International Journal of Web of Multidisciplinary Studies
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
website: https://ijwos.com
Volume 3 Issue 6 , June 2026
E-ISSN : 3049-2424
DOI: https://doi.org/10.71366/ijwos03062647638

Risk of Breast Cancer among Night Shift Working women: A Comprehensive Narrative review of Epidemiological Evidence and Occupational Health implications for Indian Women

Dr. Gabriel Ernest[1], Dr. Ezhil Raja B[2], Dr. Kavya S[3], Dr. Nandhagopal S[4], Dr. Rohithkannan T.V[5], Dr. Abhinaya S[6], Dr. Bhaskar[7]

[1] *Assistant Professor, Department of General Surgery, Karpaga Vinayaga Institute of Medical Sciences and Research Centre*

[2,3,4,5,6] *Intern, Karpaga Vinayaga Institute of Medical Sciences and Research Centre*

[7] *Professor, Department of General Surgery, Karpaga Vinayaga Institute of Medical Sciences and Research Centre.*

Article Info

Article History:

Published: 11 June 2026

Publication Issue:
Volume 3, Issue 6
June-2026

Page Number:
93-97

Corresponding Author:
Dr. Gabriel Ernest

Abstract:

Background: According to the International agency for Research on Cancer (IARC) night shift work is classified as a probable human carcinogen with an impact of approximately 15~20% of the workforce across the world. The Circadian disruption arising from night shift work suppresses secretion of melatonin, dysregulation of estrogen metabolism and changes the clock gene expression that have been proposed to be linked with Breast cancer development.

Objective: To review on the existing epidemiological evidence on the association between Risk of Breast cancer and night shift working women, policy recommendations and occupational health outcomes for Indian Women

Methods: A comprehensive narrative review was conducted using Pubmed, Scopus, Google Scholar, and the WHO index, Peer-reviewed studies published between 2000 – 2026.

Key Findings: There is a significant association between long duration of night shift work and increased breast cancer risk (Relative risk ~1.086 per 5-year increment of exposure). Workers with rotating shift has higher circadian disruption and risks of developing breast cancer compared to permanent night shift work. IARC 2019 monograph classifies night shift work as a probable human carcinogen under Group 2A. Longitudinal data for India-specific studies is still limited.

Conclusion: With increasing night shift jobs in India and Breast cancer being the leading cause of neoplasm among Indian Women there is definite need for occupational policies ensuring women welfare and more clinical research on the same to be done on a larger scale with more longitudinal study.

Keywords: Night shift work; circadian disruption; breast cancer; Indian women; occupational health; melatonin; carcinogenesis

1. Introduction

Breast cancer is an epidemiological burden across the world and being the leading cause of cancer among Indian women accounting for approximately 27% of all female cancers in India (1,2). The occupational exposure especially night shift work has been the area of interests for more than two decades.

Night shift work is typically considered between 10:00 pm to 6:00 am (3). Around 15~20% of the total workforce population is engaged in the night shift work. With expansion in healthcare, BPO and textile industries, Indian women are constantly engaged in night shifts(4).

The circadian rhythm fondly called as the "biological clock" is regulated by Suprachiasmatic Nucleus of the hypothalamus. Melatonin secreted from the pineal gland helps in the "sleep-wake cycle". melatonin secretion is suppressed when there is increased exposure to artificial light at night (ALAN) from the night shift work. Melatonin has and biological inhibitory effect on estrogen(5), decreased availability of melatonin increases the risk of increased stimulation of mammary epithelial cells by estrogen which thereby increases the risk of hormone-receptor-positive breast cancer.(3,6)

Peripheral clock genes – including BMAL1, CLOCK, PER1, PER2 and CRY1 regulates cell-cycle checkpoints, DNA damage repair and apoptosis in mammary tissue(7). There is dysregulation of clock genes due to circadian dysruption.

Night shift work being considered as Group 2A carcinogen according to IARC 2019 monograph (8), there is need of National policy framework to protect night shift workers against the risk of developing cancer.

This review aims to analyse the available epidemiological evidence on night shift work and breast cancer risk; to highlight the biological mechanisms causing this association; and to outline occupational health implications and policy recommendations for the Indian Women.

2.Methods

A narrative review was chosen as the method of study with the objective analysing heterogenous epidemiological literature and summarising findings with an occupational health framework.

2.1 Search Strategy

A detailed literature search was done using databases such as PubMed, Scopus, Google Scholar and the WHO Global Index Medicus.

2.2 Inclusion and Exclusion Criteria

The inclusion criteria were as follows:

I. Published article between January 2000 and May 2026
II. Research performed on Human subjects
III. Targeted on epidemiological associations between, night shift work, circadian disruption and Breast cancer risk
IV. Peer-reviewed articles, systematic reviews, meta-analyses

The articles examining male workers were excluded.

2.3 Data Analysis

The following components were analysed: study design, population attributes, exposure, outcomes, key estimates of effects (risk ratios, odd ratios, or hazard ratios with 95% confidence intervals), and adjustment variables, policy documents.

3.Results

3.1 Overview of Epidemiological Evidence

From the early 2000s the literature on night shift work and breast cancer has grown due to the prospective cohort studies. Schernhammer et al. in nurses shown that elevated risk of breast cancer among rotating night shift women for 30 or more years.

3.2 Magnitude of Risk

Meta analysis by Zhang et al. (2022)(6) reported a relative risk of 1.086 (95% CI: 1.041-1.133) with over 3.9 million participants for incidence of breast cancer among night shift working women compared to day workers for more than 10 years.

Esposito et al. (9) found that a five-year increase in night shift exposure was associated with 3.3% increase in risk of breast cancer (RR: 1.033, 95% CI: 1.011-1.055), the risk was more for rotating night shifts compared to permanent night shifts.

Li et al (10) in a systematic review and meta-analysis for healthcare workers, the night shift for prevalence with a RR of 1.12 (95% CI: 1.06-1.19) with highest among nurses.

Schernhammer et al. (2023) confirmed the persistence of association over multiple continents and occupational setting with Estrogen receptor positive breast cancer over other types.(11)

3.3 Rotating versus Permanent Night Shifts

Workers on rotating night shift experiences an unpredictable circadian rhythm disruption compared to permanent night shift workers, the relative risks being 1.10~1.15 in rotating night shift workers compared to 1.05~1.08 in permanent night shift workers.

3.4 Evidences from the studies conducted in Indian population

Data pertaining to night shift cancer association with risk of breast cancer is limited. The available evidence is sourced from Population Based Cancer Registries (PBCRs) which quotes increased rates of Breast Cancer in Indian Metropolitan centres but these do not highlight the association with night shift work(12)

From Survey-based studies from Indian BPO and information technology sectors, women in night shift works have reported menstrual irregularities, sleep deprivation and easy fatiguability which points towards circadian disruption.

Kaur et al. (2026) addressed sleep and circadian disruption in working women with increased risk of breast cancer among night shift workers was biologically plausible and supported with epidemiological evidences across the world but called for India-specific studies for Indian women.(1)

4.Discussion

4.1 Biological Mechanisms

Nocturnal exposure to blue wavelength light emitted by fluorescent lighting, computer screens and mobile devices activates intrinsically photosensitive retinal ganglion cells (ipRGCs), signals suprachiasmatic nucleus to inhibit melatonin production. Melatonin exhibits antiproliferative action in breast epithelial cells via the MT1 and MT2 membrane receptors by inhibiting the cell proliferation by estrogen, decreased melatonin increases the cell proliferation.(13)

Circadian disruption causes sustained oestradiol concentrations by acting on the hypothalamic-pituitary-gonadal (HPG) axis. This is the reason why there is increased risk of estrogen receptor positive breast cancer among night shift working women.

Clock genes (BMAL1, CLOCK, PER, CRY families) regulate expression of tumour suppressor genes such as p53, WEE1, and CHK1(7). This disruption in the clock genes compromises genomic integrity.

Chronic sleep deprivation activates pro-inflammatory pathways, increasing circulating concentrations of IL-6, TNF-α and CRP. Chronic inflammation is associated with breast carcinogenesis via the activation of NF-κB and STAT3 pathways.

4.2 IARC classification and Regulatory Context

IARC 2019 monograph 124 concluded that there was sufficient evidence in experimental animals and limited evidence in humans to support the classification of night shift work as Group 2A (probable human carcinogen).(8)

npj Breast Cancer (2025) says that women with specific clock gene polymorphisms (BMAL1 rs7950226, PER3 VNTR 5/5 genotype) has an increased breast cancer risk while working on night shifts.(2)

4.3 Occupational Health Implications for Indian Women

The three major sectors where women are working in the night shifts are the Healthcare sector, BPO sector, textile and garment manufacturing sector. Nurses and female healthcare workers are recognised as high-risk group with documented night shift exposure. Textile industry workers face with the occasional exposure to carcinogens. BPO workers faces the high ALAN from screens combined with sedentary lifestyle causes circadian disruption.(14)

Current Indian Occupational health regulations under Factories Act 1948 and ESIC Act 1948 restrict women working long working hours and ensure safety provisions but do not address the circadian disruption or cancer screening for night shift workers.

4.4 Policy Recommendations

Based on the available data following interventions can be recommended:

1. Shift schedule optimisation: Employers should implement forward-rotating shift schedules rather than backward-rotating schedules with reduction in continuous night shifts to be avoided.
2. Light Exposure Management: Workplaces to be installed with dynamic lighting systems provide blue light with early portion of night shifts and amber/red-toned in the latter hours. Health education to be advised to the workers
3. Cancer Screening Protocols: women workers especially the night shift workers to be encouraged for breast cancer screening programs
4. Regulatory reform: improved working conditions and mandating safety provisions along with documentation of the well-being of the night shift workers to be done.

5.Conclusion

This review emphasizes on the correlation between night shift work, circadian disruption and risk of breast cancer. The biological mechanism highlights the importance of melatonin and clock genes whose functions being a protective factor against developing breast cancer. Frequent circadian disruption among night shift workers poises a bigger threat of developing breast cancer.

Breast cancer being the leading cause of cancer among women in India and the night shift working increases the risk of incidence even further especially with few sectors which demand night shift work. Yet we lack substantial data to conclude the exact risk among Indian women who works night shift and the correlation with risk of developing breast cancer.

The main objective is to have policy frameworks to conduct large scale longitudinal studies to assess the current conditions and associations along with occupational protection against the risks. Without these steps, a preventable contributor to India’s breast cancer burden will remain unaddressed.

References

1. Kaur S, M H N, Kaur V. Sleep, circadian disruption and breast cancer risk in working women: A narrative review. World J Adv Res Rev. 2026 Apr 30;30(1):1297–308. doi:10.30574/wjarr.2026.30.1.0923

2. Vivarelli S, Formica T, Puliatti Y, Spatari G, Fenga C. Night shift work and breast cancer: from etiopathology to precision risk analysis. Npj Breast Cancer. 2025 Dec 4;12(1):7. doi:10.1038/s41523-025-00863-3

3. Wei F, Chen W, Lin X. Night-shift work, breast cancer incidence, and all-cause mortality: an updated meta-analysis of prospective cohort studies. Sleep Breath. 2022 Dec;26(4):1509–26. doi:10.1007/s11325-021-02523-9

4. Hong J, He Y, Fu R, Si Y, Xu B, Xu J, et al. The relationship between night shift work and breast cancer incidence: A systematic review and meta-analysis of observational studies. Open Med. 2022;17(1):712–31. doi:10.1515/med-2022-0470 PubMed PMID: 35702390; PubMed Central PMCID: PMC8995855.

5. Hansen J, Pedersen JE. Night shift work and breast cancer risk – 2023 update of epidemiologic evidence. J Natl Cancer Cent. 2025 Feb;5(1):94–103. doi:10.1016/j.jncc.2024.07.004

6. Hong J, He Y, Fu R, Si Y, Xu B, Xu J, et al. The relationship between night shift work and breast cancer incidence: A systematic review and meta-analysis of observational studies. Open Med. 2022;17(1):712–31. doi:10.1515/med-2022-0470 PubMed PMID: 35702390; PubMed Central PMCID: PMC8995855.

7. Wang F, Yeung KL, Chan WC, Kwok CCH, Leung SL, Wu C, et al. A meta-analysis on dose–response relationship between night shift work and the risk of breast cancer. Ann Oncol. 2013 Nov;24(11):2724–32. doi:10.1093/annonc/mdt283

8. IARC Working Group on the Identification of Carcinogenic Hazards to Humans. Night shift work. Lyon (FR): International Agency for Research on Cancer, World Health Organization; 2020. 1 p. (IARC monographs on the identification of carcinogenic hazards to humans; volume 124).

9. Esposito G, Bravi F, Santucci C, Zunarelli C, Violante FS, La Vecchia C, et al. Night shift work and breast cancer risk in healthcare workers: a systematic review and meta-analysis. Occup Med. 2025 Dec 1;75(9):596–607. doi:10.1093/occmed/kqaf040 PubMed PMID: 41525351; PubMed Central PMCID: PMC12794909.

10. Li X, Hu Y, Aslanbeigi F. Genetic and epigenetic alterations in night shift nurses with breast cancer: a narrative review. Cancer Cell Int. 2025 Jan 20;25(1):20. doi:10.1186/s12935-025-03649-6

11. Schernhammer E, Bogl L, Hublin C, Strohmaier S, Zebrowska M, Erber A, et al. The association between night shift work and breast cancer risk in the Finnish twins cohort. Eur J Epidemiol. 2023 May;38(5):533–43. doi:10.1007/s10654-023-00983-9 PubMed PMID: 36964875; PubMed Central PMCID: PMC10164004.

12. Mathur P, Sathishkumar K, Chaturvedi M, Das P, Sudarshan KL, Santhappan S, et al. Cancer Statistics, 2020: Report From National Cancer Registry Programme, India. JCO Glob Oncol. 2020 Nov;(6):1063–75. doi:10.1200/GO.20.00122

13. Blask DE, Dauchy RT, Sauer LA. Putting Cancer to Sleep at Night: The Neuroendocrine/Circadian Melatonin Signal. Endocrine. 2005;27(2):179–88. doi:10.1385/ENDO:27:2:179

14. Rajaratnam SM, Arendt J. Health in a 24-h society. The Lancet. 2001 Sep;358(9286):999–1005. doi:10.1016/S0140-6736(01)06108-6