7 days demonstrates circadian and sleep-time misalignment; (iv) sleep disturbance is not better explained by another sleep disorder, mental disorder, a medical or neurological disorder, medication use or substance use disorder[4] .

People who are involved in the night rotating shift duty are at high risk of getting shift work disorder among them nurses are the most affected one. Nursing is the profession that typically involves shift work, and as nurses is required to provide continuous health care round the clock. Nurses are doing three shifts a day: morning, evening and night shift. Particularly night shifts disrupts the sleep awake cycle and it also synchrony with the light, darkness rhythm and other endogenous biological rhythm that leads to shift work disorder among nurses.[1]

According National Sleep Foundation (2008), 25% to 30% of shift workers report excessive sleepiness or insomnia and around 10% of night and rotating shift employees have shift work disorder

Shift work schedule not only affects nurse's physical, mental health, but also affects work performance and relationships with others. Sleep deprivation among nurses leads to physical problem likes headache, feeling tired, sleep disorders and psychological problems like mood swing, depression, irritation and lack of concentration.[3]

**Objectives**

- To assess the shift work disorder among staff nurses.

- To find the association between shift work disorder and socio-demographic variables.

**Material and Methods**

**Research Approach:** Quantitative research approach

**Research Design:** The selection of the design depends upon the purpose of the study, research approach and variable to be studied. The research design selected for the study was descriptive survey research design.

**Variables**

- Study Variable :Shift Work Disorder
- Attribute Variables: Age, Gender, Marital status, Type of family, Education Status, Place of residence, Area of work, Years of work experience, Number of night duties / month, Number of children and Number of cups of coffee and tea drink /24 hours.

**Setting of the Study**

Setting is the physical location and condition in which data collection takes place in a study. The study was conducted in general medical and surgical wards, MICU, SICU, Causality, EICU, CCU, CTVSICU, Postnatal ward, NICU, plastic surgery ward of the Ramaiah Teaching Hospital and Ramaiah Memorial Hospital , Bangalore. The criteria for selecting this setting were geographical proximity, feasibility of conducting the study, availability of the samples and familiarity of the investigators with the settings.

**Population:** The population chosen for the study was nurses working in the shift duty at Ramaiah Teaching Hospital and Ramaiah Memorial Hospital, Bangalore.

**Sample and Sampling Technique:** The staff nurses working in three shift duty who fulfill inclusion and exclusion criteria were selected for the study

**Sampling Technique:** Non probability convenient technique sampling technique was used to select the required 185 staff nurses working in three shifts duty at Ramaiah Teach in, Hospital and Ramaiah Memorial Hospital, Bangalore.

**Sample Size estimation**

The sample size was estimated using the formula:

$N = t^2 \times p\ (1\text{-}P) \div m^2$

N = required sample size

t = confidence interval at 95% (CI 95% = 1.96)

p = Estimated prevalence from previous study

m = margin of error at 5 % (0.05)

Same study was conducted on assessment and treatment of Circadian rhythm disorders (shift work sleep disorder) among nurses in Australia 2018. The prevalence of shift work disorder is 14%. So estimated sample (p) = 14%

- Estimated sample size obtained using above values was 183.4.
- Therefore, 185 samples were taken for current study.

**Inclusion criteria**

**Staff nurses**

- working in three shifts duty
- who have 1 year to 5 years work experience.
- age between 21 years to 45 years.
- who have been posted at least a week of night shift duty for last consecutive two months.

**Exclusive criteria**

**staff nurses**

- diagnose to have sleep problem and under treatment.
- who are not willing to participate in the study

**Development and Description of Tool:** The tool consisted of three parts;

**Section A: Socio-demographic data:** Includes socio-demographic data which had 11 items like Age, Gender, Education status, Years of work experience, No. of night duties per month, Area of work, Type of

family, Marital status, Number of children, , Place of residence, Number of coffee and tea drink/24 hours

**Section B: Three symptom based question (ICSD-2)** was used to assess the shift work disorder. The tool is a standardized tool and it was developed by Elisabeth Flo based on minimal criteria of ICSD-2 (2005). It had 3 items.

**Scoring**

YES = 1

NO = 0

Total score ranges from 0-3.

- Maximum score =3
- Minimum score = 0

**Interpretation**

- Score 0-2 = Absence of SWD
- Score 3 = Presence of SWD

**Section C: Bergen shift work sleep questionnaire**

- The tool was developed by Bergen University of Norway (2007) and was used to assess the shift work related sleep problems and tiredness / sleepiness problem based on following six symptoms. sleep latency, awake after sleep onset, premature awakening, non restorative sleep, sleepiness / tiredness during work and free periods on work days as well as on during rest days also.
- This tool has consisted 7 questions which was developed based on 6 symptoms and each symptoms was related to morning shift, evening shift and night shift in addition to rest days when applicable. Symptoms are rated for last 3 months. The response alternatives are 'never', 'rarely', 'sometime', 'often' and always (ranging from 0 to 4).Not applicable (NA) is also considered as response alternatives when all subjects were not worked in three shifts and scored as missing.
- Questions No.1-4 assessed sleep problems (sleep latency, awake after sleep onset, premature awakening and non restorative sleep) whereasQuestions No. 5-7 assessed impaired wake time functioning **(**sleepiness /tiredness during work, free periods on work days and during rest days.)

**Total Score**

- This tool has consist of 23 items which was developed based on 6 symptoms and distributed under 7 questionnaire.
- Questions No. 1-4 consisted 16 items ie, each question consist 4/4 items
- Questions No 5-6 consisted 6 items ie, each question consist 3/3 items and,
- Question No. 7 consisted 1 item.

Each item is rated on a 5 point rating scale, ranging from **' 0'** to **'4'.** The five points likert scale of Bergen Shift Work Sleep Questionnaire were score as;

| S.N. | Points on likert scales | Score. |
|---|---|---|
| 1. | Never | 0 |
| 2. | Rarely | 1 |
| 3. | Sometimes | 2 |
| 4. | Often | 3 |
| 5. | Always | 4 |

- The composite score for each shift is 0-24.
- The composite score for rest day is 0-20.
- An increasing sum of composite score indicates increased risk of shift work related insomnia

**Interpretations**

In order to diagnose the subjects having shift related insomnia (morning shift, evening shift and night shift insomnia),

- The subject had to score at least 'often 'or 'always' in question number 1-4 and again 'often' or 'always' in question number 5-6

In order to diagnose the subjects having rest days insomnia

- The subject had to score 'often' or 'always' in question number 1-4 and 'often 'or always in question 7. Here the questions 5-6 are not applicable as it does not have any question related to rest day.

**Data Collection Procedure**

- The study was carried out from 08/04/2018 to 06/05/2018
- Formal permission was obtained from the Principal of R.I.N.E.R, Chief administrative Officer and Nursing superintendent of Ramaiah Medical College hospital and Ramaiah Memorial Hospital, Bangalore.
- The list of staff nurses who met the criteria for this research study was obtained from ward in charge of the entire respected ward for first 4 days of data collection periods.
- A total of 185 subjects who met the selection criteria were selected using non probability convenient sampling technique during the data collection period.
- Student researcher introduced herself, explained the purpose of the study to each subject and obtained an informed written consent from them for participating in the research study
- 10-20 samples were selected per day. Time taken for each sample was around 20-30 minutes.
- Tool (questionnaire) was distributed to each subjects and informed to read and follow the instructions carefully. Subjects were requested to respond for Section- A (Socio-demographic data), Section – B (Three symptom based questionnaire) and Section -C (Bergen Shift Work Sleep Questionnaire).

**Result**

Statistical analysis for the study was done using IBM SPSS version 20

**Descriptive statistics**

- Frequency and percentage distribution were used to analyse socio-demographic data.

**Inferential statistics:**

- Chi-square was used to find the association between study findings and selected socio-demographic variables.

Table 1: Frequency and percentage distribution of subjects with regards to socio demographic variables

| Sn. | Socio demographic variables | Frequency(f) | Percentage (%) |
|---|---|---|---|
| 1 | Age in completed years | | |
| | • 21-30 years | 167 | 90.3 |
| | • 31-40 years | 18 | 9.7 |
| 2 | Gender | | |
| | Male | 41 | 22.2 |
| | Female | 144 | 77.8 |
| 3 | Marital status | | |

| | | | |
|---|---|---|---|
| | Married | 78 | 42.3 |
| | Single | 107 | 57.87 |
| 4 | Type of family | | |
| | Nuclear | 46 | 24.9 |
| | Joint | 139 | 75.1 |
| 5 | Education Status | | |
| | GNM | 43 | 25.4 |
| | B.Sc. Nursing | 103 | 55.7 |
| | PBBSC Nursing | 35 | 18.9 |
| 6. | Area of residence | | |
| | Hostel | 84 | 45.4 |
| | House | 101 | 54.6 |
| 7. | Area of work | | |
| | General ward | 99 | 53.5 |
| | Closed area ( critical area) | 86 | 46.5 |
| 8 | Years of experience | | |
| | One | 26 | 14.1 |
| | Two | 39 | 21.0 |
| | Three | 46 | 24.9 |
| | Four | 49 | 26.5 |
| | Five | 25 | 13.5 |
| 9 | Number of night duty | | |
| | <7 days/month | 81 | 43.8 |
| | <7 days/month | 104 | 56.3 |
| 10 | Number of children | | |
| | Nil | 132 | 71.4 |
| | One child | 37 | 20 |
| | Two children | 16 | 8.6 |
| 11 | Number of cups of coffee and tea drink/24 hours | | |
| | Nil | 22 | 11.9 |
| | One | 7 | 3.8 |
| | Two | 57 | 30.9 |
| | Three | 47 | 25.4 |
| | Four | 34 | 18.4 |
| | Five | 18 | 9.6 |

Table 2: Frequency and percentage distribution of Shift Work Disorder according to Three Symptoms Based Questionnaire (ICSD-2)

n=185

| Shift work disorder | Frequency (f) | Percentage (%) |
|---|---|---|
| Present | 88 | 47.6 |
| Absent | 97 | 52.4 |

Table 2: reveals that 47.6% subjects were complained of shift work disorder where as more than half (52.4%) subjects were free from shift work disorder

Table 3: Assessment of insomnia for morning shift, evening shift, and night shift, as well as rest days by using Bergen Shift Work Sleep Questionnaire.

n=88

| Sn. | Types of insomnia | Present (Frequency and percentage) | Absent (Frequency and Percentage ) |
|---|---|---|---|
| 1 | Morning shift insomnia | 41 (46.6%) | 47 (53.4%) |
| 2 | Evening shift insomnia | 47 (53.4%) | 41 (46.6%) |
| 3 | Night shift insomnia | 70 (79.5%) | 18 (20.5%) |
| 4 | Rest day insomnia | 22 (25%) | 66 (75%) |

Table 3: shows that majority of subjects 53.4% were not having morning shift insomnia. With regards to evening shift insomnia 53.4% subjects were having evening shift insomnia. In relation to night shift insomnia more than half 79.5% of the subjects were having night shift insomnia. With regards to rest day insomnia majority 75% subjects were having rest day insomnia.

Table 4: Association between shift work disorder with socio-demographic variables such as area of work and years of work experience.

n=185

| Sn. | Socio demographic variables | Shift work disorder | | Chi- square ($\chi^2$) | P value (<0.05%) |
|---|---|---|---|---|---|
| | | Present | Absent | | |
| 1 | Area of work | | | | |
| | General words | 33 | 66 | 17.301df=1 | 0.000001 S* |
| | Critical area (ICUs, Dialysis and Causalities) | 55 | 31 | | |
| 2 | Years of work experience | | | | |
| | One year | 12 | 14 | 13.181 | 0.010 |
| | Two years | 28 | 11 | df=4 | S* |
| | Three years | 19 | 27 | | |
| | Four years | 17 | 32 | | |
| | Five years | 12 | 13 | | |

S*Significant, NS= not significant at <0.05% , df= degree of freedom

The above table 4 depicts that, the calculated Chi-square value for Area of work is 17.301 with P value 0.000001 and Years of experience is 13.181with P value is 0.010. Hence, the hypothesis ($\mathbf{H_1}$) stated as, "There is a significant association between shift work disorder and socio-demographic variables" is **accepted** for area of work and years of experience.

Table 5: Association between shift work disorder with socio- demographic variables such number of cups of coffee and tea per 24 hours.

**n=185**

| Sn. | Socio- demographic Variables | Shift work disorder | | Chi- square ($\chi^2$) | P value (<0.05) |
|---|---|---|---|---|---|
| | | Present | Absent | | |
| 1 | Number of cups of coffee and tea drink per 24 hours | | | | |
| | Nil | 11 | 11 | 13.426 | 0.020 |
| | One cup | 4 | 3 | df=5 | S* |
| | Two cups | 20 | 37 | | |
| | Three cups | 32 | 15 | | |
| | Four cups | 15 | 19 | | |
| | Five cups | 6 | 12 | | |

S*= Significant, NS= Not significant, df = degree of freedom,

The above table no 4.1 depicts that the calculated value for number of cups of coffee and tea per 24 hours is 13.426 with P value 0.020. Hence, the hypothesis ($\mathbf{H_1}$) stated as, "There is a significant association between shift work disorder with socio-demographic variables" is accepted for number of cups of coffee and tea per 24 hours.

**Discussion**

Findings of the study have been discussed in term of objectives, theoretical bases and hypothesis. In this section, major findings of the current study have been discussed concerning the results obtained by the researcher.

The findings have been organized and discussed according to the objectives which are mentioned above.

**Objective 1**

To assess the shift work disorder among the staff nurses.

The study results show that 47.6% were having shift work disorder. The findings of the study were supported by a study conducted by Anbazhagan .S et al in Bangalore on shift work disorder and related health problems among nurses working in a tertiary care hospital and the results found that 43.07% subjects had shift work disorder.[19]

A similar study was conducted by Flo E.. et al in Norway among nurses and the study results shows that one thirds of nurses showed symptoms indicative of shift work disorder, with high prevalence (45% )[7].

A study was conducted by Darke L. et.al in (2007) on shift work sleep disorder prevalence and consequences beyond that of symptomatic day workers. Study result found that, by using minimum criteria for shift work sleep disorder, 31.1% of night workers and 26.1% of rotating workers met the criteria for shift work sleep disorder. Thus, the true prevalence (ie, differential

prevalence) of shift work sleep disorder was 10% of shift workers between the ages of 18 to 65 years.[24]

Several studies were conducted on shift work disorder among random population. The study results found that the prevalence of shift work disorder was ranging from 10% to 43.7%.[29,302631]

**Objective 2**

To find the association between shift work disorder and socio demographic variables.

Study finding showed that there is a statistical association between Shift Work Disorder and Area of work (p=0.00001), Years of experience (p=0.010), and Number of cups of coffee and tea drink per 24 hours (p=0.0.20) where as for other variables like Age, Gender, Educational status, Marital status, Number of night duties per month, Place of residence, Number of children and Type of family were found to have no association with the Shift Work Disorder.

The study finding was supported by a descriptive cross-section study conducted by Anbazhagan .S et alone shift work disorder and related health problems among nurses working in a tertiary care hospital, Bangalore. The study result found that there is significant association Age (p=0.035), Number of night duties (p=0.010) and Years of experience (p=0.010) as the p value is <0.05. It concluded that young nurses with less experience are not adopted for the shift work and the mechanism behind coping with shift duties.[19]

Study finding also supported by the study which was conducted by Asoka .s. et al on factor associated with shift work disorder in nurses working with rapid rotation schedules in Japan. The study result found that there is significant association with age ($\chi^2$ =8.5, P<0.05), length of nursing work experience ($\chi^2$=8.2, P <0.01) and having a children ($\chi^2$ =9.6, P=<0.05). It concluded that nurses with less experience are more prone to have shift work disorder.[16]

**Limitation**

- Authenticity of the information regarding socio-demographic variables is based on the response of the subjects.
- Unavailability of sufficient related literature to support the study.
- Limited sample size

**Conclusion**

- The following conclusions were drawn on the basis of finding of the study;
  - Staff nurses working in shift work will have greater chance of developing shift work disorder.
  - Staff nurses working in night shift had higher percentage of shift related insomnia.
  - Staff nurses working in critical wards had higher percentage of shift work disorder as compared to general wards.

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