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Original Article

Age-Wise Analysis of Breast Cancer Incidence and Mortality in India, Asia, and Worldwide: Insights from GLOBOCAN 2022

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Abstract

Background: *Breast cancer is the second most common cancer among women worldwide and exhibits significant age- and region-specific variations in incidence and mortality. Understanding these patterns is critical for early detection, preventive strategies, and effective healthcare planning.*

Methods:*This review analyzed age-specific breast cancer incidence, mortality, and epidemiological indicators—including Age-Standardized Incidence Rate (ASIR), Age-Standardized Mortality Rate (ASMR), cumulative frequency, and crude rate—among women in India, Asia, and globally using the GLOBOCAN 2022 database. Additionally, relevant research studies were reviewed to summarize risk factors, diagnostic methods, treatment approaches, and preventive strategies.*

Results: *In 2022, breast cancer accounted for 2.29 million new cases and 666,103 deaths globally. The highest incidence occurred in women aged 50–59, while ASIR peaked in the 80–85+ age group. France reported the highest ASIR (105.4), and Fiji had the highest mortality (182 per 100,000). China, the United States, and India contributed the largest case numbers, with India leading in mortality (51.2%). In India, most cases occurred between ages 50–69, highlighting strong age-dependent trends.*

Conclusion: *Breast cancer incidence and mortality vary significantly by age and region. These findings underscore the importance of early awareness, age-targeted screening, and preventive interventions to reduce the disease burden, particularly in high-risk populations.*

Keywords *- Breast cancer; Age-wise analysis; Incidence; Mortality; ASIR; ASMR*

Introduction

Cancer is the second leading cause of death worldwide, accounting for 9.74 million deaths in 2022 and projected to reach around 29.4 million by 2040 (WHO). One in six deaths globally is due to cancer. Among these, breast cancer was the second most common cancer in 2022, with 2,296,840 new cases reported, following lung cancer. Globally, lung, colorectal, prostate, stomach, and breast cancers constitute the most prevalent cancer types.Breast cancer is a heterogeneous, hormone-dependent malignancy, representing approximately 11.5% of all cancers worldwide. Key risk factors in women include advancing age, infertility, age at first full-term pregnancy, menopause, mutations in BRCA1 or BRCA2 genes, and the use of postmenopausal hormones (Donepudi *et al*., 2014). It is classified into five molecular subtypes—basal-like, luminal A, luminal B, HER2+/ER–, and normal breast–like—with distinct clinical outcomes and treatment responses (Reis *et al*., 2008). Asia accounts for the largest share of global cancer incidence (49.2%), with the most common cancers being lung (15.9%), breast (10%), colorectal (9.8%), stomach (7%), and liver (6.2%).Breast cancer is a multifactorial disease affected by various risk factors such as age, genetics, lifestyle, and hormonal factors. Age remains the most critical determinant, with most cases occurring in women aged 50 and older. Globally, women aged 80 and above show the highest age-specific incidence rate (ASIR) of breast cancer. Nevertheless, the largest number of cases is observed among women aged 50–59 years (569,724 cases), followed by those aged 60–69 years (517,598 cases). Although the risk rises with age, awareness and prevention efforts should start as early as 19 years to promote early detection (GLOBOCAN, 2022).The incidence of breast cancer rises significantly with age, peaking around menopause, after which it gradually declines or stabilizes.

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A case–control study also found that women over 50 years of age had a higher incidence of breast cancer (Momenimovahed, Z., & Salehiniya, H. (2019). This highlights the need for region-specific studies on breast cancer incidence and mortality, particularly in India, to guide effective prevention and management strategies.

Methods

Data on breast cancer were extracted from the GLOBOCAN 2022 database, covering 185 countries, to analyze age-specific incidence and mortality in India, Asia, and worldwide. In addition, relevant literature was reviewed from PubMed, ScienceDirect, WHO, the International Agency for Research on Cancer (IARC), and the National Cancer Registry Program (NCRP) of India, under the Indian Council of Medical Research (ICMR).

Incidence refers to the number of new cancer cases diagnosed within a specific time period and region, while mortality indicates the number of cancer-related deaths within the same period and region. The Age-Standardized Incidence Rate (ASIR) represents the number of new cancer cases per 100,000 individuals per year, and the Age-Standardized Mortality Rate (ASMR) represents the number of cancer deaths per 100,000 individuals per year. Age-Standardized Prevalence (ASPR) estimates the number of cases prevalent over a five-year period (X *et al*., 2024).

Risk Factors for Breast Cancer

Breast cancer risk increases with age, with the highest incidence in women aged 50–59 and the highest mortality in those over 60 (WHO, 2022; GLOBOCAN, 2022). Lifestyle factors such as obesity, high-fat diet, alcohol consumption, smoking, and pesticide exposure also contribute. Family and personal history, including previous breast or ovarian cancer and early-onset breast cancer in first-degree relatives, significantly elevate risk. Genetic mutations, particularly in BRCA1, BRCA2, TP53 and other related genes, increase susceptibility. Hormonal factors, including prolonged estrogen exposure, combined hormone replacement therapy, and progesterone use, play a key role, as do reproductive factors such as nulliparity or late pregnancy. Additional risk factors include dense breast tissue, late menopause, radiation exposure at a young age, and postmenopausal obesity, all of which can influence cancer development and detection (YS *et al*., 2017; A *et al*., 2014; Z *et al*., 2019).

Breast cancer diagnosis

Table 1. Advantages and disadvantages of diagnosis technique(Z *et al*,. 2020)

Diagnosis techniques	Advantages	Disadvantages
XRM X-ray mammography	The standard for diagnosing BC patients.It is most suitable as a screening technique for BC Detect mammary gland calcification	It is not advisable for people under 40 Not applicable for people with high gland densityIt's not used more than twice a year
US Ultrasonography	Suitable screening for young women Non-invasive diagnostic methods Finding mammary gland inflammation	Not suitable for small mass and atypical tissueAffected by the examining doctor Definition and Resolution are not high
MRI Magnetic resonance imaging	High sensitivity and specificity to invasive BCScreening of high-risk groups, such as family history of BC Suitable for patients with breast-conserving surgery	Not for everyone, such as patients with Claustrophobia and hypersensitivity to contrast Not suitable for wide scale screening Not suitable for BC staging
PET Positron emission tomography;	High sensitivity to BC recurrence and metastasis Helpful for staging of the BCHigh sensitivity to small breast tumour (>0.5 cm)	High cost, not recommended as routine screening Not suitable for patients with hypersensitivity to Developer
CT Computed tomography	Supplementary diagnostic method for BC, such as identifying BC with or without intrapulmonary metastases	Not the first choice for diagnosing BC Radiation damage Poor spatial resolution and need experienced doctor
SPECT Single-photon emission computed tomography	High resolution, small field of vision Recommended use when suspects metastasis (such as osseous metastasis)	Obtaining littler clinic information Not suitable for patients with inflammatory bone lesions and bone proliferative metabolic abnormalities or variations

Breast Cancer Prevention and Treatment

Breast cancer risk can be reduced by addressing modifiable factors and adopting preventive measures. Monthly breast self-examinations, ideally 7–10 days after menstruation or on a fixed day for postmenopausal women, help detect early changes in breast shape, size, skin, or nipple appearance (J *et al*., 2005). Routine screening and mammograms after age 40, maintaining a healthy weight, regular exercise, a balanced diet, limiting alcohol, avoiding tobacco, breastfeeding, and careful use of hormone replacement therapy can lower risk. Genetic counseling and testing for BRCA1/BRCA2

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and other mutations are recommended for those with a family history. Treatment depends on cancer type, stage, location, and patient health, and includes surgery (lumpectomy, mastectomy, lymph node biopsy), radiation therapy, chemotherapy (neoadjuvant or adjuvant), hormone therapy, targeted therapy (e.g., HER2 inhibitors), immunotherapy, bone-targeted therapy, and participation in clinical trials. Multidisciplinary care tailored to individual tumor characteristics ensures optimal outcomes (S *et al*., 2018; T.A. *et al*., 2018; G.N. *et al*., 2010).

Results

Global scenario of breast cancer in 2022

According to GLOBOCAN 2022, breast cancer remains a major global health burden, with 2,296,840 new cases, making it the second most common cancer worldwide and the leading cancer among women, accounting for 23.8% of all female cancer cases. The age-standardized incidence rate (ASIR) for breast cancer was 46.8 per 100,000, while its age-standardized mortality rate (ASMR) was 12.7 per 100,000, with a total of 666,103 deaths, ranking fourth among all cancers globally. Among the top five cancers in 2022, lung cancer led with 2,480,675 cases (12.4%), followed by breast cancer (11.5%), colorectal (9.6%), prostate (7.3%), and stomach cancer (4.8%), while other cancers accounted for 54.2% of cases. Breast cancer incidence varied geographically, with Asia reporting the highest number of cases (985,817, 42.9%), followed by Europe (567,532, 24.3%), North America (306,307, 13.3%), Latin America and the Caribbean (220,124, 9.6%), Africa (198,553, 8.6%), and Oceania (28,507, 1.2%). Mortality showed a similar distribution, with Asia accounting for 315,309 deaths (47.3%), Europe 144,439 (21.7%), Africa 91,252 (13.0%), Latin America and the Caribbean 59,876 (9.0%), North America 49,744 (7.5%), and Oceania 5,483 (0.8%). These findings underscore the significant global burden of breast cancer, particularly in Asia and Europe, highlighting the need for targeted prevention, early detection, and treatment strategies.

Table 2 : Age wise ASR(World Mortality of Breast Cancer)

Table 2 shows breast cancer mortality rate globally according to different age groups -Age standardized mortality rate was (12.7%) in both sexes across all age groups.

Age group	number of cases	ASMR	Crude rare	cumulative risk
0-19	428	0.03	0.03	0
20-29	7036	1.2	1.2	0.01
30-39	41236	7.3	7.3	0.07
40-49	92680	19.2	19.1	0.19
50-59	140949	32.3	32.4	0.33
60-69	146504	46.6	46.8	0.47
70-79	123541	64.6	65.6	0.67
80-85+	113729	114.8	114.4	1.2
Total	666102	12.7	17	1.4

(Source : GLOBOCAN 2022)

A total of 666102 deaths occurred due to breast cancer. Table 2 shows that highest ASMR (114.8) is in 80 - 85 age group while highest number of death cases (146504) were recorded in 60 -69 age group. 57.6% of deaths due to breast cancer occurred in people over the age of 60.Globally, 11.5 percent of all cancer cases are reported as breast cancer, while the most common cancer type at 12.4 percent is lung cancer, and colorectal cancer ranks third at 9.6 percent. The cumulative risk of these cancers is 2.9, 5.1 and 2.1, respectively

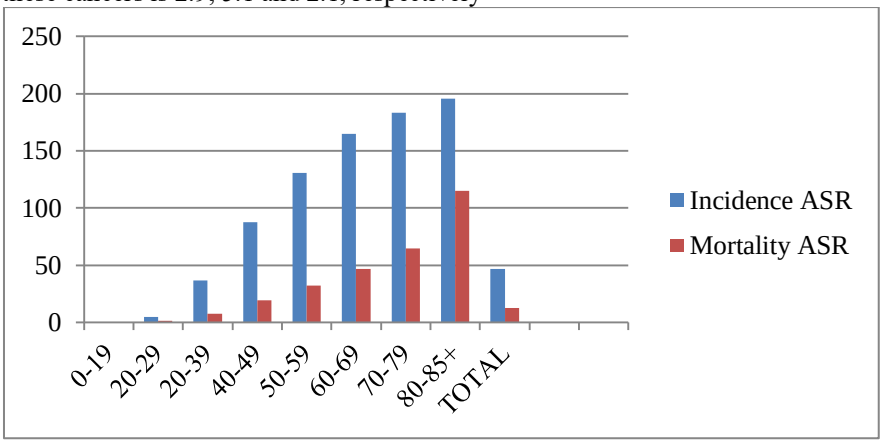

Figure 1:World ASIR and ASMR of Breast cancer 2022 (Age group) wise

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Figure 1 shows that breast cancer contributes the highest incidence and mortality across different age groups, with ASIR and ASMR values as follows: 20–29 years (ASIR 4.6, ASMR 1.2), 30–39 years (ASIR 36.4, ASMR 7.4), 40–49 years (ASIR 87.6, ASMR 19.2), 50–59 years (ASIR 130.7, ASMR 32.3), 60–69 years (ASIR 165.1, ASMR 46.6), 70–79 years (ASIR 183.5, ASMR 64.6), and 80–85+ years (ASIR 195.6, ASMR 114.8). Across all age groups, the overall ASIR of breast cancer was 46.8 cases per 100,000 people per year, with an ASMR of 12.7 (figure 1).

Table 3. Top 5 Countries with the Highest Breast Cancer Incidence, According to GLOBOCAN 2022."

S.NO	Countries	Incidence (0-85+ Age group)
1	China	357161
2.	USA	274375
3.	India	192020
4.	Brazil	94728
5.	Japan	91916

Breast cancer incidence Top 5 Leading countries
Source: Globocan 2022

According to GLOBOCAN 2022 data**,** China recorded the highest number of breast cancer cases (357,161), followed by the United States (274,375). India ranks third with 192,020 cases, while Brazil and Japan occupy the fourth and fifth positions with 94,728 and 91,916 cases, respectively. (Table 3) This data indicates that breast cancer is a major global health concern, particularly in large and highly populated countries.

Table 4. Top 5 Countries with the Highest Breast Cancer Mortality, According to GLOBOCAN 2022."

S.NO	Countries	Mortality (0-85+ Age group)
1	India	98337
2.	China	74986
3.	USA	42900
4.	Indonesia	22598
5.	Brazil	22189

The table 4 *"Top 5 Countries in Breast Cancer Mortality, GLOBOCAN 2022"* shows that India has the highest deaths (98,337), followed by China (74,986), USA (42,900), Indonesia (22,598), and Brazil (22,189). This highlights that breast cancer mortality is a major concern, especially in developing countries.

Breast Cancer Burden in Asia

According to GLOBOCAN 2022, Asia accounts for 49.2% of all new global cancer cases**,** with a mortality rate of 56.1% and a 5-year prevalence of 43.8%**,** the highest among all continents. In 2022, Asia reported 9.82 million new cases and 5.46 million deaths**,** with an estimated 23.42 million 5-year prevalent cases**.** The top three cancers in Asia are lung (1,566,355; 15.9%)**,** breast (985,817; 10%)**,** and colorectal cancer (966,399; 9.8%)**,** prevalent across all age groups and both sexes. In women, breast cancer (985,817; 20.8%) ranks first, followed by lung (11.6%) and thyroid cancer (9.3%)**.** The age-standardized incidence rate for both sexes is 164.4 per 100,000**,** with a cumulative risk of developing cancer before age 75 of 16.9%**.** The age-standardized mortality rate **is** 88 per 100,000**,** with a cumulative risk of dying from cancer before age 75 of 9.3%**.**

Table 5: Asian breast cancer Incidence and Morality ,Both sexes and age group wise 2022

AGE GROUP	BREAST CANCER INCIDENCE	BREAST CANCER MORTALITY
0-19	309	367
20-29	18180	2644
30-39	102038	20194
40-49	219746	50528
50-59	285674	80986
60-59	204047	74811
70-79	108333	51143
80-85+	47636	34636
TOTAL	985817	315309

Table 5 Analysis of the data indicates a significant association between age and breast cancer incidence and mortality in Asia. 98% (967,474) of the total 985,817 cases occurred in individuals aged 30–85 years**,** with 32% (321,784) in the 30–50 age group, 49% (489,721) in 50–70**,** and 15.8% (155,969) in 70–85**.** Mortality followed a similar pattern: 22.4%

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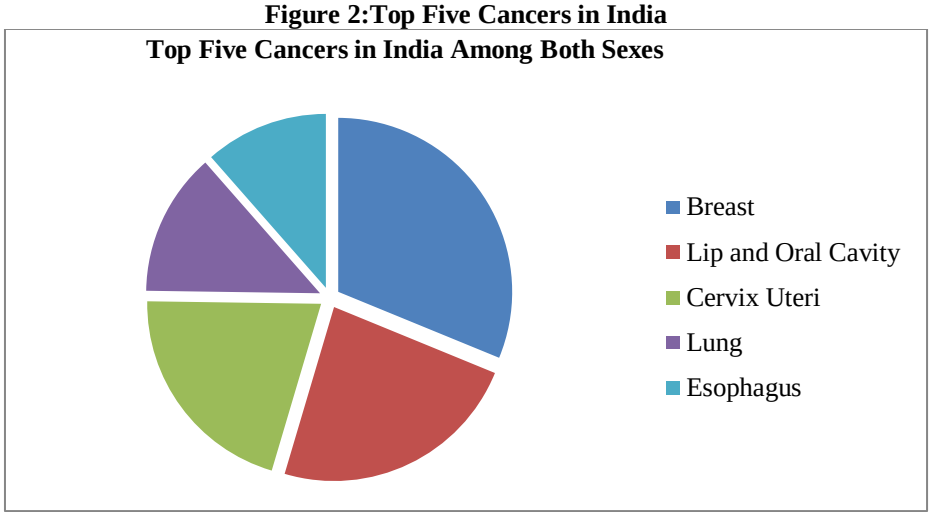
(70,722) of deaths occurred in the 30–50 age group, 49.4% in 50–70, and 27.2% (85,779) in 70–85, showing that the highest number of deaths occurred among those aged 50–70.

Breast Cancer in India

According to GLOBOCAN 2022, India reported 1.41 million new cancer cases, with an estimated 916,828 annual deaths and 3,258,518 five-year prevalent cases. Among all cancers, the top five in both sexes were breast (13.6%), lip and oral cavity (10.2%), cervix uteri (9%), lung (5.8%), and esophagus (5%). Breast cancer ranks first in incidence and mortality in India, making it the most prevalent cancer. In 2022, 192,020 new breast cancer cases (13.6%) were diagnosed in both sexes, while in women it accounted for 26.6% of all cancer cases. The age-standardized incidence rate (ASIR) for Indian women was 26.6 per 100,000, with a cumulative risk of 2.9%, and a crude rate of 28.4. Breast cancer also caused the highest number of deaths (98,337; 10.7%), with a cumulative risk of 1.6%, crude mortality rate of 14.6, and age-standardized mortality rate (ASMR) of 13.7 per 100,000.

Figure 2:Top Five Cancers in India



(Source: GLOBOCAN 2022)

Table – 6. Breast cancer incidence and mortality of India 2022

AGE GROUP	BREAST CANCER INCIDENCE	BREAST CANCER MORTALITY
0-19	47	21
20-29	4090	1170
30-39	21762	6511
40-49	42454	16392
50-59	51548	24844
60-69	42486	25771
70-79	21820	16325
80-85+	7813	7303
Total	192020	98337

(Source: GLOBOCAN 2022)

Analysis of age-specific breast cancer incidence in India Table 6 shows that the highest number of new cases (26.8%; 51,548) occurred in the 50–59 age group, followed by 22.1% (42,486) in 60–69, 22.1% (42,454) in 40–49, 11.3% (21,820) in 70–79, 11.3% (21,762) in 30–39, and 4% (7,813) in 80–85+ years. In terms of rates, the highest age-standardized incidence rate (ASIR) and crude rate (97.8) were observed in the 70–79 age group, followed by 96.6 in 80–85, 93.4 in 60–69, 78.6 in 50–59, and approximately 50 in 40–50. The average ASIR and crude rate for India were 26.6 and 28.4, respectively.

Age-wise mortality shows that 26.2% (25,771) of deaths occurred in 60–69, 25.3% (24,844) in 50–59, 16.6% (16,325) in 70–79, and 16.6% (16,362) in 40–49. The highest number of deaths was recorded in the 60–69 age group, whereas the highest ASMR (91.4), crude rate (90.5), and cumulative risk (1.2%) were observed in 80–85+, followed by 70–79 (ASMR 72.8, crude rate 73.2, cumulative risk 0.74%) and 60–69 (ASMR 56.5, crude rate 56.7, cumulative risk 0.57%).

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Table : 7 Top 5 Cancers (Incidence) According to GLOBOCAN 2022

S.NO.	World	Asia	China	India
1.	Lung	Lung	Lung,	Breast
2.	Breast	Breast	Breast	Lip& Cavity Oral
3.	Colorectal	Colorectal	Thyroid	Cervix Uteri
4.	Prostate	Stomach	Colorectal	Lung
5.	Stomach	Liver	Liver	Esophagus

(Source: GLOBOCAN 2022)

In Western countries and Asia, cancers linked to pollution and lifestyle factors are more dominant, whereas in India, tobacco-related and infection-driven cancers are more common. In China, cancers such as lung, colorectal, and liver are rising rapidly, influenced by industrialization and environmental risks. The overall cancer pattern in India is determined by socio-economic inequality, urban–rural population differences, limited access to healthcare services, and inadequate public health resources. According to GLOBOCAN, India needs major improvements not only in cancer treatment but also in prevention, screening, and awareness. In the context of women, GLOBOCAN 2022 shows that breast cancer is the most common cancer globally, while in Asia, breast cancer along with
cervical and thyroid cancers carries a relatively higher burden. In India, breast and cervical cancers are highly prevalent among women and are often detected at late stages, which increases mortality. Overall, while the global cancer pattern is influenced mainly by lifestyle factors, in Asia—and especially in India—limited screening, low awareness, and insufficient healthcare facilities make the cancer situation far more complex.

Discussion

This review examined the age-wise incidence and mortality of breast cancer in 2022 across global, Asian, and Indian populations, highlighting its significance as a major public health concern. Globally and in Asia, breast cancer remains the second most common cancer, whereas India reports the highest mortality rate and ranks third in incidence. The analysis also considered key risk factors, diagnostic methods, lifestyle influences in Central India, and preventive strategies, providing a comprehensive overview of the disease burden. The 50–59 age group exhibited the highest incidence and mortality across all populations, while the 80–85+ age group showed the highest age-standardized incidence (ASIR) and mortality rates (ASMR). Similarly, crude rates were highest among individuals over 70 years. These findings suggest that while middle-aged populations experience the highest number of cases and deaths, older populations bear a disproportionately higher risk when adjusted for age. Globally, China, the United States, India, Brazil, and Japan report the highest incidence, whereas India, China, the United States, Indonesia, and Brazil have the highest mortality. China leads in incidence with 357,161 cases but ranks second in deaths, accounting for 20% (74,986) of global breast cancer mortality. In contrast, India, although third in incidence, records the highest mortality, accounting for 51.2% (98,337) of deaths. The United States, Brazil, and Japan account for 27.3%, 23.4%, and 19% of deaths, respectively (GLOBOCAN 2022). The elevated mortality in India compared to Western countries may be attributed to early onset of the disease, delayed diagnosis at advanced stages, late initiation of treatment, and fragmented or inadequate healthcare access (Mehrotra et al., 2022). These factors underline the urgent need for improved awareness, early detection programs, and timely treatment strategies. The 2022 World Cancer Report reinforces that early diagnosis and prompt intervention are pivotal in reducing breast cancer mortality.

Overall, the data highlight significant regional differences in incidence and mortality, emphasizing that targeted interventions and health policies tailored to high-risk populations are essential to mitigate the growing burden of breast cancer, particularly in India.

Conclusion

This review highlights the age-wise incidence and mortality of breast cancer in 2022 across global, Asian, and Indian populations. Breast cancer remains a major global health challenge, being the second most common cancer worldwide and in Asia. India ranks third in incidence but has the highest breast cancer mortality globally. While the 50–59 age group shows the highest incidence and mortality, the 80–85+ age group exhibits the highest age-standardized incidence and mortality rates (ASIR and ASMR). The higher mortality in India is attributed to early onset, late-stage diagnosis, delayed treatment, and inadequate healthcare infrastructure. These findings underscore the urgent need for early detection, timely intervention, and effective preventive strategies to reduce the breast cancer burden, particularly in high-risk populations.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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Author Contribution
Kanti Nage, Research Scholar, and Dr. Dhananjay Tandon, Assistant Professor, Department of Applied Science, Shri Rawatpura Sarkar University, Raipur (C.G.), have jointly reviewed and approved the final version of the manuscript for publication.

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