



IMPACT OF NIGHT-SHIFT WORK ON MENSTRUAL IRREGULARITIES AMONG FEMALE HEALTHCARE WORKERS: A CASE-CONTROL STUDY

Dr. Vaishnavi Jalake*

Junior Resident, Family Medicine Department. *Corresponding Author

Dr. Swapnil Hinge

Junior Resident, Family Medicine Department.

Dr. Aditi Singhania

Associate Professor, Family Medicine Department.

ABSTRACT

Background: Shift work, particularly night shifts, is known to disrupt the circadian rhythm, which may lead to significant hormonal imbalances and reproductive health issues in women. This study aimed to evaluate the impact of night-shift work on menstrual health among female healthcare workers. **Methods:** A case-control study was conducted involving 100 female healthcare workers, divided into 50 night-shift workers (cases) and 50 day-shift workers (controls). Data were collected on demographic characteristics, menstrual history, symptom prevalence, and the perceived impact of work schedules on menstrual health. **Results:** The study revealed a markedly higher prevalence of menstrual irregularities in night-shift workers compared to controls. Specifically, 64% of cases reported irregular cycles (vs. 24% of controls) and 56% experienced prolonged cycle lengths (vs. 20% of controls). Furthermore, 64% of cases reported that menstrual symptoms interfered with their work performance, compared to 28% of controls. A significant majority of night-shift workers (84%) expressed a critical need for medical support to manage their menstrual health. **Conclusion:** Night-shift work is strongly associated with an increased prevalence of menstrual disorders and severe associated symptoms among female healthcare workers. These disruptions not only affect physiological well-being but also impair occupational efficacy. The findings highlight the urgent need for organizational interventions and supportive policies to mitigate the adverse health impacts of shift work.

KEYWORDS : Night-Shift Work, Healthcare Workers, Menstrual Irregularities, Circadian Disruption, Dysmenorrhea, Occupational Health.

INTRODUCTION

Shift work is an integral component of healthcare delivery, particularly in tertiary care hospitals where continuous patient care is essential. Female healthcare workers - including nurses, resident doctors, and support staff - frequently engage in night-shift duties, exposing them to disruptions in normal biological rhythms. Increasing evidence suggests that such occupational patterns adversely affect reproductive health, with menstrual irregularities emerging as a significant concern¹.

Circadian rhythm disruption (CRD), commonly experienced by individuals working night shifts, has significant impact on the endocrine system, particularly the hypothalamic-pituitary-ovarian (HPO) axis, which regulates female reproductive function.² Central to circadian regulation is the suprachiasmatic nucleus (SCN) of the hypothalamus, which synchronizes the body's internal clock with ambient light-dark cues. When night-shift workers are exposed to artificial light during their duty hours, this synchronization is impaired, altering the normal 24-hour hormonal rhythm.²

This disruption leads to altered melatonin secretion - a hormone that plays a critical role not only in sleep regulation but also in reproductive hormone balance.² In night-shift workers, reduced or phase-shifted melatonin production has been shown to impair the pulsatile GnRH signalling originating from the hypothalamus. This downstream effect reduces the co-ordinated release of LH and FSH from the anterior pituitary, undermining the follicular maturation and ovulatory events that underpin a regular menstrual cycle.³ Chronic repetition of this disruption may precipitate persistent reproductive dysfunction.

In addition, prolonged night shift work can affect levels of oestrogen and progesterone, further contributing to menstrual irregularities.⁴ Among the menstrual disorders documented in shift-working women, oligomenorrhea and secondary amenorrhea are especially prevalent, while dysmenorrhea and anovulatory cycles indicate both hormonal and inflammatory consequences of chronic circadian

misalignment.⁵ These menstrual disturbances not only affect quality of life but may also signal deeper endocrine imbalances with long-term reproductive health implications.⁶

Given the high prevalence of night shift duties among healthcare workers, particularly in tertiary care settings, it is important to explore how occupational patterns influence menstrual health.

This study aimed to evaluate the impact of night-shift work on menstrual health, associated symptoms, and professional performance among female healthcare workers.

MATERIALS AND METHODS

A case-control, questionnaire-based study was conducted at tertiary care hospital among female healthcare workers aged 20-45 years. Cases (n=50) were regular night-shift workers and controls (n=50) were day-shift workers. Sample size was calculated assuming 50% prevalence of menstrual irregularities (95% CI, 10% margin of error), yielding minimum of 96; adjusted to 100 for feasibility.

A structured, pre-validated questionnaire covering demographic details, work schedule, menstrual history, and lifestyle factors was used.^{7,8}

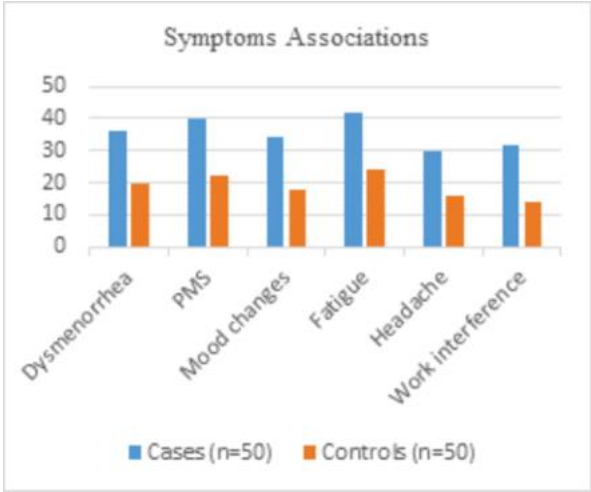
Data were collected via self-administered Google Forms with informed consent. Analysis was performed using SPSS v25; descriptive statistics and Chi-square test were applied (p<0.05).

RESULTS:

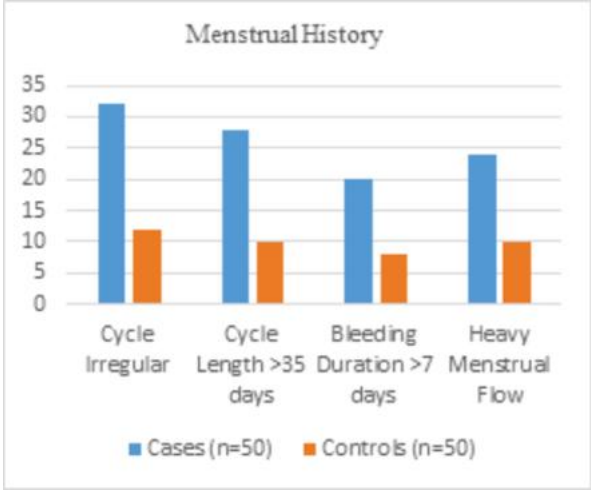
Table - 1 Demographic Details

Category	Cases [n=50]	Controls [n=50]
Age in years		
• 20-30	28	26
• 31-40	20	20
• 41-45	2	4
Designation		
• Nursing staff	32	28
• Lab technician	18	22

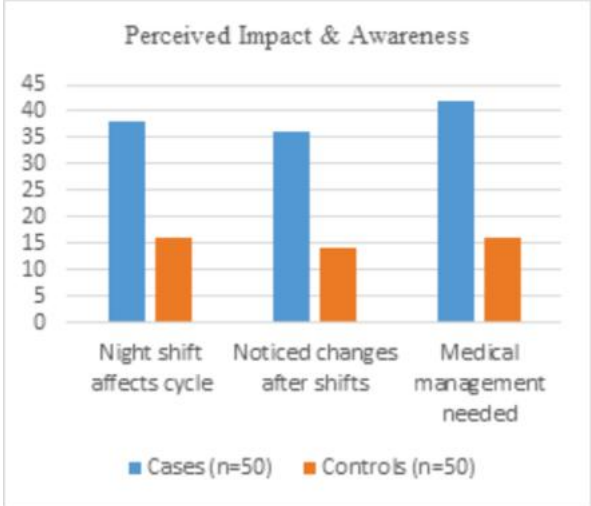
Work experience		
• <5 years	14	22
• 6–10 years	24	18
• >10 years	12	8



Graph 1: Symptoms Association



Graph 2: Menstrual History



Graph 3: Perceived Impact & Awareness

A total of 100 female healthcare workers were included in the study, comprising 50 cases (night-shift workers) and 50 controls (day-shift workers). The majority of participants belonged to the 20–30 years age group, accounting for 56% of cases and 52% of controls, followed by 30–40 years (40% in

both groups). A smaller proportion was observed in the 40–45 years category (4% cases vs 8% controls).

With respect to professional designation, nurses constituted the majority in both groups (64% of cases and 56% of controls), while technicians accounted for 36% of cases and 44% of controls.

Regarding work experience, 48% of cases had 5–10 years of experience compared to 36% of controls. A higher proportion of controls had less than 5 years of experience (44% vs 28%), whereas >10 years of experience was observed in 24% of cases and 16% of controls.

Menstrual symptoms were more prevalent among night-shift workers. Dysmenorrhea was reported by 72% of cases compared to 40% of controls. Premenstrual syndrome (PMS) was present in 80% of cases versus 44% of controls. Mood changes were reported by 68% of cases and 36% of controls. Fatigue was the most commonly reported symptom, affecting 84% of cases compared to 48% of controls. Headache was reported by 60% of cases and 32% of controls. Additionally, menstrual symptoms interfered with work performance in 64% of cases compared to 28% of controls.

Menstrual irregularities were notably higher among cases. Irregular cycles were observed in 64% of cases compared to 24% of controls. A prolonged menstrual cycle length (>35 days) was reported in 56% of cases versus 20% of controls. Bleeding duration exceeding 7 days was reported in 40% of cases compared to 16% of controls. Heavy menstrual flow was observed in 48% of cases, whereas only 20% of controls reported the same.

A majority of night-shift workers (76%) reported that night-shift work affects their menstrual cycle, compared to 32% of controls. Similarly, 72% of cases noticed changes in their menstrual cycle after starting night shifts, whereas only 28% of controls reported such changes. The need for medical support to manage menstrual health was expressed by 84% of cases compared to 32% of controls.

DISCUSSION

The present study demonstrates a higher prevalence of menstrual irregularities and associated symptoms among night-shift female healthcare workers compared to day-shift workers, consistent with existing evidence on the adverse reproductive effects of shift work.

In this study, 64% of night-shift workers reported irregular menstrual cycles compared to 24% of controls. Similar findings were reported by Wang et al.¹ who observed increased menstrual disturbances among women engaged in night and rotating shifts. Lawson et al. also reported a higher risk of irregular cycles among night-shift workers, attributing this to circadian rhythm disruption and hormonal imbalance.⁷

Prolonged menstrual cycles (>35 days) were observed in 56% of cases compared to 20% of controls. This aligns with findings by Stock et al. who demonstrated that shift work is associated with altered cycle length and ovulatory dysfunction, likely due to disruption of the hypothalamic–pituitary–ovarian axis.⁸

Heavy menstrual bleeding (48%) and prolonged bleeding duration (40%) were more common among night-shift workers. These findings are supported by Labyak et al. who reported a higher prevalence of abnormal menstrual bleeding patterns among shift workers.⁹

Menstrual symptoms, including dysmenorrhea (72%), PMS (80%), fatigue (84%), and mood changes (68%), were markedly higher in cases. Attarchi et al. similarly reported

increased PMS and dysmenorrhea among shift-working nurses.¹⁰ Flo et al. further observed that night work is associated with fatigue and mood disturbances, contributing to poor menstrual health outcomes.¹¹

Sleep deprivation appears to be an important contributing factor. A considerable proportion of night-shift workers in this study reported reduced sleep duration. Kalmbach et al. found that sleep disturbances and circadian misalignment are strongly associated with menstrual irregularities and increased PMS symptoms.¹²

A significant proportion (76%) of participants perceived that night-shift work negatively affects their menstrual cycle. This subjective perception is supported by Nurminen et al. who highlighted the association between shift work and reproductive health disturbances.¹³

Additionally, 84% of cases expressed the need for institutional support, indicating a gap in workplace health measures. Booker et al. emphasized the importance of organizational interventions to mitigate the health consequences of shift work among healthcare professionals.¹⁴

Overall, the findings of the present study are consistent with previous research, reinforcing the strong association between night-shift work and adverse menstrual health outcomes, likely mediated by circadian disruption, hormonal imbalance, and sleep deprivation.

CONCLUSIONS

The findings of this study reinforce existing concerns regarding the adverse relationship between night-shift work and the menstrual health of female healthcare workers, revealing significant menstrual irregularities, chronic fatigue, and hormonal disturbances associated with disrupted circadian rhythms. Healthcare institutions must therefore adopt evidence-based scheduling policies - such as limiting consecutive night shifts, ensuring adequate recovery intervals, and providing access to occupational health support to safeguard the reproductive and overall well-being of their female workforce. Future research with larger sample sizes and objective hormonal assays would further strengthen the causal evidence base.

REFERENCES

- [1] Wang F, et al. Night shift work and menstrual disorders among women: findings from a large cross-sectional study. *Occupational and Environmental Medicine*. 2016; 73 (6):361–367.
- [2] Wright KP et al. Influence of sleep deprivation and circadian misalignment on cortisol, thyroid-stimulating hormone, and negative affect under controlled conditions. *Endocrine Reviews*. 2013; 34 (2):197–227.
- [3] Berek JS. Berek & Novak's Gynecology. 16th ed. Philadelphia: Wolters Kluwer; 2019.
- [4] Harlow SD, Campbell OM. Epidemiology of menstrual disorders in developing countries: a systematic review. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2004; 111(1):6–16.
- [5] Fraser IS, et al. Can we achieve international agreement on terminologies and definitions used to describe abnormalities of menstrual bleeding? *Human Reproduction Update*. 2007; 13(2):121–131.
- [6] Rapkin AJ, Winer SA. Premenstrual syndrome and premenstrual dysphoric disorder: quality of life and burden of illness. *Obstetrics and Gynecology Clinics of North America*. 2009; 36(1):1–14.
- [7] Lawson CC, et al. Rotating shift work and menstrual cycle characteristics. *Epidemiology*. 2011; 22(3):305–312.
- [8] Stock D, et al. Shift work and abnormal uterine bleeding: a systematic review and meta-analysis. *Scandinavian Journal of Work, Environment & Health*. 2019; 45(4):313–324.
- [9] Labyak S, et al. Effects of shiftwork on sleep and menstrual function in nurses. *Health Care for Women International*. 2002; 23(6–7):703–714.
- [10] Attarchi M, et al. Association between occupational exposures and menstrual cycle disturbances in female shift workers. *Journal of Occupational Health*. 2013; 55(6):405–410.
- [11] Flo E, et al. Shift work disorder in nurses — assessment, prevalence and related health problems. *PLOS ONE*. 2012; 7(4):e33981
- [12] Kalmbach DA, et al. The impact of sleep on female sexual response and behavior: a pilot study. *Journal of Sexual Medicine*. 2015; 12(5):1221–1232.
- [13] Nurminen T. Shift work and reproductive health. *Scandinavian Journal of Work, Environment & Health*. 1998; 24(Suppl 3):28–34
- [14] Booker LA, et al. Individual vulnerability to insomnia, excessive sleepiness and shift work disorder amongst healthcare shift workers: a systematic review. *Sleep Medicine Reviews*. 2018; 41:220–233