Modifiable Risk Factors For Breast And Cervical Cancer And Their Association With Sample Characteristics

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Abstract

A. Background: *By 2030, the global cancer burden is expected to nearly double, growing to 21.4 million cases and 13.2 million deaths. It may be the result of demographic changes (a growing and aging population) compounded by adopting unhealthy lifestyles and behaviors related to economic development.Objectives:1)To assess the modifiable risk factors for breast & cervical cancer 2)To identify the association of modifiable risk factors with selected sample characteristics. Methods: Using a purposive sampling technique, a pre-tested and structured interview schedule was administered to 426 women in gynae O.P.D. of Lok Nayak Hospital. Results: 86.85% of study subjects were in the modifiable risk factor score category, and most of them were in the illiterate and primary educated group. Age, education, employment, occupation, and income were significantly associated with modifiable risk factor scores. Conclusion: Moderate modifiable risk factors appeared to influence women's risk status for breast and cervical cancer in this study.*

Keywords*: Modifiable risk factors, diet, exercise, stress, personal habits, environmental conditions.*

I. INTRODUCTION

Cancer is a group of diseases characterized by uncontrolled cellular growth with local tissue invasion and systematic metastasis. Cancer represents more than 100 types of malignant tumors that can occur in individuals of all ages, gender, races, and ethnic and socioeconomic groups. No one is exempt from the potential for developing cancer. The physical effects can be as minimal as the excision of a small basal cell cancer of the skin, which leaves a minimal scar. On the other extreme, cancer treatment can be mutilating and disfiguring, with devastating physical appearance changes and function[1].

Age is the most outstanding risk factor for cancer. Cancer incidence increases with age. Tobacco is a major cause of cancer-related deaths. Excessive alcohol intake is associated with cancers of the mouth, throat, esophagus, and liver, especially when combined with smoking. Exposure to carcinogens, such as asbestos, benzene, and radiation, increases the risk of developing certain cancer types. Solar ultraviolet radiation increases the risk of skin cancers. There is a hereditary predisposition to specific forms of cancers that have been linked to certain events within genes like BRCA1 and BRCA2 in breast cancer and MSH2 in colon cancer. Infections and viruses are associated with an increased risk of certain forms of cancer like human papillomavirus (HPV) with cervical cancer and tonsillar cancer, cytomegalovirus with Kaposi's sarcoma, and colon cancer. Dietary choices and physical activity are the most important modifiable risks of cancer[2].

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A. Global cancer burden

Forouzanfar MH, Foreman KJ, Delossantos AM, Lozano R, Lopez AD, Murray CJL, et al. revealed that the number of cases and deaths from breast and cervical cancer are rising in most countries, especially in the developing world where more women are dying at younger ages. In 2010, 425,000 women died from breast cancer, of which 68,000 were between the ages of 15 and 49 in developing countries. New cervical cancer cases occurred more often in developing countries than in developed countries in all age groups[3].

In 2012, there were 14.1 million new cancer cases, 8.2 million cancer deaths, and 32.6 million people living with cancer (within 5 years of diagnosis) worldwide. Eight million (57%) new cancer cases, 5.3 million (65%) cancer deaths, and 15.6 million (48%) 5-year prevalent cancer cases occurred in the less developed regions. The 5 most common cancer cases among men were lung, prostate, colorectal, stomach, and liver. Among women, the 5 most common sites diagnosed were breast, colorectal, cervix, lung, and corpus uteri cancer[4].

Cancer was the second leading cause of death globally, responsible for 8.8 million deaths in 2015. Globally, nearly 1 in 6 deaths was due to cancer. Approximately 70% of deaths from cancer occurred in low- and middle-income countries[5].

By 2030, the global cancer burden is expected to nearly double, growing to 21.4 million cases and 13.2 million deaths[4]. And while that increase is the result of demographic changes (a growing and aging population), it may be compounded by adopting unhealthy lifestyles and behaviors related to economic development, such as smoking, poor diet, and physical inactivity [5,6].

B. The burden of cancer in India

Dsouza N, Murthy N S, and Aras R revealed that the proportion of the Indian population in the age above 40 years (which is more prone to cancer) would increase from 28% in 2011 to 35.7% in 2026. The estimates of cancer incidence would increase to 1.87 million by the year 2026. New cancer cases in females are higher as compared to males at all periods. Further estimation of new cancer cases by major states of India reveals that the burden is very high in those states which are highly populous. Nearly 41.3 percent of cancers seen in Indian females are accounted for by cancer of the breast and cervix alone. The estimates of breast cancer incidence would increase from 153,297 cases to 235,490 cases from 2011 to 2026. Similarly, cancer of cervix cases would rise from 96,156 cases to 148,813 cases [7]. Though, because of India's population, the percentage of total women affected appears less. India's breast and cervical cancer burden is much more than in developed countries and is steadily rising.

C. Cancer of the breast in Indian women

Breast cancer is the malignant neoplasm of breast tissues. 70% of women have no major risk factors other than gender and age. The other risk factors of breast cancer include family history and personal history of breast cancer, genetic factors, prolonged estrogen exposure, early menarche (age <12 years), late menopause (age >55 years), nulliparity, first full-term pregnancy after the age of 30 years, obesity, high fat diet, excessive alcohol consumption and repeated exposure to ionizing radiations at younger age [1,8].

Initially, breast cancer typically appears unilateral, single mass, or thickening, usually in the breast's upper outer quadrant. The mass is usually painless, non-tender, hard, irregular in shape, and immobile. The other clinical manifestations like skin or nipple retraction, nipple discharge, and peu d' orange appearance (orange peel) of the skin reflect advanced disease [1, 8].

Agarwal G and Ramakant P found that, in general, breast cancer has been reported to occur a decade earlier in Indian patients compared to their western counterparts[14]. Similar findings were revealed by Agarwal G, Pradeep P V, Aggarwal V, et al. [9].

D. Cancer of the uterine cervix

Neoplastic disease of the uterine cervix is known as cervical cancer. The risk factors for cervical cancer include human papillomavirus(HPV) infection, cigarette smoking, low socioeconomic status, first sexual intercourse before the age of 16 years, multiple sexual partners, history of sexually transmitted diseases, high-risk male partner, compromised immunity, HIV infection, early age at first pregnancy and multiparity [1,10].

Cervical cancer is asymptomatic in the early stages. As the disease progresses, women may experience vaginal discharge and bloody spotting (especially after intercourse). With advanced disease, foul-smelling discharge, pain in the flank, lower back, and abdomen, weight loss, leg edema, dysuria, rectal bleeding, anorexia, and anemia may occur [1,10].

Dinshaw KA, Shastri SS, and Patil SS emphasized that prevention should be the key element in any disease control program. Prevention means eliminating or minimizing exposure to the causes of cancer and includes reducing individual susceptibility to the effect of such causes. This approach offers the greatest public health potential and the most cost-effective long-term method of cancer control. Tobacco is the single leading cause of cancer worldwide, and in the fight against cancer, every country should give the highest priority to tobacco control. Educating people regarding the disease will help to drive away the fears and stigma associated with the disease. It is important to involve all levels of the population in the educational process. The contents of cancer education should focus on tobacco control, physical activity and avoidance of obesity, healthy dietary practices, reducing occupational and environmental occupational exposures, reducing alcohol use, immunization against hepatitis B virus, safe sexual practices to avoid human papillomavirus infection[11].

Tsu VD, Jeronmo J, and Anderson B O discuss that much attention has been paid to women in their teens and twenties because of the risks associated with sexuality and pregnancy – namely, infection with the human immunodeficiency virus (HIV) and other sexually transmitted infections, unwanted pregnancy and associated unsafe abortion, and obstetric complications. Governments and doctors have focused much less attention on how these earlier life experiences affect women's health when they reach their thirties, forties, and fifties – those ill-defined middle years between youth and old age.

The causes of breast and cervical cancer are related. However, the same reproductive factors that protect against one form of cancer increase the other form's risk. Women who have early and frequent pregnancies and who breastfeed their children have a lower risk of getting breast cancer but are at increased risk of developing cervical cancer. The time is right to focus on breast and cervical cancer and support critical interventions to reduce the incidence of these two diseases and their case-fatality rates[33].

Nurses, as professionals, can be proactive in promoting primary prevention by individual efforts. Also, as Individuals, nurses can practice cancer prevention measures for themselves and their families.

Juneja A, Sehgal A, Mitra A B, and Pandey A discussed the need to develop alternative approaches based on risk reduction modalities. They emphasized health education, behavioral interventions, legislative approaches, and modifying the health care-seeking behavior[13].

It is evident from the literature review above that there is a dire need to assess the modifiable risk factors present in Indian women to find out why we are unable to control cancer incidences. This leads to increased morbidity and mortality in women from breast and cervical cancer, reducing their overall survival. By assessing the presence of modifiable risk factors in Indian women, we can achieve our primary prevention goal and examine the

association of the modifiable risk factors with sample characteristics, which increases the risk status of women for breast and cervical cancer. Therefore the investigator planned to conduct this study, a part of a Ph.D. study, to assess modifiable risk factors for breast and cervical cancer in women and its association with the selected sample characteristics.

Conceptual framework of the study -This study's conceptual framework is based on Health Belief Model by Rosentock (1974) & Becker & Mauman (1975), which addresses the relationship between a person's belief and behavior. It is a way of understanding and predicting how clients will behave in relation to their health and how they will comply with health care policies.

II. MATERIAL AND METHODS

A. Research Approach - Quantitative research approach is used.

B. Research Design - Exploratory & descriptive survey design has been used to identify, explore, and describe the existing phenomenon and its related factors.

C. Variables in the study
1. **Independent variables-** Selected sample characteristics (age, education, marital status, religion, employment, occupation, family income, own income, and type of family and food habits)

2. **Dependent variable- Modifiable risk factors** in women

D. Setting for the study – Gynae outpatient department (O.P.D.) of Lok Nayak Hospital of Delhi **Sampling technique and sample size -** The study's sample size was 426 Women who meet the laid criteria, using a purposive sampling technique.

E. Inclusion criteria –
    i. Women who are attending Gynae O.P.D for the first time (new registrations).

    ii. Women who are married and have an intact uterus.

    iii. Women in the age group of 20- 60 years of age.

F. Exclusion criteria –
  i. Diagnosed cases of carcinoma breast and cervix, women with a prolapsed uterus who have undergone hysterectomy, women on treatment for infertility, and pregnant women.
  ii. Unmarried women
  iii. Women who are menstruating/cases of bleeding per vagina.
  iv. Women who are not interested in participating in the study.

G. Description of the tools - Interview Schedule, developed by the investigator, was used for data collection, which consisted of the following parts:
- Sample characteristics contain items on age, education, religion, marital status, occupation, income, menstrual history, obstetrical history, type of family, and type of diet(13 items with subheadings).

- **The questionnaire on modifiable risk factors** included diet, physical activity, personal habits, exposure to smoke, and reproductive tract infections. There were a total of 22 items.

- **Scoring of the Questionnaire on modifiable risk factors**

  ✓ Modifiable risk factors were measured on a three-point scale (always, sometimes, never) and consisted of both positive (good health behaviors) and negative statements(bad health behaviors)

  ✓ Positive statements were scored as; always =0, sometimes = 1 and never =2, and negative statements were scored as : always =2, sometimes = 1 and never =0.

  ✓ Thus higher the risk factors scores more are the modifiable risk factors. The maximum score was **58**.

  ✓ The investigator divided modifiable risk factor scores into three categories to represent low, moderate, and high-risk factors.

H. The tool's content validity and reliability -The interview schedule's content validity were established by giving the tool to 13 experts in nursing, community medicine, oncology, and gynecology. Cronbach's alpha value for the reliability of the tool was 0.714. A Hindi translation of the tool was prepared, which was validated by a bi-lingual expert.

I. Procedure for data collection -After ethical clearance from the Institutional Ethics Committee and permission from hospital authorities, three days, i.e., Tuesday, Wednesday, and Friday, were selected for data collection. On average, 4- 5 patients fulfilling the inclusion criteria were enrolled for data collection per day. Time taken to collect data was 20-25 minutes per patient. Data collection was started in February 2015 and continued till August 2015. A total of 431 patients have enrolled in the study, out of which 5 patients left the study without completing it. Final data collection was done on 426 patients.

III. RESULTS
A. Sample characteristics
The demographic data revealed that the maximum number of the study subjects were aged between 30-39 years (33.8%) and illiterate (33.57%), followed by education up to 5th class were (19.95%). The majority of study subjects

were married and living with husbands (96.71%). About 56.34% of study subjects were Hindu, followed by Muslims (41.78%) by religion. The employment status of study subjects depicts that the majority of them (87.32%) were unemployed housewives. Only 54 (12.68%) study subjects were employed. Out of the employed study subjects, the maximum number, i.e., 22 (40.74%), were in private jobs. The monthly income of the majority of employed study subjects (40.38%) was up to Rs.5000. The monthly family income of most of the study subjects (41.31%) was Rs.5001-10000.

An almost equal number of study subjects were living in a joint family (50%) and the nuclear family (48.83%), and most of the study subjects were non-vegetarian(59.62%). The place of residence of the maximum number of study subjects (80%) was Delhi. 20% of the study subjects were from outside the Delhi region.

B. Frequency and percentage-wise distribution of modifiable risk factors

majority of study subjects (80.05%) sometimes consumed shallow/deep-fried food items followed by sweets/cake/pastry etc. (59.16%), ghee/butter/cream etc. (45.31%), fruits (63.14%), green leafy vegetables (58.45%), dry fruits (53.52%), milk/curd (50.47%), meat/eggs/daal/ cheese/fish(59.99%) and white bread/bun/burger/pizza (49.53%). As many as 50.70% sometimes reused oil for frying again and again. It is interpreted from the data that consumption of fried and sweet food items is high. A maximum number of study subjects (58.45%) expressed that they never ate overcooked or burned meat, followed by 33.80% who ate it sometimes. The majority of the study subjects (47.18%) sometimes consumed tea/coffee three times or more per day. With regard to an exercise regimen and activity level, only 18.78% always spent their day while sitting. A maximum number of study subjects walked for 30 minutes daily (49.30%). As many as 48.59% never did yoga or any exercises. Regarding the personal habits of study subjects, the majority of them (69.72%) never sat in morning sunlight for at least15 minutes and reported to be always stressed (44.84%). Though as many as 45.07% always used cosmetics, most of the study subjects (94.60%,98.59%, 96.48%, and 98.59%, respectively) never consumed tobacco, alcohol, and paan masala and never smoked.

It is alarming to observe that a small number of study subjects (3.99%, 0.47%, 2.11%, and 1.64%, respectively) regularly consumed tobacco, alcohol, paan masala, and regularly smoked. Stress and lack of exposure to morning sunlight are also health deterrent.

As many as 52.82% sometimes used indigenous cure for gynae problems. The majority of study subjects (54.46%) never used a condom during sexual intercourse.

It is noteworthy that only 18.08% of study subjects made sure that condoms are always used during intercourse, and 30.75% of study subjects never used sanitary pads during menstruation, followed by 28.64% who used sanitary pads sometimes.

With respect to exposure to smoke, the maximum number of study subjects (37.56% and 44.13%, respectively) were coming in contact with smoke from passive smoking/burning of chulha and burning of trash/ factories/ vehicles sometimes. Most of the study subjects (40.85%) sometimes suffered from boils/warts/infections/ inflammation/foul-smelling watery discharge in reproductive tract organs.

C. Category wise modifiable risk factors scores

Findings revealed that the majority of study subjects (86.85%) were in the moderate risk category. Only 13.15%of study subjects were in the low modifiable risk factors category. It is noteworthy that none of the study subjects belonged to the high modifiable risk factors category. The mean elastic risk factor scores (24.23±4.19) were also found to be in the moderated category. This shows that modifiable risk factors need to be reduced to lower the risk status for breast and cervical cancer. The modifiable risk factors scores of study subjects for breast and cervical cancer are summarized in table1.

Table 1: Category wise modifiable risk factors scores

S. No.	Category	Range of Scores	f	%	Mean score and Std. Deviation
1.	Low modifiable risk factors	0-19	56	13.15	24.23 ± 4.191
2.	**Moderate modifiable risk factors**	**20-39**	**370**	**86.85**	
3.	High modifiable risk factors	40-58	Nil	Nil	

(N=426)

Further analysis of data using the Chi-square test revealed that there is a highly significant association of modifiable risk factor scores with age, education, employment status, occupation, family income, own income, and food habits. On the other hand, marital status, religion, and family type were found to have no significant association with modifiable risk factors. The summary of findings is presented in table 2 given below:-

Table 2: Summary of findings of Pearson chi-square test for association of modifiable risk factor scores with selected sample characteristics

s.no.	Variables	Value	Df	P
1.	Age and modifiable risk factors	9.384	3	0.025
2.	Education and modifiable risk factors	21.664	6	0.001
3.	Marital status and modifiable risk factors	7.002	3	0.072
4.	Religion and modifiable risk factors	2.376	4	0.667
5.	Employment status and modifiable risk factors	8.847	1	0.008
6.	Occupation and modifiable risk factors	9.135	3	0.028
7.	Family income and modifiable risk factors	31.017	5	0.000
8.	Own income and modifiable risk factors	16.731	5	0.005
9.	Family type and modifiable risk factors	5.552	2	0.062
10.	Food habits and modifiable risk factors	8.723	2	0.013

IV. DISCUSSION

The majority of study subjects revealed the intake of fat and carbohydrate-rich food items, which seem to be a risk factor for breast cancer. This could be due to a lack of awareness among study subjects and Low purchasing power due to the study subjects' low socioeconomic status.

Park S, Bae J, Nam B H, and Yoo KY also cited the role of high caloric and fat intake in breast cancer [10]. Spector D, Mishel IM, Skinner C S, Deroo L A, Vanriper M, and Sandler D P indicated that many women were unaware of associations between lifestyle behaviors and breast cancer risk. Dietary change was most frequently reported in women with a family history of cancer [14]. Donaldson **MS** revealed that intake of fruits and cruciferous vegetables reduces the risk of cancer [15]. Murphy N, Norat T, Ferrari P, et al. also found the role of dietary fibers in reducing the risk of colorectal cancer [16]. Centre for science and environment(India) detected Potassium bromate or iodate (classified as a possible carcinogen by WHO) in samples of pre-packaged bread, pav, and buns, ready to eat burger bread, and ready to eat pizza from all big companies during May to June 2015 [17]. Thus findings of the present study are in coherence with the findings mentioned above.

The majority of study subjects also reused oil for frying again and again sometimes. This may be a risk factor for cancer. Studies by Greger M[18] and American cancer soiety[19] also pointed out that deep-frying increases the risk of various cancers.

A maximum number of study subjects expressed that they never ate overcooked or burned meat. The majority of study subjects sometimes consumed tea/coffee three times or more/day. Findings revealed that eating burnt meat and excess intake of tea/coffee may be a risk factor among most study subjects. Kamath R, Mahajan KS, Ashok L, and Sanal T S revealed that a non-vegetarian diet was an important risk factor (OR 2.80, CI 1.15-6.81)[20]. In contrast, Murphy N, Norat T, Ferrari P, Jenab M, Bueno-de-Mesquita B, Skeie G, et al. identified the significant role of high dietary fiber intake colorectal cancer prevention[16].

It is also noteworthy that study subjects lead sedentary lives, which may be a risk factor for lifestyle diseases. These findings are substantiated by Lemanne D, Cassileth B R, and Gubili J, who indicated that cancer incidence decreases with increasing physical activity levels [21]. Further study by Steindorf K pointed out that exercise has a strong potential for primary prevention of cancer as modifiable health behavior. Current recommendations call for at least 30–60 min of moderate to vigorous activity daily[22].

Regarding personal habits of study subjects, the majority of them never sat in morning sunlight for at least15 minutes and reported to be always stressed. Findings revealed that lack of sun exposure and stress might be risk factors for lifestyle-related diseases. These results are substantiated by Holick M F[23] and Garland CF, Gorham E D, Mohr S B et al. .24, who revealed that exposure to sunlight produces vitamin D in the body. Lack of vitamin D may predispose people to various lifestyle diseases, including cancer. Holick M F [23] recommends sensible sun

exposure for 5-10 minutes of arms, legs, hands, and face, 2-3 times/week prevent vitamin D sufficiency. In contrast, Garland CF, Gorham E D, Mohr S B et al. pointed out very moderate exposure to sunlight, about 12 minutes/day in the sun, could raise serum 25(OH)D to 52 ng/ml, and reduction in the incidence of breast cancer [24]. Lemone P, Burke K[25] and Tiwari A, Kishore J, Tiwari A[26] also revealed that continuous and unmanaged stress is responsible for the depression of the immune system, and women who reported being stressed in their lives had a higher number of abnormal smears as compared to women who claimed to lead a stress-free life, respectively.

Though most study subjects always used cosmetics, most of them never consumed tobacco and alcohol, never smoked, and never used paan masala. Findings revealed that though habits of abstinence from smoking and alcohol by the majority of study subjects may be due to due to cultural factors which lead to health promotion yet it is alarming to observe that a small number of study subjects regularly consumed tobacco and alcohol, regularly smoked, and used paan masala adequate attention. According to American cancer society [19], little is known about the health effects of long-term exposure to many cosmetics ingredients, whereas Hussein E S, Muret P, Berard M et al. .[27] revealed that parabens found in some cosmetics might cause skin toxicity. Various studies by Dinshaw KA, Shastri SS, Patil SS[11], Goodman A [28], Mathur M R, Singh A, Dhillon PK et al. .[29], and Reynolds P, Hurley S, Goldberg D Eet.al.[30] also revealed the association of cancer with tobacco, smoking, and alcohol intake. A study by Key J, Hodgson S, and Omar R Z concluded that the association between alcohol and breast cancer might be causal[31]. Park S, Bae J, Nam B H, Yoo KY also revealed that smoking, betel nut chewing, tobacco smoking, and heavy alcohol intake are risk factors for cancer [10].

Lack of menstrual hygiene and hesitancy in using condoms may be risk factors for cervical cancer for the present study subjects. This could have been due to a lack of awareness among study subjects about risk factors of reproductive tract infections, which focuses on creating awareness about the importance of menstrual and sexual hygiene among study subjects. Habits of not using condoms also need to be addressed. The following studies support the findings:
Juneja A, Sehgal A, Mitra A B[13], Tiwari A, Kishore J, Tiwari A[26], and Thakur A, Gupta B, Gupta A et al. .[32] also found unprotected sex and poor genital hygienic practices as a risk factor for cervical cancer among the majority of study subjects. Singh S, Badaya S [33] pointed out that the majority of the respondents used clothes instead of sanitary pads. A study by Lam J U H, Rebolj M, Dugue P A et al. .[34] revealed that consistent use of condoms provides good protection from HPV infections and reduces cervical cancer chances.
Exposure to smoke by study subjects in the present study is a risk factor for lung and breast cancer. The studies by Boffetta P support the above results, Nyberg F [35] and Yu ITS, Chiu Y I, Au JSK et al. [36], who also revealed that cooking fumes by frying could increase the risk of lung cancer.

Most of the study subjects also suffered from boils/warts/infections/ inflammation/foul-smelling watery discharge in reproductive tract organs sometimes. Mathur M R reveals similar risk factors for cancer, Singh A, Dhillon PK et al. .[37], Modibbo F I, Dareng E, Bamsisaye P et al. .[38] and World Health Organisation [39].
Findings suggest that common people's compromised living conditions, the habit of smoking by other family members, and gynecological infections among study subjects may be risk factors for cancer.

V. CONCLUSION
Overall modifiable risk factors scores showed that the majority of study subjects were in the moderate modifiable risk factor category. Only a few study subjects were in the low modifiable risk factors category. This may be highlighted that none of the study subjects belonged to the high modifiable risk factors category, which may be due to the study subjects' frugal living conditions. Moderate modifiable risk factors were also significantly associated with age, education, employment, occupation, income, and food habits.

VI. RECOMMENDATIONS
On the whole, the assessment of modifiable risk factors revealed that high carbohydrate and fat-rich diet, sedentary lifestyle, stress, lack of exposure to sunlight, not using sanitary pads during menstruation, lack of personal hygiene, reluctance to use condoms, exposure to smoke by study subjects, the habit of smoking by other members of family and prevalence of reproductive tract infections are the modifiable risk factors present among study subjects which need immediate attention. Therefore, improving the Indian population's living conditions, early detection, and prompt treatment of gynecological diseases are of paramount importance.

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