"RISK FACTORS IN BREAST CANCER AMONG WOMEN ADMITTED IN TERTIARY CARE HOSPITAL - A CASE CONTROL STUDY"

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LIST OF ABBREVIATIONS USED

ANM	–	Axillary nurse midwife
ASHA	–	Accredited social health activist
BCRAT	–	Breast Cancer Risk Assessment Tool
BMI	–	Body Mass Index
BRCA	–	Breast cancer
CI	–	Confidence Interval
CHEK2	–	Check point kinase2
df	–	Degree of freedom
DCIS	–	Ductal carcinoma in situ
ER	–	Estrogen receptor
FGFR2	–	Fibroblast growth factor receptor2
FNAC	–	Fine needle aspiration cytology
HER2/neu	–	Human epidermal growth factor receptor 2
ICD	–	International Classification of Diseases International
IARC	–	Agency for Research on Cancer
IOTF	–	International obesity task force
Kgs	–	Kilograms
MRI	–	Magnetic resonance imaging
NCRP	–	National Cancer Registry Programme
OCPs	–	Oral contraceptive pills

OR	–	Odds Ratio
PBCR	–	Population-based cancer registries
PTEN	–	Phosphatase and tensin
PHC	–	Primary Health Centre
PUC	–	Pre-University College
SD	–	Standard Deviation
TP53	–	Tumor Protien53
SES	–	Socio Economic Status
SPSS	–	Statistical Package for Social Sciences
WHO	–	World Health Organization
χ^2	–	Chi – square

ABSTRACT

INTRODUCTION

Breast cancer is most common malignancy affecting women worldwide. Breast cancer is second most important cancer among Indian women after cervical cancer. There are 2 to 2.5 million cancer cases at any given point of time in India. In Karnataka there are about 1.5 lakh prevalent cases of Breast cancer and 35000 new cases added every year. Present study attempts to find out some of the risk factors of Breast cancer among women admitted in tertiary care hospital in Belagavi.

OBJECTIVE

To know the risk factors in breast cancer among women admitted in tertiary care hospital.

METHODOLOGY

A case control study, conducted from January to December 2015 among women admitted in Dr. Prabhakar kore Tertiary care hospital, Belagavi. A total of 210 participants (42 newly diagnosed breast cancer cases and 168 age matched controls) were included in the study.

Ethical clearance was obtained by J. N. Medical College Institutional Ethics Committee. Written informed consent was obtained from every participant. Data was collected using a predesigned questionnaire. Statistical analysis was done using odd's ratio, χ^2 test, Univariate and Multiple logistic regression analysis to find out the risk factors associated with breast cancer and 'p' value less than 0.05 was considered significant.

RESULTS

Majority i.e. 40.5%, 38.0% and 36.9% of cases, hospital controls and community controls belonged to 41-50 years. 54.7%, 46.4% and 32.1% of cases, hospital and community controls were illiterate respectively. Larger proportion 45.0% of cases 75.0% of hospital controls and 93.0% community controls were housewives, 48.0% cases and 56% of controls belonged to joint families. As regards to socio-economic status, among cases majority i.e. 28.4% belonged to each of class IV and V, among hospital controls 30.9% belonged to each of class III and IV and among community controls 42.8% belonged to class III.

On performing Univariate analysis, the Risk factors such as Religion, lower level of education, Occupation, lower socio-economic status, type of family, age at menopause, age at first child, non-veg diet and BMI $\geq$23kg/m^2 were associated with breast cancer. On performing Multivariate analysis and thereby removing the effect of confounders, the risk factors independently associated with breast cancer were religion, occupation, lower socio-economic status (class IV & V), age at first child <18years and non-vegetarian diet.

CONCLUSION

The risk factors such as lower socio-economic status, religion, lower level of education, occupation, type of family unmarried status of woman, late attainment of menopause, absence of breast feeding, overweight, previous history of benign breast disease, family history of breast cancer were associated with breast cancer.

KEYWORDS: Breast cancer, Risk factors, Case control study.

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INTRODUCTION

Breast Cancer is the most common malignancy affecting women worldwide. The peak occurrence of breast cancer in developed countries is above the age of 50 years, as compared to India, where it occurs in younger age group that is about a decade earlier.[1]

Globally every 3 min a woman is diagnosed with breast cancer, amounting to one million cases annually. According to World Cancer Report the incidence could go up to 1.5 million by 2020. In India and other developing countries, breast carcinoma ranks second only to cervical carcinoma among women. But the incidence of breast cancer is on the rise and may become number one cancer in females in the near future.[2]

Worldwide breast cancer is the 5th most common cause of death (after lung, stomach, liver and colon cancer) [1] with 1 million new cases in the world each year. Breast cancer is commonest malignancy in women and comprises 18% of all female cancers. In United Kingdom incidence among women aged 50 years and above is about 2 per 1000 women per year.[3]

The age-adjusted incidence rates varied between 16 and 25/100,000 populations. At present, India reports around 100,000 new cases annually. According to a study by the International Agency for Research on Cancer (IARC), there will be approximately 250,000 new cases of breast cancer in India by 2015.[2]

Breast Cancer has become one of ten leading causes of death in India. It is estimated that there are nearly 2 to 2.5 million cancer cases at any given point of time

in India. Over 7 to 9 lakh new cases and 3 lakh death occur annually in India due to breast cancer, whereas in Karnataka there are about 1.5 lakh prevalent cases of breast cancer and about 35000 new cases are added to this every year.[4]

Under the National Cancer Registry Programme (NCRP), the Indian Council of Medical Research commenced a network of cancer registries across the country in December 1981.

It consisted of 2 years data (1999-2000) of the 5 urban (Bangalore, Bhopal, Chennai, Delhi, and Mumbai) and 1 rural (Barshi) PBCR (population-based cancer registries). The report released in December 2006 covers: (a) The data of the 6 registries - Bangalore, Bhopal, Chennai, Delhi, Mumbai, and Barshi for the years 2001-2003 (b) The 6 PBCRs (Aizawl District, Dibrugarh District, Kamrup Urban District, Silchar Town, Imphal West District, and Sikkim State) in the North East for the year 2003-2004 (c) Ahmedabad PBCR covering Ahmedabad District (other than Ahmedabad Urban) for the year 2004.

In the PBCR report, among females, breast cancer was the leading site of cancer in all registries, except in Barshi. This was followed by cancer cervix as the second leading site of cancer. In Barshi, the leading site of cancer was cervix uteri constituting 36.8% of all cancers followed by breast.

Hospital - based cancer registries reported more cases of breast cancer than cervical cancer in Mumbai, Dibrugarh, and Thiruvananthapuram and more cases of cervical cancer than breast cancer in Bangalore and Chennai. The increase in the breast cancer cases is mainly being documented in the metropolitan cities; but this data is not totally reliable as many cases in the rural areas go unnoticed.[2]

Geographical variations in incidence and mortality rates of breast cancer suggest that the known risk factors for breast cancer may vary in different parts of the world and that environmental factors are of greater importance than genetic factors. For instance, in Iran it has been shown that, even after adjusting for age, young women are at relatively higher risk for developing breast cancer than are their Western counterparts.[5]

Based on the statistical reports, breast cancer is the fifth cause of death among Iranian women. The age specific mortality rate of breast cancer in Iran is around 25 individuals per 100,000 with 7500 annual incidence of new cases.

Considering the high prevalence of this cancer among women, the factors triggering this cancer have not been well-recognized yet. Regarding the importance of this issue, there has been a wide range of cross-sectional, case control, and cohort studies to identify the role of specific reproductive and hormonal factors, some of them are : oral contraceptive pills (OCPs), age at menarche, age at menopause, abortion (spontaneous or induced), age at first pregnancy, duration of breast feeding, multiparity, regular menses, diet, obesity, inheritance factors, etc., However, the scientists and researchers are not in agreement about the relationship between these factors and breast cancer.

Although many epidemiological studies have been conducted on the risk factors of breast cancer, different results have been reported. Most of these studies reported that there is a relationship between the incidence of breast cancer and the reproductive condition among women and its related issues, including early menses, delayed menopause, nulliparity, giving birth at old age, diet, physical activity and using hormone.

In a study conducted in Switzerland, it was observed that each parity or delivery of live birth reduces the risk of developing breast cancer by 10%. Furthermore, in a cohort study in France, a relationship between no parity and the incidence of breast cancer was reported. In a systematic review of 30 case-control studies, the protective effect of breast feeding against occurrence of breast cancer was shown. Furthermore, it was found that both pregnancy and parity through life time are in fact protective factors against breast cancer.

Based on the results of systematic review and meta-analysis study of 13 cohort studies, significant relationship between the use of OCPs and the risk of breast cancer incidence was not observed. However, in another systematic review and meta-analysis study on the risk factors of breast cancer, it was derived that hormone therapy and use of OCPs increase the risk of breast cancer incidence, whereas breast feeding decreases the breast cancer incidence.[6]

The observation that early motherhood promotes a reduction in Breast Cancer risk indicates that reproductive and hormonal factors play an important role in prevention of this neoplasm. Numerous studies have focused on relationship between reproductive factors and breast cancer risk. Although much is known about knowledge of the risk factors but has not resulted in successful preventive measures. It has been hypothesized that changes occurring during lactation protect women from breast cancer.[7]

For a country like India with a huge population, diverse cultures, geographical variations, diets and habits, sources of information on cancer risk factors are considerably limited. The reasons for varying incidence of breast cancer among women are not fully understood, which are likely to be explained by reproductive and

lifestyle factors such as literacy, diet, age at menarche and menopause, age at first delivery, abortion, family history of breast cancer.

The present study attempts to find out some of the risk factors of Breast Cancer among patients with breast cancer admitted in the tertiary care hospital in Belgaum.[4]

OBJECTIVE

The objective of the present study is:

To know the risk factors in breast cancer among women admitted in tertiary care hospital.

REVIEW OF LITERATURE

Carcinoma of the breast is the most common non-skin malignancy in women. A woman who lives to age 90 has one in eight chance of developing breast cancer. The majority of cancer are estrogen receptor (ER) positive and are characterized by a gene signature dominated by a dozens of genes under the control of estrogen.

Incidence and Epidemiology:

After remaining constant for many years, the incidence of breast cancer began to increase in older women. DCIS (ductal carcinoma in situ) is almost exclusively detected by mammography. From 2001 to 2004, the incidence of ER- positive invasive cancer decreased. Reason for this trend are probably multifactorial. During the same time period incidence of breast cancer for African American women remained stable and the number of ER- negative cancers increased, suggesting that, cancers are not affected by hormonal treatment.

Risk Factors for breast cancer:

The most important risk factor is gender; only 1% of breast cancer cases occur in men. Common risk factors for women identified by epidemiologic studies have been combined into the Breast Cancer Risk Assessment Tool (BCRAT), which now includes information from the Contraceptive and Reproductive experiences study, which provides more accurate information for African American women. The model can be used to calculate the absolute risk of an individual woman developing invasive cancer within the next 5 years or over a lifetime. The BCRAT incorporates the following risk factors.

Age:

The incidence rises throughout a woman's lifetime, peaking at the age of 75–80 years and then declining slightly thereafter. The average age at diagnosis is 61 for white women, 56 for Hispanic women, and 46 for African American women. Only 20% of non-Hispanic white women are diagnosed under the age of 50, compared with 35% of African American women and 31% of Hispanic women. Breast cancer is very rare in all groups before the age of 25. Although carcinoma is uncommon in young women, almost half of these are either ER negative or human epidermal growth factor receptor 2 (HER2/neu) positive, whereas these cancers make up less than a third of cancers in women over the age of 40.

Age at Menarche:

Women who reach menarche when younger than 11 years of age have a 20% increased risk compared with women who are more than 14 years of age at menarche. Late menopause also increases the risk.

Age at First Live Birth:

The risk of breast cancer is halved for women who experience first full-term pregnancy at ages younger than 20 years as compared to nulliparous women or women over the age of 35 at their first birth. It is hypothesized that pregnancy results in terminal differentiation of milk-producing luminal cells, removing them from the potential pool of cancer precursors. This protective effect might be overshadowed in older women by stimulation of proliferation early in pregnancy of cells that have already undergone preneoplastic changes. It is also possible that the changes in stroma that allow the growth and expansion of lobules during pregnancy facilitate the

transition from in situ to invasive carcinoma. These pregnancy-related changes may help explain the transient increase in cancer risk that follows a pregnancy, an effect that is most pronounced in older women. Age at first live birth is not a strong risk factor for African American women.

First-Degree Relatives with Breast Cancer:

The risk of breast cancer increases with the number of affected first-degree relatives (mother, sister, or daughter), especially if the cancer occurred at a young age. However, most women do not have a family history. Only 13% of women with breast cancer have one affected first-degree relative and only 1% have two or more. In turn, over 87% of women with a family history will not develop breast cancer. Most family risk is probably due to the interaction of low-risk susceptibility genes and nongenetic factors.

Atypical Hyperplasia:

A history of prior breast biopsies, especially if revealing atypical hyperplasia, increases the risk of invasive carcinoma. There is a smaller increase in risk associated with proliferative breast changes without atypia.

Race/Ethnicity:

Non-Hispanic white women have the highest rates of breast cancer. The risk of developing an invasive carcinoma within the next 20 years at age 50 is 1 in 15 for this group, 1 in 20 for African Americans, 1 in 26 for Asian/Pacific Islanders, and 1 in 27 for Hispanics. However, women of African or Hispanic ancestry present at a more advanced stage and have an increased mortality rate. Social factors such as decreased access to health care and lower use of mammography may well contribute to these

disparities, but biologic differences also play an important role. African American and Hispanic women tend to develop cancers at a younger age, prior to menopause, that are more likely to be poorly differentiated and ER negative. Mutations in p53 are more common in African American women but less common in Hispanic women, as compared with non-Hispanic white women. It is suspected that variation in breast cancer risk genes across ethnic groups is responsible, at least in part, for these differences. One known example is the incidence of BRCA1 and BRCA2 mutations, which occur at different frequencies in different ethnic groups.

Additional risk factors (listed below) are recognized, but have not been incorporated into the BCRAT model because of their rarity or uncertainties about quantifying the magnitude of risk.

Estrogen Exposure:

Postmenopausal hormone replacement therapy increases the risk of breast cancer 1.2- to 1.7-fold, and adding progesterone increases the risk further. Most excess cancers are ER-positive carcinomas, including invasive lobular carcinomas that tend to be of small size when detected. As a result, any effect on the death rate is expected to be small. After publication of the Women's Health Initiative trial in 2002, the number of postmenopausal women receiving hormone replacement therapy dropped from approximately 17% to 7%, a change that was followed by a substantial drop in ER-positive invasive breast cancers in 2003 and 2004.

Oral contraceptives have not been shown convincingly to affect breast cancer risk but do decrease the risk of endometrial and ovarian carcinomas. Reducing endogenous estrogens by oophorectomy decreases the risk of developing breast

cancer by up to 75%. Drugs that block estrogenic effects (e.g., tamoxifen) or block the formation of estrogen (e.g., aromatase inhibitors) also decrease the risk of ER-positive breast cancer.

Breast Density:

High breast radio density is a strong risk factor for developing cancer. High density is correlated with young age and hormone exposure, and clusters in families. High breast density may be related to less complete involution of lobules at the end of each menstrual cycle, which in turn may increase the number of cells that are potentially susceptible to neoplastic transformation. Dense breasts also make detection of cancer more difficult by mammography. Other modalities, such as MRI, may be helpful in such women.

Radiation Exposure:

Radiation to the chest, whether due to cancer therapy, atomic bomb exposure, or nuclear accidents, results in a higher rate of breast cancer. The risk is greatest with exposure at young age and with high radiation doses. For example, women in their teens and early 20s who received radiation to the chest for Hodgkin lymphoma have a 20% to 30% risk of developing breast cancer over next 10 to 30 years. Recognition of this iatrogenic complication has led to a much more judicious use of radiation therapy in adolescents and young women undergoing cancer treatment. The risks of radiation exposure are substantially lower in women over the age of 25. Current mammographic screening uses low doses of radiation and is unlikely to have an effect on the risk of breast cancer.

Carcinoma of the Contralateral Breast or Endometrium:

Approximately 1% of women with breast cancer develop a second contralateral breast carcinoma per year. The risk is higher for women with germ line mutations in high-risk breast cancer genes such as BRCA1 and BRCA2, who frequently develop multiple cancers. Breast and endometrial carcinomas have several risk factors in common, the most important of which is exposure to prolonged estrogenic stimulation.

Geographic Influence:

Breast cancer incidence rates in the United States and Europe are four to seven times higher than those in other countries. Unfortunately, the rates are rising worldwide, and by 2020 it is estimated that 70% of cases will be in developing countries. The risk of breast cancer increases in immigrants to the United States with each generation. The factors responsible for this increase are of considerable interest because they are likely to include modifiable risk factors. Reproductive history (number and timing of pregnancies), breastfeeding, diet, obesity, physical activity, and environmental factors all probably play a role.

Diet:

Large studies have failed to find strong correlations between breast cancer risk and dietary intake of any specific type of food. Coffee addicts will be pleased to know that caffeine consumption may decrease the risk of breast cancer. On the other hand, moderate or heavy alcohol consumption increases risk. Higher estrogen levels and lower folate levels may underlie this association.

Obesity:

There is decreased risk in obese women younger than 40 years as a result of the association with anovulatory cycles and lower progesterone levels late in the cycle. In contrast, the risk is increased for postmenopausal obese women, which is attributed to the synthesis of estrogens in fat depots.

Exercise:

There is a probable small protective effect for women who are physically active. The decrease in risk is greatest for premenopausal women, women who are not obese, and women who have had full-term pregnancies.

Breastfeeding:

The longer women breastfeed, greater the reduction in risk. Lactation suppresses ovulation and may trigger terminal differentiation of luminal cells. The lower incidence of breast cancer in developing countries largely can be explained by the more frequent and longer nursing of infants.

Environmental Toxins:

There is concern that environmental contaminants, such as organochlorine pesticides, have estrogenic effects on humans. Possible links to breast cancer risk are being investigated intensively, but definitive associations have yet to be made.

Tobacco:

Cigarette smoking has not been clearly associated with breast cancer but is associated with the development of periductal mastitis (subareolar abscess). Breast cancer was the leading cause of cancer deaths in women until the early 1990s, when lung cancer deaths surged ahead. Currently, twice as many women die from lung cancer surely a good reason to avoid tobacco use.

Classification of breast cancer:

A) NON- INVASIVE (IN SITU) CARCNOMA

1) Intraductal carcinoma
2) Lobular carcinoma

B) INVASIVE CARCINOMA

1) Infiltrating (invasive) ductal carcinoma
2) Infiltrating (invasive) lobular carcinoma
3) Medullary carcinoma
4) Colloid (mucinous) carcinoma
5) Papillary carcinoma
6) Tubular carcinoma
7) Adenoid cystic (invasive) carcinoma
8) Secretory(juvenile) carcinoma
9) Inflammatory carcinoma
10) Carcinoma with metaplasia

C) PAGET'S DISEASE OF THE NIPPLE[14]

REVIEW OF STUDIES ON BREAST CANCER:

This study being a case control study was carried out at Indira Gandhi Govt. Medical college Hospital, Nagpur over a period of one year. A Hospital based group matched study was carried out to determine risk factors of Breast Cancer. The study consisted of 105 hospitalized cases confirmed by histopathology and 210 controls selected from urban field area, Sadar, without any malignancy. Cases diagnosed on histopathology as breast cancer for the first time, and were admitted in surgery department were selected for the study. Only incident cases (new) were included in the study. Wards were visited twice weekly and any new case diagnosed on histopathology were included in the study after explaining the objectives of the study to the subject. For each case, two age matched (group matched) controls were selected from the community of urban field practice area, Sadar, by adopting random sampling procedure. Earlier age at menarche $\leq$12 years of age, late age at first full term delivery, nulliparity, lack of breast feeding were found to be significantly associated with the risk of Breast Cancer. Data was analyzed by using SPSS (Version 11.0). Mean, standard deviation, odds ratio with 95% confidence level was applied. Bivariate analysis was carried out using reproductive risk factors and breast cancer. Study suggested that the changes in menstrual and reproductive patterns among women i.e. early age at menarche and late age at first childbirth and some environmental factors in Central India may have contributed to the increase in breast cancer risk, particularly among younger women.[1]

An interview based case-control study was carried out in the wards of Oncosurgery and General Surgery in a tertiary care institute of north India. About 125-150 new patients of breast carcinoma are admitted annually for treatment in the

Department of Oncosurgery in this institute. All the newly diagnosed women with breast cancer admitted in the Oncosurgery ward during 1-year period were taken as study subjects. A total of 128 women, with histopathologically confirmed breast cancer and age matched controls (±2 years) were included in the study with 1:1 ratio. The categorical data were analyzed statistically using Chi-square test and odds ratio (OR) with 95% confidence interval (CI). Continuous variables were analysed using independent *t* test. All the analyses were performed with Statistical Package for Social Sciences (SPSS) version 17. In the present study, risk of carcinoma increased as the age at menopause increased. , History of late marriage and late age at first child birth were the significant risk factors for breast cancer, which are modifiable.[2]

A Hospital based Case control study was conducted at Shirdi Sai Baba Cancer Hospital and Research Centre, Manipal, Udupi District. Total 188 Participants were included in the study, 94 cases and 94 controls who were aged between 25 to 69 years. The cases and controls were matched by ±2 years age range. All type of histopathologically confirmed cases of breast cancer irrespective of their degree, between the age group 25 to 69 years were included in the study as cases and ± 2 years age matched individuals; patients other than breast cancer in the hospital were selected as controls. Patients, who were not willing to participate in study, or those cases who were seriously ill and male breast cancer patients were excluded from the study. Univariate Conditional Logistic Regression analysis was used to evaluate the significant factors associated with breast cancer. Multivariate Analysis was used to calculate the adjusted Odds Ratio with 95% CI. The study suggested that non vegetarian diet was one of the important risk factors (OR 2.80, CI 1.15-6.81). Education of 7 to 12 years of education (OR 4.84 CI 1.51-15.46) had 4.84 times risk of breast cancer as compared with illiterate women.[4]

A case–control study was conducted from April 1997 to April 1998 in Tehran, Iran. The cases were newly diagnosed breast cancer patients living in Tehran, and they were entered into the study if they had a confirmed pathological breast cancer diagnosis Univariate logistic regression analysis was performed to calculate odds ratios (ORs) and to examine the predictive effect of each factor on risk for breast cancer. $P < 0.05$ was considered statistically significant. In all, 286 women with breast cancer (from the total of approximately 300 women who were newly diagnosed as having breast cancer during the study period) and 249 control women were interviewed. The mean ± SD age of cases and controls was 47.5 ± 12.5 years (range 24–81 years) and 44.2 ± 13.3 years (range 23–80 years), respectively. The final model indicated that only marital status (never married: OR 4.24, 95% CI 1.70–10.57 [P = 0.002]; widowed/divorced: OR1.71, 95% CI 1.05–2.68 [P = 0.03]) and family history of breast cancer (positive family history: OR 2.95, 95% CI 1.15–7.59 [P = 0.02]) were significantly associated with breast cancer and nulliparity and older age were not significant risk factors for breast cancer. Cases were more compared to controls.[5]

The present work is a case-control study which was conducted in 2011. In order to conduct the study, 216 women who had been clinically identified with breast cancer were selected from Seiedo-Shohada Hospital, Isfahan, Iran, as the case group. And, 41 healthy women who were the relatives of the selected patients (i.e., sisters and aunts) were selected as the control group. The selected patients had been diagnosed with cancer by the oncology group of the hospital via histopathology diagnosis method. The collected data was analyzed by applying SPSS version 16.0 (SPSS Inc., Chicago, Illinois) software. To compare the quantitative and qualitative variables in both groups, Chi-square and independent samples *t*-tests were applied.

Furthermore, multiple logistic regression method was used to control the confounding factors as well as estimating the risk of breast cancer, by which it means the odds ratio (OR) and 95% confidence interval (CI). Based on the results of the comparative tests, specific variables, including vocation, age, marital status, menopause status, use of OCPs, and hormone therapy had significant relationship ($P < 0.02$) with developing of breast cancer. In the present study, it was concluded that the use of OCPs could be regarded as a protective factor in developing of breast cancer. On the other hand, hormone therapy and late menopause were found to be the risk factors of this cancer.[6]

To investigate the relationship between breastfeeding and Breast Cancer in Southern Brazil, a Case Control design was employed (between 1995-98), with two age-matched control groups. A total 250 cases of Breast Cancer were identified in women from 20 to 60 years of age, with 1,020 hospital and community controls. A multivariate conditional logistic regression analysis was employed. Women over 60 years of age when breast cancer was diagnosed were excluded during data collection. The odds ratio (OR) for women who breastfed was 0.9 (95% CI: 0.8-1.2) compared to women who did not breastfeed. For women who breastfed for six months or less, the OR was 1.0 (95% CI: 0.6-1.8). In pre-menopausal women who breastfed for more than 25 months, the OR was 0.95 (95% CI: 0.5-3.5), and in post-menopausal women OR was 1.27 (95% CI: 0.5-3.1), compared to women who had not breastfeed. According to the results, breastfeeding did not have a protective effect against breast cancer.[7]

A case control study was carried out at the Pereira Rossell Women's Hospital, Montevideo to analyze risk of breast cancer (BC) in premenopausal Uruguayan women. 253 incident BC cases and 497 frequency-matched healthy controls were interviewed on menstrual and reproductive story and a series of body measurements were performed to calculate body composition and somatotype. Odds ratio (OR's) coefficients were taken as estimates of relative risk derived from unconditional logistic regression. Results showed a positive association for the fat fraction (OR for highest quartile = 4.19, 95% CI (95% Confidence Interval) 2.70-6.50) as well as for the fat-to-muscle ratio (OR=4.68, 95% CI 2.98-7.36). Muscle fraction was inversely associated with risk (OR=0.53 95% CI 0.36-0.78). High endomorphism was the only somatotype variable associated to the disease risk (OR=1.69, 95% CI 1.13-2.54), however losing its association when fat amount was included in the regression model. Stratified analyses by body mass index (BMI) levels, bone weight, age groups and number of live births also showed risk increases for the highest fat fractions, displaying significant linear trends. Albeit most of the literature reports a putative slight protective effect for a high BMI in premenopausal women.[8]

A case-control study conducted at Lok-Nayak Hospital (LNJPH), New Delhi from January to December 2006. All the newly diagnosed cases of breast cancer attending surgery outpatient department (OPD) and wards during this period were included as the study cases. The diagnosis was based on fine needle aspiration cytology (FNAC), incision biopsy, mammography, and clinical examination. The cases having any cancer other than breast cancer were excluded from the study. Thus a total of 115 women with breast cancer were included in this study. The controls were selected from the patients attending surgery OPD and wards during the same

period by matching for age and sex. One to three controls were selected for a case of breast cancer by matching for age within ± 2 years. The data was analyzed statistically using Chi-Square test and Odds ratio with 95% confidence interval. All analyses were performed with SPSS version 11.5software and EPI-INFO Version 3.03. The current data support that various factors like marital status, wife's occupation, place of residence (urban/ rural), BMI, and breast-feeding were significantly associated with breast cancer ($p < 0.05$).[9]

A case–control study was conducted at Bhopal urban agglomerate from October 2008 to August 2009. The case group was defined as women suffering from breast cancer and registered between January 2006 and December 2008 at Population-Based Cancer Registry (PBCR), Department of Pathology, Gandhi Medical College, Bhopal. Logistic regression showed that history of using OCP ($P = 0.010$), history of not having breast fed ($P = 0.014$), and family history of breast cancer ($P = 0.037$) were found to be significantly associated with breast cancer; similarly adjusted odds ratios (AOR) for history of OCP (OR = 3.02, 95%CI: 1.28–7.11), history of not having breastfed (OR = 3.62, 95%CI: 1.29–10.16) and family history of breast cancer (OR = 3.98, 95%CI: 1.06–14.826) showed positive association with the occurrence of breast cancer.[10]

A hospital based case-control study conducted in a tertiary care hospital in New Delhi. A total of 320 breast cancer cases (all consecutive cases) from the outpatient and hospital admissions of the Departments of Surgery/Surgical Oncology were included in the present study. The mean age of the cases was 45.5 years. The criteria for the selection of cases were: (i) They should be proven cases of breast cancer by histopathology/cytopathology; (ii) they should have not undergone any

treatment specific to breast cancer; (iii) they should not have suffered from any major chronic illness in the past, before the diagnosis of breast cancer so as to change their dietary pattern; (iv) they should not have taken long course of any vitamin or mineral supplements during the last 1 year; and (v) they should not be on corticosteroid therapy or suffering from hepatic disorders/severe malnutrition. An equal number of matched controls accompanying the cases in the Department of Gastroenterology, Medicine and Surgery at the hospital constituted the control group. The subjects in the control group were matched individually with the cases for their age ± 2 years and socioeconomic status. The Chi‑square test and unpaired *t*-test were used. The conditional univariate logistic regression analysis (unadjusted odds ratio and confidence intervals) was used to calculate the significance level of each variable followed by multivariate regression analysis. It was found that the risk of breast cancer was 9.50 times higher in women having a history of consumption of oral contraceptive pills. Menopausal status was also found to be associated with the risk of breast cancer with post‑menopausal women having a 2.50 times higher risk (95% confidence interval: 1.20, 5.22). The risk also increased 2.68 times in women having a late age of menopause, more than 49 years. The family history of breast cancer was reported in 21.3% of the cases and none of the controls.[11]

An interview based case control study was carried out in the wards of Oncosurgery and General Surgery departments in a tertiary care institute of north India. A total of 128 women, with histopathologically confirmed breast cancer, who consented were included in the study. The study subjects were interviewed once only and their registration number were recorded to prevent double counting of the same subject. Wards were visited twice weekly and any new cases were included in the

study, after explaining the objectives of the study to the subject. Controls were selected from the indoor female patients admitted for a wide spectrum of general surgical procedures in the General Surgery ward of the same institute without having any type of cancer. Controls were also selected twice a week by simple random sampling using lottery method. Controls were matched for age with range of ±2 years. Case to control ratio was 1:1. The categorical data were analyzed statistically using Chi square test and odds ratio (OR) with 95% confidence interval (CI). Continuous variables were analyzed using independent *t* test. All the analyses were performed with Statistical Package for Social Sciences (SPSS) version 17. In the present study, history of late marriage and late age at first child birth were the significant risk factors for breast cancer, which are modifiable.[12]

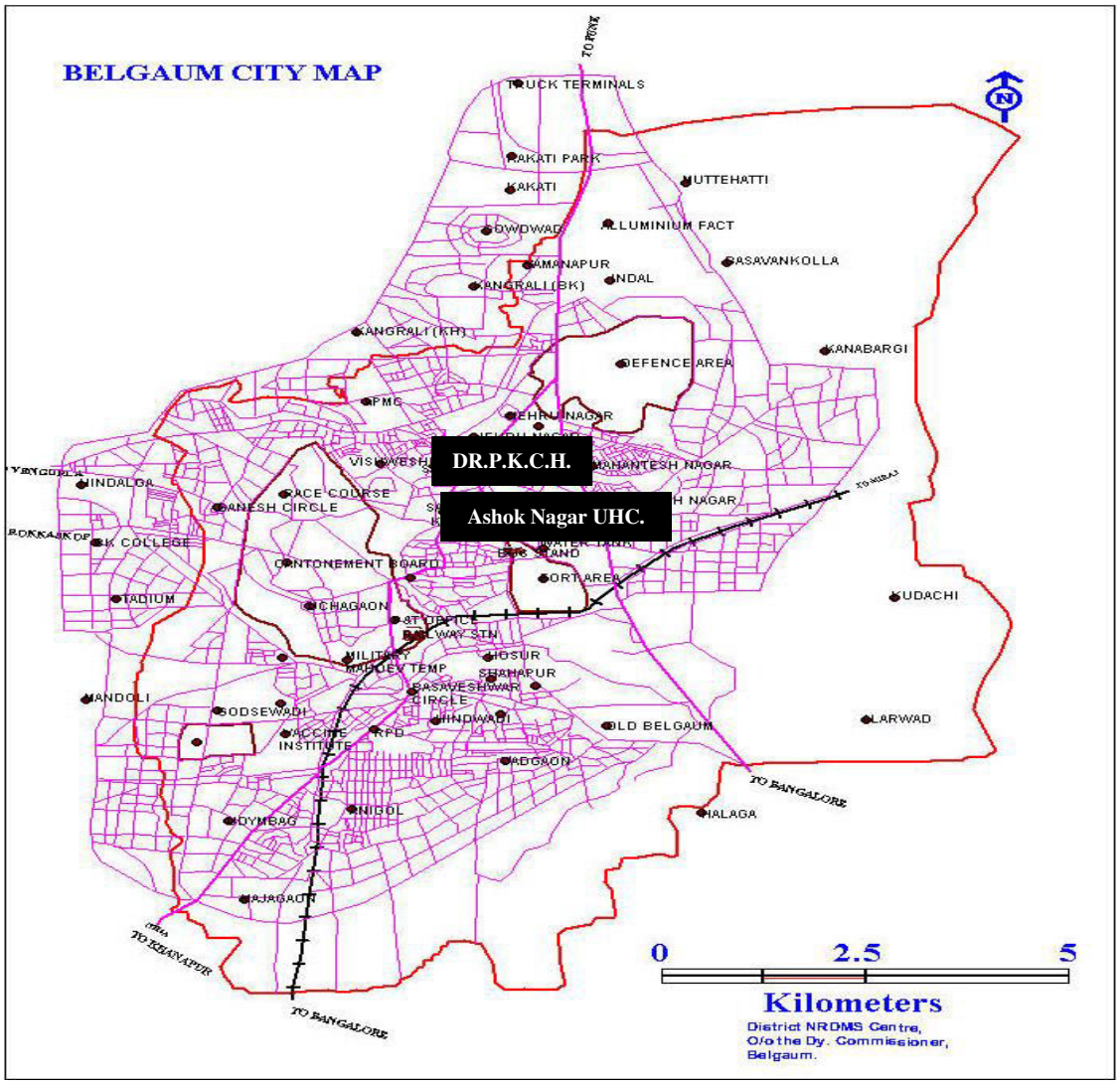
Aim of this study was to find out whether known and/or presumptive breast cancer risk factors hold true for women of developing countries like India also. Study group consisted of women with histopathologically proven breast cancer (of any age) attending a tertiary care center in eastern India between 2008 and 2012. The control population consisted of healthy women accompanying the above described patients, who were from the same locality but were not her first/second degree relatives. It was done to ensure the same socioeconomic, environmental, racial, and ethnicity match among 'study' and 'control' groups, while eliminating the familial trait of breast cancer. Permission was obtained from the institutional ethics committee1, 463 breast cancer patients were compared side by side with 1,440 matched controls by predetermined questionnaire and anthropometric variables. Data were analyzed by Statistical Package for Social Sciences (SPSS) V19 software to determine whether selected risk factors were more common in the patient group than the control group.

From the present study, it may be concluded that risk factors for breast cancer in our population do not differ significantly from the established ones except duration of breast feeding and family history of breast and ovarian cancer.[13]

In the absence of health consciousness among patients of breast cancer in our country, many women present at the advanced stage. Hence assessment of risk factors help in educating women about the risk factors and breast examination, which in turn will help in reducing the burden of the disease.

METHODOLOGY

Source of data: The study was conducted at Dr. Prabhakar Kore charitable hospital, Belagavi and Ashok Nagar, which is one of the urban field practice area of Department of Community Medicine, Jawaharlal Nehru Medical College, Belagavi.



Map-1: Map of Belagavi city showing Dr. Prabhakar Kore Charitable hospital and urban area of Ashok Nagar.

Study design: A case control study

Study Setting: Present case control study was conducted in Belagavi district, Karnataka. DR. PRABHAKAR KORE Charitable hospital Belagavi, is premier institute in Belagavi district, which provides the diagnostic as well as the therapeutic cancer services viz. diagnostic, surgery, chemotherapy, radiotherapy, palliative care etc. This hospital provides tertiary care and referral services to many private and public health care institutions from neighbouring regions.

Study participants:

Cases: Newly diagnosed cases of breast cancer in women, confirmed by histopathology report / Fine needle aspiration cytology, among women admitted at Dr. Prabhakar Kore Charitable hospital, Belagavi. - From 1st January to 31st December 2015.

Controls: Age matched controls (±2 year)

Ratio- Cases + Controls = 1:4

Hospital Controls - 2

Community Controls - 2

Hospital Controls: Women admitted in Surgery, Medicine Department, also in OBG Department (except Women with malignancy of Uterus, Ovary, Cervix etc) of Dr. Prabhakar Kore charitable hospital has been matched for the age (± 2 years).

Community Controls- Ashok Nagar, Urban Health Centre area, after identifying the age matched controls in the community. In the presence of ANM, breast examination was carried out to rule out any lump in the breast. If any lump was found, they were referred to hospital and other control was selected.

Study period: 1st January to 31st December 2015.

Matching: Cases were matched with respect to age to avoid possible bias in the study.

SELECTION CRITERIA

Inclusion Criteria: All newly diagnosed cases of breast cancer confirmed by histopathology /Fine needle aspiration cytology, irrespective of stage of diagnosis were included as "cases" in the study.

Exclusion Criteria: **a)** Development of cancer in contra lateral breast.

b) Re-admission of already treated cases.

Thus as per inclusion and exclusion criteria, total breast cancer cases which were diagnosed between 1st January to 31st December 2015 were 42. 168 control (four times of cases) were also selected for the present study, thus total of 210 women were studied.

Sample size: By taking the prevalence of age at 1st child ≥31years among controls being 21%[7], sample size calculated using the following formula:

$P_0 = 21$

Odds Ratio (OR) =2.5

$P_1 = P_0 \text{ X OR}/ 1 + P_0 (OR - 1) = 21 \text{ X } 2.5/ 1 + 21 \text{ X } 1.5 = 1.59$

$P = P_0 + P_1/ 2 = 21 + 1.59/2 = 22.59/2 = 11.3$

$q = 100 - P = 100 - 11.3 = 88.7$

$n = 2(Z\alpha + Z\beta)^2 \text{ X } Pq / (P_0 - P_1)^2 = 2(2.8)^2 \text{ X } 11.3 \text{ X } 88.7 / (21 - 1.59)^2 = 41.79 \approx \mathbf{42}$

All eligible women were totaled, 210 (42 cases and 168 controls) according to inclusion and exclusion criteria of study.

Ethical Clearance: The present study was approved by J. N. Medical College Institutional Ethics Committee on Human subjects' Research. (Ref: MDC/DOME/102 dated 14/11/2014- Annexure I)

Data Collection:

A questionnaire was prepared which included socio-demographic details such as age, sex, address, educational status, history of occupation, marital status, socio-economic status, menstrual history, history of breastfeeding, family history of breast cancer, personal habits, dietary habits, etc.

Data was collected through personal interview, using the pretested questionnaire. The information related to the socio-demographic, economic, personal, reproductive aspects and life style was collected from both cases as well as controls. Newly diagnosed cases of breast cancer were interviewed at respective hospital and same day age matched controls (two from hospital and two from community) were also interviewed. Adequate time was given to each study subject. Patient's comfort was maintained during the interview. The data was collected after obtaining the informed consent in their local language, in the presence of an eye witness.

Data analysis:

The collected data was entered in Microsoft Excel 2007 and analyzed by using SPSS 20 statistical software. Risk factors associated with breast cancer were found out using chi-square test. The strength of association was found out by using Odd's ratio.

The association and relationship between the risk factor and breast cancer was analyzed by using chi-square test. Multiple logistic regressions were used to know the risk factors associated for breast cancer. Statistical significance was considered when p value was less than 0.05 at 95% confidence interval. Odd's ratio was used to know the strength of association.

Definition of study variables:

Age: Age was recorded to the nearest completed years.

Religion: The participant's religion was noted and was grouped as "Hindu", "Muslim", "Christian" and "Others" (Jain, Buddhist, Parsi, etc).

Educational status:

The participants were asked about their highest level of completed education and were grouped into following categories:

1. **Illiterate**: A women who cannot read and write.
2. **Primary school**: A women who has studied from first to seventh standard.
3. **High school**: A women who has studied eighth to tenth standard.
4. **Pre-university**-1: A women who has studied up to Pre-University College first year.
5. **Pre-university-2**: A women who has studied up to Pre-University College second year
6. **College:** A women who has studied up to College.

Occupation: Each study participant was asked about her major occupation. This information was collected and grouped as follows:-

1. **Housewife:** Woman who takes care of the day to day household duties without being paid.
2. **Working:** Occupations which involve Govt. job, pvt job or farming etc.

Socio-economic status: Information regarding per capita income (in Rupees / month) was collected and socio-economic status was classified using Modified B. G. Prasad's classification for the study period (2015).

Socio-Economic Class	Prasad's classification 1961 (per capita income in Rupees/month)	Modified Prasad's classification 2015 (per capita income in Rupees/month)[15]
I	100 and above	5965 and above
II	50-99	2983-5964
III	30-49	1789-2982
IV	15-29	895-1788
V	<15	Below 895

Monthly Per Capita Income = $\frac{\text{Total monthly income of family}}{\text{Total members of family}}$

Modification was done with the aid of Correction factor (CF), which was obtained as below:

As our study period was from 1st January to 31st December 2015, the mean consumer price index for the period was considered.

Average consumer price index for year 2015 was 1210[16].

$$CF = \text{Value } \frac{\text{of consumer price index average for the study period (2015)}}{100} \times 4.93$$

$$= \frac{1210 \times 4.93}{100} = 59.65$$

Modified B. G. P=Per capita family monthly income of 1961 (B.G. Prasad) x CF

Marital Status: Marital status was classified as "Married", "Unmarried" and "Widowed" and "Separated".

Type of Family:

1. **Nuclear family**: The family consisting of married couple along with their dependent children.
2. **Joint family**: It consists of more than one married couple and their children who live in the same household.
3. **Broken family** – It is one where the parents have separated or when death has occurred of one or both the parents.

Diet: It includes type of diet i.e. vegetarian or non-vegetarian diet.

Height: Participants were asked to stand straight without footwear, with heels, buttocks and back straight and arms hanging by side. The height was measured from head to heel. The coinciding reading was measured to the nearest 0.1 cm using a metallic measuring tape.[28]

Weight: Participants were asked to stand straight without footwear, with heels, buttocks and back straight and arms hanging by side. The weight was measured using standard weighing scale.[28]

Calculation of Body Mass Index (BMI in Kg/m^2): Body mass index was calculated as:

$$\textbf{BMI} = \frac{\text{weight in Kgs}}{(\text{height in metre})^2}$$

Based on WHO and International obesity task force (IOTF), BMI cut-off standards for Asia and India, obesity was defined as below[29:]

Body Mass Index	Interpretation
< 18.5	Underweight
18.5-22.9	Normal weight
23-24.9	Overweight
≥ 25	Obese

Menstruation history:

1. **Not attained menopause**
2. **Attained menopause**
3. **Hysterectomy done**

Menopause means – physiologically complete stoppage of menstrual cycle.

Breastfeeding status: How many years participants breastfed their children?

Old history of breast disease: meant lump in breast or breast abscess.

Family history of breast cancer: Anyone of first degree relative had been diagnosed with breast cancer.

Habits: Ever and current use of any form of tobacco/ smokeless /alcohol etc**.**

RESULTS

The present study was conducted in Dr. Prabhakar Kore charitable hospital, Belagavi and Ashok Nagar urban health Centre including 42 cases and 168 controls during the period of January to December 2015. The data obtained was tabulated and analyzed under the following headings:

I. **Socio-demographic profile**

II. **Association between risk factors and breast cancer (cases and hospital controls)**

III. **Association between risk factors and breast cancer (cases and community controls)**

IV. **Univariate analysis of cases and hospital controls**

V. **Multivariate analysis of cases and hospital controls**

VI. **Univariate analysis of cases and community controls**

VII. **Multivariate analysis of cases and community controls**

I. Socio-demographic profile

Table 1: Age wise distribution of cases and controls

Age (in years)	Cases		Hospital Controls		Community Controls	
	no.	%	no.	%	no.	%
31-40	12	28.6	25	29.9	25	29.8
41-50	17	40.5	32	38.0	31	36.9
51-60	7	16.7	15	17.9	15	17.9
≥60	6	14.2	12	14.2	13	15.5
Total	**42**	**100**	**84**	**100**	**84**	**100**

In the present study majority i.e. 40.5%, 38.0% and 36.9% of 42 cases, 84 hospital and 84 community controls, belonged to 41-50 years respectively, followed by 31-40 years (28.6%, 29.9% and 29.8 respectively) least were ≥60 years (14.2%, S14.2% and 15.5% respectively).

Figure 1: Age wise distribution of cases and controls

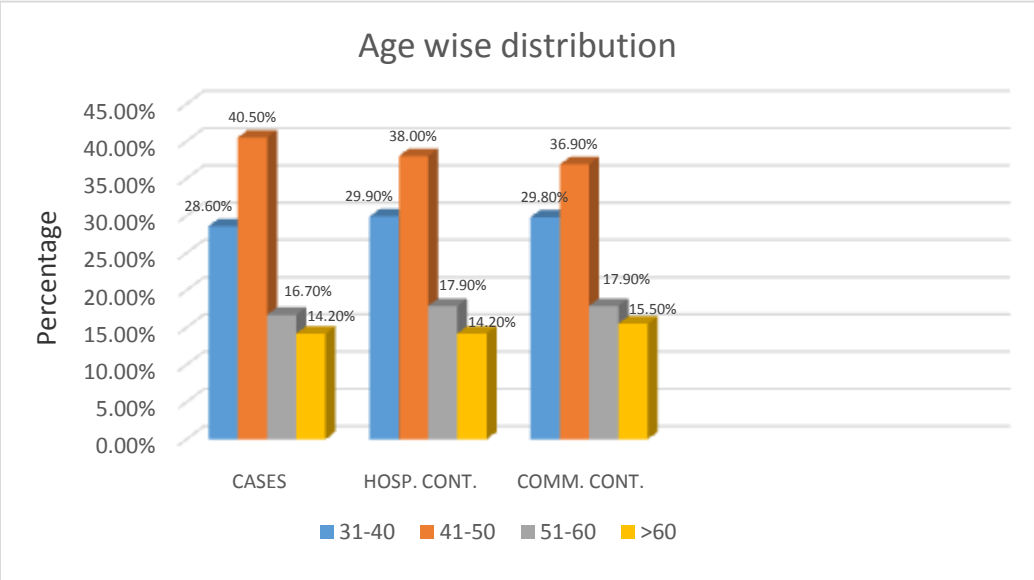


Table -2 Residence wise distribution of cases and controls

Residence	Cases		Hospital Controls		Community Controls	
	no.	**%**	**no.**	**%**	**no.**	**%**
Urban	18	42.9	23	27.4	84	100
Rural	24	57.1	61	72.6	-	0
Total	**42**	**100**	**84**	**100**	**84**	**100**

Among the cases, majority of participants, 24 (57 %) were from rural area and 18 (42.9 %) were from urban, among hospital controls 61 (72.6 %) were from rural and 23 (27.4%) were from urban and among community controls 84 were from urban area.

Figure -2 Residence wise distribution of cases and controls

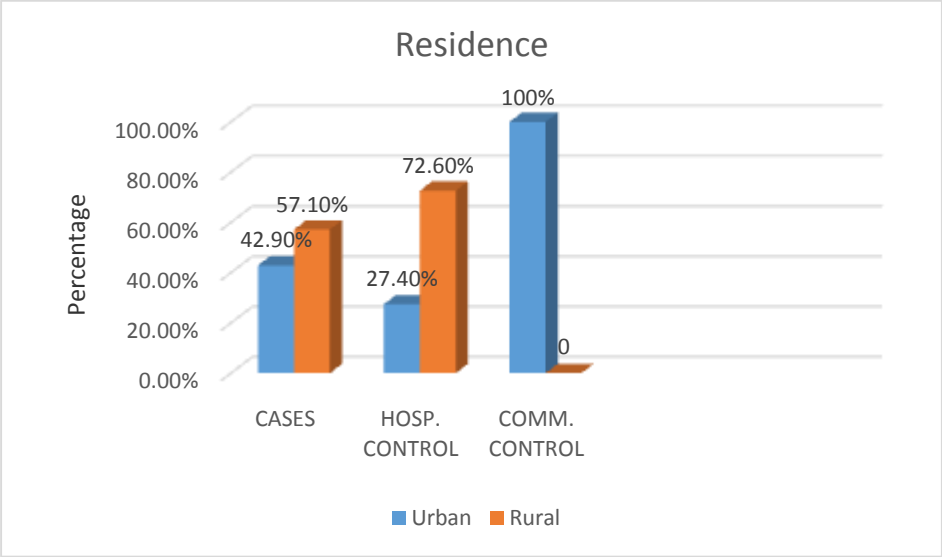

Residence
Percentage
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
42.90%
57.10%
27.40%
72.60%
100%
0
CASES
HOSP. CONTROL
COMM. CONTROL
Urban
Rural

Table- 3 Religion wise distribution of cases and controls

Religion	Cases		Hospital Controls		Community Controls	
	no.	%	no.	%	no.	%
Hindu	36	85.7	75	89.2	41	48.8
Muslim	5	11.9	9	10.7	43	51.2
Christian	1	2.4	-	0	-	0
Total	**42**	**100**	**84**	**100**	**84**	**100**

In the present study majority i.e. 85.7%, 89.2% and 48.8% of cases, hospital and community controls, belonged to Hindu religion respectively, followed by Muslim (11.9%, 10.7% and 51.2% respectively) least were Christian (2.4%).

Figure - 3 Religion wise distribution of cases and controls

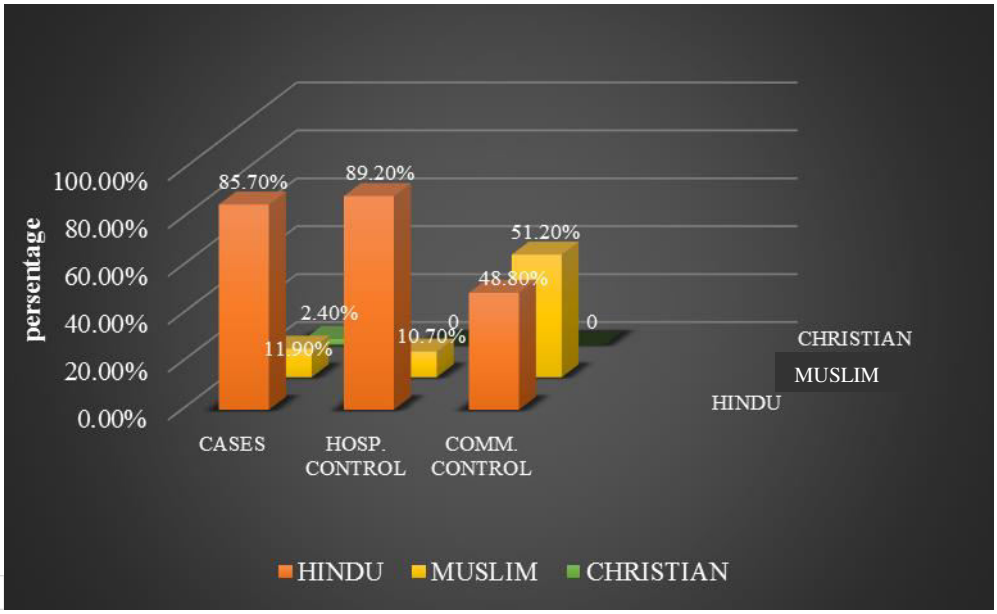


Table 4: **Distribution of cases and controls according to their literacy status**

Education	Cases		Hospital Controls		Community Controls	
	no.	%	no.	%	no.	%
Illiterate	23	54.7	39	46.4	27	32.1
Primary	11	26.2	26	30.9	31	36.9
High school	1	2.3	16	19.5	23	27.4
Pre Uni-1	2	4.6	2	2.3	-	0
Pre Uni-2	-	0	-	0	2	2.3
College	5	11.9	1	1.2	1	1.2
Total	**42**	**100**	**84**	**100**	**84**	**100**

In the present study majority i.e. 54.7%, 46.4% and 32.1% of cases, hospital and community controls were Illiterate respectively, followed by who had studied up to primary school (26.2%, 30.9% and 36.9% respectively), 2.3%, 19.5% and 27.4% respectively were educated up to High school, least were educated up to Pre-University College (4.6%, 2.3% and 2.3% respectively).

Figure 4: **Distribution of cases and controls according to their literacy status**

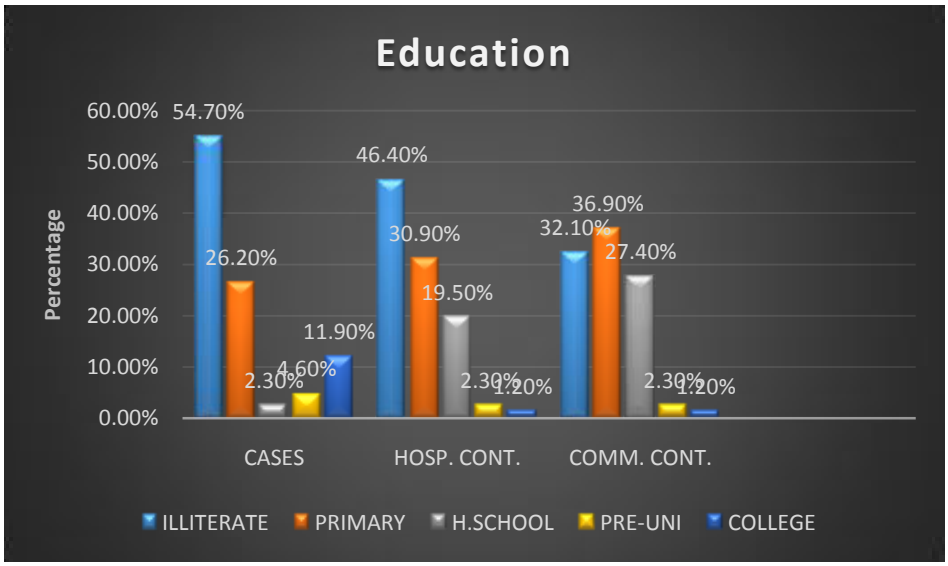


Table-5 Distribution of cases and controls according to their occupation

Occupation	Cases		Hospital Controls		Community Controls	
	no.	%	no.	%	no.	%
Housewife	19	45.3	64	76.2	78	92.8
Govt. job	2	4.7	1	1.2	2	2.4
Pvt. job	3	7.1	3	3.6	3	3.6
Others	18	42.8	16	19.0	1	1.2
Total	**42**	**100**	**84**	**100**	**84**	**100**

In our study, among cases 45.3% were housewives, 11.8% were working (govt. or pvt. Job), rest (42.8%) were doing other works. Among hospital controls 76.2% were housewives, 4.8% were working, rest (19.0%) were involved in other works. Among community controls 92.8% were housewives and 5.9% were working, other were 1.2%

Figure - 5 Distribution of cases and controls according to their occupation

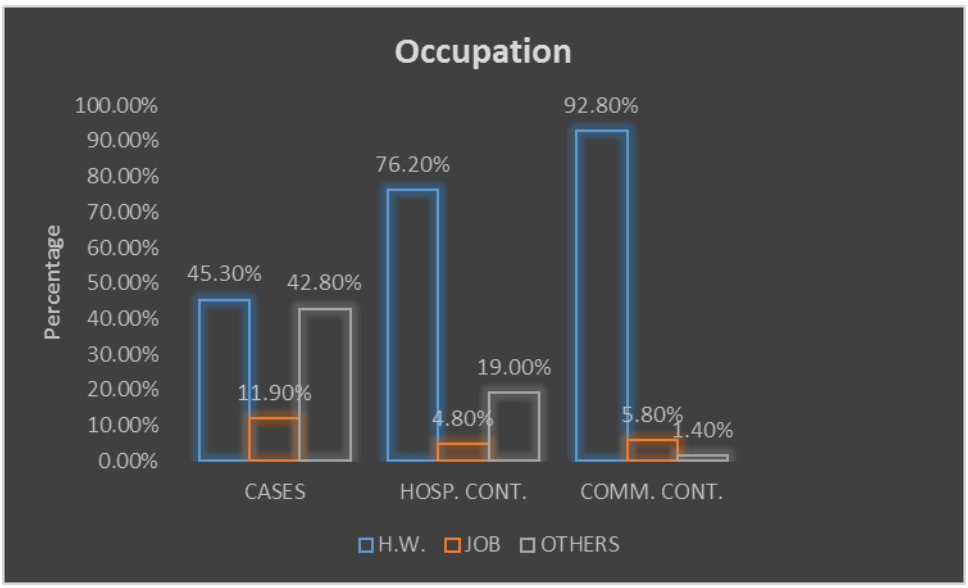


Table 6: Distribution of cases and controls according to type of family

Type of family	Cases		Hospital Controls		Community Controls	
	no.	%	no.	%	no.	%
Joint	20	47.6	46	56.0	46	56.0
Nuclear	16	38.0	36	42.8	37	44.0
Broken	6	14.2	2	2.4	1	1.2
Total	**42**	**100**	**84**	**100**	**84**	**100**

Among cases 47.6% women belongs to joint family, 38% to nuclear and 14.2% to broken. Among hospital controls 56% were from joint, 42.8% from nuclear and 2.4% were from broken. Among community controls 56% were from joint, 44% from nuclear and 1.2% were from broken family.

Figure 6: Distribution of cases and controls according to type of family

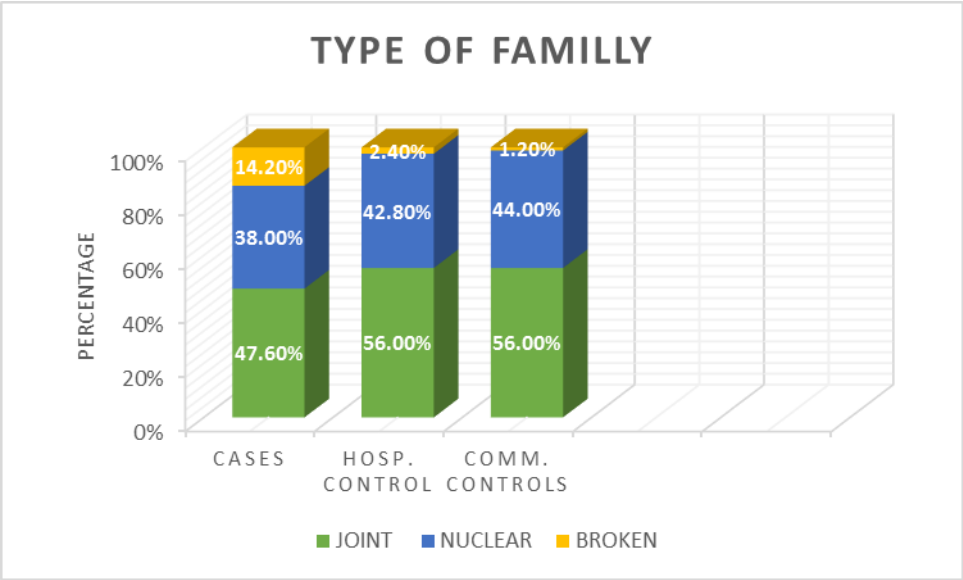


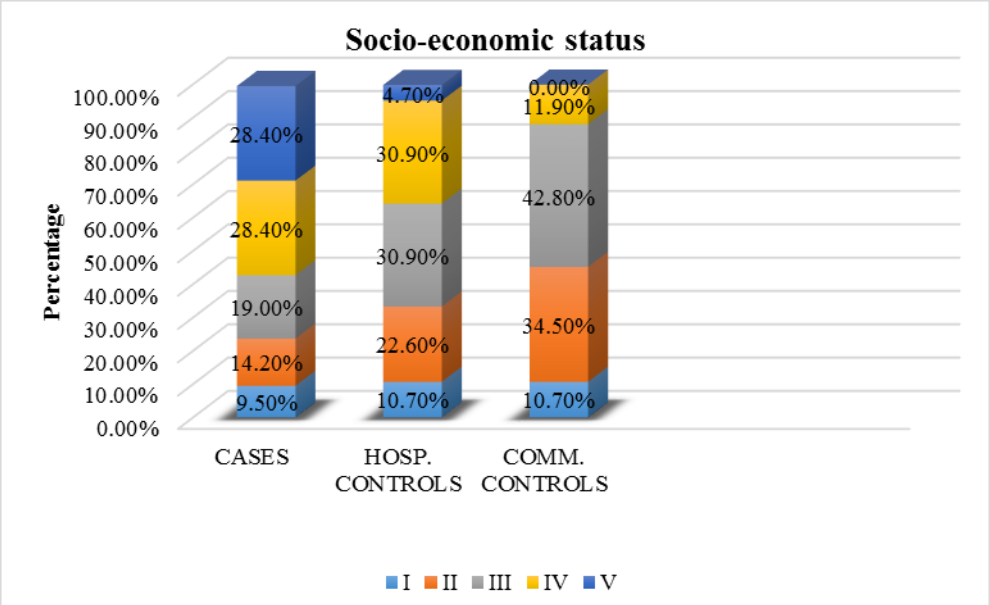
Table 7: Distribution of cases and controls according to socioeconomic status (Acc. To modified B. G. Prasad Classification, 2015)

Socioeconomic status	Cases		Hospital Controls		Community Controls	
	no.	%	no.	%	no.	%
I	4	9.5	9	10.7	9	10.7
II	6	14.2	19	22.6	29	34.5
III	8	19.0	26	30.9	36	42.8
IV	12	28.4	26	30.9	10	11.9
V	12	28.4	4	4.7	-	-
Total	**42**	**100**	**84**	**100**	**84**	**100**

As regards to socio-economic status, majority i.e. among cases majority of them, 28.4% each belonged to class IV and V, followed by 19.0% to class III, 14.2% to class II, and 9.5% to class I. Among hospital controls majority of them, 30.9% each belonged to class III and IV, followed by 22.6% to class II, 10.7% to class I, and 4.7% to class V. Among community controls majority of them, 42.8% belonged to class III, followed by 34.5% to class II, 11.9% to class IV, and 10.7% to class I.

Figure 7: Distribution of cases and controls according to socioeconomic status

(Acc. To modified B. G. Prasad Classification, 2015)



II. Association between risk factors and breast cancer (Cases and hospital controls)

Table 8: Association between Residence and Breast cancer

	Urban	**Rural**	**Total**
Cases	18 (42.9%)	24 (57.1%)	42
Hospital controls	23 (27.4%)	61(72.6%)	84
$\chi^2 = 3.055$ df =1 p=0.080			

The present study revealed that among cases majority of women i.e. 57.1% were from rural and 42.9% were from urban and among hospital controls 72.6% were from rural and 27.4% were from urban. This difference was not statistically significant with p=0.080.

Table 9: Association between Religion and Breast cancer

	Hindu	**Muslim + Christians**	**Total**
Cases	36 (85.7%)	6 (14.3%)	42
Hospital controls	75 (89.3%)	9 (10.7%)	84
$\chi^2 = 0.341$ df =1 p=0.560			

Among cases majority of women i.e. 85.7% were Hindus and 14.3% belonged to Muslim + Christian community. Among hospital controls 89.3% were Hindus and 10.7% were from others (Muslims + Christians). This difference was not statistically significant with p=0.560.

Table 10: Association between Education and Breast cancer

	Illiterate	**Primary School**	**High school**	**PUC + College**	**Total**
Cases	22 (52.4%)	12 (28.6%)	1 (2.4%)	7 (16.7%)	42
Hospital controls	39 (46.4%)	26 (31.0%)	16 (19.0%)	3 (3.6%)	84
$\chi^2 = 12.072$ df = 3 **p = 0.007**					

Majority of i.e. 52.4% were illiterates among cases and incidence of breast cancer decreased as literacy status improved. Among hospital controls majority 46.4% were illiterate. There was a statistical significant association between education and breast cancer (p = 0.007).

Table 11: Association between Occupation and Breast cancer

	Housewife	**Working**	**Total**
Cases	19 (42.5%)	23 (54.8%)	42
Hospital controls	64 (76.2%)	20 (23.8%)	84
$\chi^2 = 11.933$ df =1 **p = 0.001**			

Among cases 54.8% were working and 42.5% were housewife, among hospital controls 76.2% were housewives and 23.8% were working. This difference was found to be statistically significant. (p = 0.001) .

Table 12: Association between Type of family and Breast cancer

	Joint	**Nuclear**	**Broken**	**Total**
Cases	20 (47.6%)	16 (38.1%)	6 (14.3%)	42
Hospital controls	46 (54.8%)	36 (42.9%)	2 (2.4%)	84
$\chi^2 = 6.677$		df = 2	**p=0.035**	

In the present study majority i.e. 47.6% of cases and 54.8% of controls belonged to joint family, followed by nuclear (38.1% and 42.9% respectively) 14.3% of cases belonged to broken family, while only 2.4% controls belonged to it. This difference was found to be statistically significant with p=0.035.

Table 13: Association between Socio-economic status and Breast cancer

	I	**II**	**III**	**IV**	**V**	**Total**
Cases	4 (9.5%)	6 (14.3%)	8 (19%)	12 (28.6%)	12 (28.6%)	42
Hospital controls	9 (10.7%)	19 (22.6%)	26 (31%)	26 (31%)	4 (4.8%)	84
$\chi^2 = 15.042$			df = 4	**p=0.005**		

Majority of Cases 28.6% each belonged to class IV and V and incidence of breast cancer decreased as socio-economic status improved. Among hospital controls majority of participants 31% each were from class III and IV. There was a statistical significant association between socio-economic status and breast cancer (p=0.005).

Table 14: Association between Marital status and Breast cancer

	Married	**Single**	**Total**
Cases	38 (90.5%)	4 (9.5%)	42
Hospital controls	84 (100%)	0 (0.0%)	84
Fisher Exact Test **p = 0.011**			

Among cases, 90.5% were married and 9.5% were single and 100% of controls were married. This difference was statistically significant with p = 0.011.

Table 15: Association between attainment of menopause and Breast cancer

	Not attained menopause	**Attained menopause**	**Hysterectomy**	**Total**
Cases	14 (33.3%)	21 (50.0%)	7 (16.7%)	42
Hospital controls	34 (40.5%)	49 (58.3%)	1(1.2%)	84
$\chi^2 = 11.286$ df = 2 **p=0.004**				

Majority of cases 50.0% were among women, who attained menopause, followed by 33.3% from women, not attained menopause and 16.7% were done hysterectomy. Among hospital controls 58.3% participants attained menopause, 40.5% not attained menopause and 1.2% were done hysterectomy. This difference was found to be statistically significant with p=0.004.

Table 16: Association between Age at menarche and Breast cancer

	<13 years	**≥13 years**	**Total**
Cases	10 (23.8%)	32 (76.2%)	42
Hospital controls	13 (15.5%)	71 (84.5%)	84
$\chi^2 = 1.303$	df = 1	p = 0.254	

Among cases 76.2% attained menarche when they were ≥13years and 23.8% at <13years, among hospital controls 84.5% attained at ≥13years and 15.5% at <13years. This difference was not statistically significant with p=0.254.

Table 17: Association between Age at 1st child and Breast cancer

	<18 years	**≥18 years**	**No child**	**Total**
Cases	16 (38.1%)	18 (42.9%)	8 (19.0%)	42
Hospital controls	21 (25.0%)	62 (73.8%)	1 (1.2%)	84
$\chi^2 = 18.360$	df = 2		**p=<0.001**	

At the time of 1st child, 42.9% of cases were ≥18years, followed by 38.1% who were <18years and 19% had not borne children, among hospital controls 73.8% had 1st child at the age of ≥18years, followed by 25.0% at the age of <18years and 1.2% had not borne children. This difference was found to be statistically significant with p=<0.001.

Table 18: Association between duration of breastfeeding and Breast cancer

	1-2 years	**>2 years**	**Not breast fed**	**Total**
Cases	4 (9.5%)	29 (69.0%)	9 (21.5%)	42
Hospital controls	4 (4.8%)	79 (94.0%)	1 (1.2%)	84
$\chi^2 = 17.492$		df = 2		**p=<0.001**

Among cases 69.0% breast fed for >2years, 21.5% did not and 9.5% between 1-2 years, among hospital controls, 94.0% breastfed their children for >2years, 4.8% for 1-2 years and 1.2% did not breast feed. This difference was found to be statistically significant with p=<0.001.

Table 19: Association between Previous H/O Benign breast disease and Breast cancer

	Yes	**No**	**Total**
Cases	1 (2.4%)	41 (97.6%)	42
Hospital controls	1 (1.2%)	83 (98.8%)	84
Fisher Exact Test		p = 1	

In the present study majority i.e. 97.6% cases and 98.8% did not have previous H/O benign breast disease. This difference was not statistically significant with p = 1.

Table 20: Association between Diet and Breast cancer

	Vegetarian	**Non vegetarian**	**Total**
Cases	19 (45.2%)	23 (54.8%)	42
Hospital controls	59 (70.2%)	25 (29.8%)	84
$\chi^2 = 7.421$ df = 1 **p = 0.006**			

Among cases 54.8% women were non vegetarian and 45.2% were vegetarian, among hospital controls, 29.8% women were non vegetarian and 70.2% were vegetarian. This difference was found to be statistically significant with p = 0.006**.**

Table 21: Association between Family history and Breast cancer

	Yes	**No**	**Total**
Cases	3 (7.1%)	39 (92.9%)	42
Hospital controls	0 (0.0%)	84 (100%)	84
Fisher Exact Test **p = 0.035**			

In the present study majority i.e. 92.9% of cases and 100% of controls did not have family history of breast cancer. This difference was found to be statistically significant with p=0.035.

Table 22: Association between BMI and Breast cancer

	<18.5 kg/m^2	**18.5 -22.9 kg/m^2**	**≥23 kg/m^2**	**Total**
Cases	6 (14.3%)	14 (33.3%)	22 (52.4%)	42
Hospital controls	4 (4.8%)	51 (60.7%)	29 (34.5%)	84
$\chi^2 = 9.475$		df = 2	**p=<0.009**	

Majority of cases (52.4%) had BMI ≥23 kg/m^2, followed by 33.3% with BMI between 18.5 to 22.9 kg/m^2 and 14.3% with BMI <18.5 kg/m^2. Among hospital controls 60.7% had BMI 18.5 to 22.9 kg/m^2, 34.5% with ≥23 kg/m^2 and 4.8% with BMI <18.5 kg/m^2. This difference was found to be statistically significant with p=<0.009.

III. Association between risk factors and breast cancer (Cases and community controls)

Table 23: Association between Residence and Breast cancer

	Urban	**Rural**	**Total**
Cases	18 (42.9%)	24 (57.1%)	42
Community controls	84 (100%)	0(0.0%)	84
$\chi^2 = 59.294$ df =1 **p=<0.001**			

The present study revealed that among cases majority of women 57.1% were from rural and 42.9% were from urban and among community controls all participants (100%) were from urban area. This difference was found to be statistically significant with p=<0.001.

Table 24: Association between Religion and Breast cancer

	Hindu	**Muslim + Christian**	**Total**
Cases	36 (85.7%)	6 (14.3%)	42
Community controls	41 (48.8%)	43 (51.2%)	84
$\chi^2 = 16.046$ df =1 **p=<0.001**			

Among cases majority of women i.e. 85.7% were Hindus and 14.3% belonged to Muslim + Christian community. Among community controls 48.8% were Hindus and 51.2% were from Muslims + Christians community. This difference was found to be statistically significant with p=<0.001.

Table 25: Association between Education and Breast cancer

	Illiterate	**Primary School**	**High school**	**PUC + College**	**Total**
Cases	22 (52.4%)	12 (28.6%)	1 (2.4%)	7 (16.7%)	42
Community controls	27 (32.1%)	31 (36.9%)	23 (27.4%)	3 (3.6%)	84
$\chi^2 = 18.756$ df = 3 **p = <0.001**					

Majority of i.e. 52.4% were illiterates among cases and incidence of breast cancer decreased as literacy status improved. Among community controls majority i.e. 36.9% were those who studied up to primary school. There was a statistical significant association between education and breast cancer (p = <0.001).

Table 26: Association between Occupation and Breast cancer

	Housewife	**Working**	**Total**
Cases	19 (42.5%)	23 (54.8%)	42
Community controls	78 (92.9%)	6 (7.1%)	84
$\chi^2 = 35.834$ df =1 **p = <0.001**			

Among cases 54.8% were working and 42.5% were housewife, among community controls 92.9% were housewife and 7.1% were working women. This difference was found to be statistically significant (p = <0.001).

Table 27: Association between Type of family and Breast cancer

	Joint	**Nuclear**	**Broken**	**Total**
Cases	20 (47.6%)	16 (38.1%)	6 (14.3%)	42
Community controls	46 (54.8%)	37 (44.0%)	1 (1.2%)	84
$\chi^2 = 9.171$		df = 2	**p=0.010**	

In the present study majority i.e. 47.6% of cases and 54.8% of controls belonged to joint family, followed by nuclear family (38.1% and 44.0% respectively) 14.3% of cases belonged to broken family while only 1.2% controls belonged to it. This difference was found to be statistically significant with p=0.010.

Table 28: Association between Socio-economic status and Breast cancer

	I	**II**	**III**	**IV+V**	**Total**
Cases	4 (9.5%)	6 (14.3%)	8 (19.0%)	24 (57.1%)	42
Community controls	9 (10.7%)	29 (34.5%)	36 (42.9%)	10 (11.9%)	84
$\chi^2 = 29.948$		df = 3	**p=<0.001**		

Majority of Cases 57.1% belonged to class IV + V and incidence of breast cancer decreased as socio-economic status improved. Among community controls majority of participants 42.9% were from class III and 34.5% from class II. There was a statistical significant association between socio-economic status and breast cancer (p=<0.001).

Table 29: Association between Marital status and Breast cancer

	Married	**Single**	**Total**
Cases	38 (90.5%)	4 (9.5%)	42
Community controls	84 (100%)	0 (0.0%)	84
Fisher Exact Test **p = 0.011**			

Among cases, 90.5% were married and 9.5% were single and 100% of controls were married. This difference was statistically significant with p = 0.011.

Table 30: Association between attainment of menopause and Breast cancer

	Not attained menopause	**Attained menopause**	**Hysterectomy**	**Total**
Cases	14 (33.3%)	21 (50.0%)	7 (16.7%)	42
Community controls	36 (42.9%)	46 (54.8%)	2 (2.4%)	84
$\chi^2 = 8.759$ df = 2 **p=0.013**				

Majority of cases 50.0% were among women, who attained menopause, followed by 33.3% from women, not attained menopause and 16.7% were done hysterectomy. Among community controls 54.8% participants attained menopause, 42.9% not attained menopause and 2.4% were done hysterectomy. This difference was found to be statistically significant with p=0.013.

Table 31: Association between Age at menarche and Breast cancer

	<13 years	**≥13 years**	**Total**
Cases	10 (23.8%)	32 (76.2%)	42
Community controls	13 (15.5%)	71 (84.5%)	84
$\chi^2 = 1.303$	df = 1	p = 0.254	

Among cases 76.2% attained menopause when they were ≥13years and 23.8% at <13years, among community controls 84.5% attained at ≥13years and 15.5% at <13years. This difference was not statistically significant with p=0.254.

Table 32: Association between Age at 1st child and Breast cancer

	<18 years	**≥18 years**	**No child**	**Total**
Cases	16 (38.1%)	18 (42.9%)	8 (19.0%)	42
Community controls	22 (26.2%)	62 (73.8%)	0 (0.0%)	84
$\chi^2 = 21.541$	df = 2		**p=<0.001**	

At the time of 1st child, 42.9% of cases were ≥18years, followed by 38.1% who were <18years and 19% had not borne children, among community controls 73.8% had 1st child at the age of ≥18years, followed by 26.2% at the age of <18years and 0.0% had not borne children. This difference was found to be statistically significant with p=<0.001.

Table 33: Association between duration of breastfeeding and Breast cancer

	1-2 years	**>2 years**	**Not breast fed**	**Total**
Cases	4 (9.5%)	29 (69.0%)	9 (21.5%)	42
Community controls	6 (7.1%)	78 (92.9%)	0 (0.0%)	84
$\chi^2 = 20.069$		df = 2		**p=<0.001**

Among cases 69.0% breast fed for >2years, 21.5% did not and 9.5% between 1-2 years, among community controls, 92.9% breastfed their children for >2years, 7.1% for 1-2 years and 0.0% did not breast feed. This difference was found to be statistically significant with p=<0.001.

Table 34: Association between Previous H/O Benign breast disease and Breast cancer

	Yes	**No**	**Total**
Cases	1 (2.4%)	41 (97.6%)	42
Community controls	0 (0.0%)	84 (100%)	84
Fisher Exact Test		p = .337	

In the present study majority i.e. 97.6% cases and 100% controls did not have previous H/O benign breast disease. This difference was not statistically significant with p = .337.

Table 35: Association between Diet and Breast cancer

	Vegetarian	**Non vegetarian**	**Total**
Cases	19 (45.2%)	23 (54.8%)	42
Community controls	37 (44.0%)	47 (56.0%)	84
$\chi^2 = .016$ df = 1 p = 0.899			

Among cases 54.8% women were non vegetarian and 45.2% were vegetarian, among community controls, 56.0% women were non vegetarian and 44.0% were vegetarian. This difference was not statistically significant with p = 0.899.

Table 36: Association between Family history and Breast cancer

	Yes	**No**	**Total**
Cases	3 (7.1%)	39 (92.9%)	42
Community controls	0 (0.0%)	84 (100%)	84
Fisher Exact Test **p = 0.035**			

In the present study majority i.e. 92.9% of cases and 100% of controls did not have family history of breast cancer. This difference was found to be statistically significant with p=0.035.

Table 37: Association between BMI and Breast cancer

	<18.5 kg/m^2	**18.5 -22.9 kg/m^2**	**≥23 kg/m^2**	**Total**
Cases	6 (14.3%)	14 (33.3%)	22 (52.4%)	42
Community controls	5 (6.0%)	20 (23.8%)	59 (70.2%)	84
$\chi^2 = 4.55$		df = 2	p = .102	

Majority of cases (52.4%) had BMI ≥23 kg/m^2, followed by 33.3% with BMI between 18.5 to 22.9 kg/m^2 and 14.3% with BMI <18.5 kg/m^2. Among community controls 23.8% had BMI 18.5 to 22.9 kg/m^2, 70.2% with ≥23 kg/m^2 and 6.0% with BMI <18.5 kg/m^2. This difference was not found statistically significant (p=0.102).

Table 38: Distribution of cases according to the type of breast cancer (n=42)

Type of cancer	**Grade-I**	**Grade-II**	**Grade-III**	**Grade-IV**	**Total**
Invasive ductal carcinoma	5(24%)	13(62%)	3(14%)	_	21
Infiltrating ductal carcinoma	8(38%)	9(43%)	3(14%)	1(5%)	21
Total	13(31%)	22(52%)	6 (14%)	1(2.5%)	42

In our study 50% were invasive ductal carcinomas and remaining 50% were infiltrating ductal carcinoma. Maximum were grade II (52%) followed by grade I (31%), III (14%) and least grade VI (2.5%).

Table 39: Univariate analysis for risk factors of breast cancer

(Cases and hospital controls)

Particulars	Unadjusted OR	95% CI	p value
Education:			
High school	Ref		
PUC+ College	9.01	1.12-71.42	**0.039**
Primary	7.35	0.87-62.5	0.066
Illiterate	37.03	3.28-500	**0.027**
Occupation:			
Housewife/Working	0.26	0.12-0.57	**0.001**
Family Type:			
Broken	Ref		
Nuclear	6.75	1.23-37.14	**0.028**
Joint	6.90	1.28-34.18	**0.025**
SES:			
Class I	Ref		
Class II	0.71	0.16-3.16	0.654
Class III	0.69	0.17-2.86	0.612
Class IV	1.04	0.27-4.05	0.957
Class V	6.75	1.32-34.48	**0.022**
Menstrual history:			
Hysterectomy	Ref		
Attained menopause	17.0	1.91-151.25	**0.011**
Not attained menopause	16.33	1.89-141.69	**0.011**
Age at first child:			
No child	Ref		
<18years	10.5	1.19-92.72	**0.034**
≥18years	27.55	3.23-235.16	**0.002**
Diet:			
Veg. / Non-veg.	0.35	0.16-0.25	**0.007**
Breastfeeding:			
1-2years	Ref		
>2years	0.111	0.01-1.34	0.175
Not breastfed	2.724	0.64-11.8	0.083
BMI:			
<18.5 kg/m^2	Ref		
18.5-22.9 kg/m^2	1.97	0.49-7.86	0.333
≥23 kg/m^2	5.46	1.35-22.08	**0.017**

As compared to education, highest risk of breast cancer is seen among illiterate with odds ratio of 37.03, CI 3.28-500 and p <0.027. Women belonging to class V of socio economic class had risk of developing breast cancer 6.75 times more compared to women belonging to class I (CI 1.32-34.48, P=0.022). House wives had lower risk as compared to working women with odds ratio of 0.26 and p=0.001. As the number of women in broken family were less hence the reverse result has occurred. No biological plausibility could be explained. Hysterectomy seems to be protect women from breast cancer as compare to attaining menopause naturally or not attaining menopause. As the risk of breast cancer being 17 times higher in them. As the number of women who had no children were very less among the controls hence reverse association is shown as far as age at 1^{st} and breast cancer is concerned. Breastfeeding for >2 years has beneficial effect in preventing breast cancer as compared to those who never breast fed with odds ratio of 0.111, but statistically this was not significant. Higher the BMI more risk of breast cancer. Women with BMI $\geq$23 kg/m^2 were 5.46 times at higher risk as compared to those with BMI < 18 kg/m^2. This difference was statistically significant with p=0.017.

Table 40: Multivariate analysis for risk factors of breast cancer (Cases and hospital controls)

Particulars	Adjusted OR	95% CI	p value
Education:			
High school	Ref		
PUC+ College	4.13	0.37-47.6	0.242
Primary	2.65	0.24-47.6	0.377
Illiterate	20.83	0.83-500	0.064
Occupation:			
Housewife/Working	0.46	0.14-1.53	0.209
Family Type:			
Broken	Ref		
Nuclear	0.82	0.07-8.92	0.873
Joint	1.18	0.11-12.5	0.891
SES:			
Class I	Ref		
Class II	1.18	0.06-24.39	0.914
Class III	1.97	0.07-55.55	0.687
Class IV	1.35	0.05-37.03	0.858
Class V	7.93	0.23-2.50	0.250
Menstrual history:			
Hysterectomy	Ref		
Attained menopause	9.20	0.71-119.63	0.09
Not attained menopause	7.56	0.59-96.7	0.119
Age at first child:			
No child	Ref		
<18years	0.08	1.19-92.72	**0.045**
≥18years	2.23	0.69-7.91	0.173
Diet:			
Veg. / Non-veg.	0.22	0.07-.706	**0.011**
BMI:			
<18.5 kg/m^2	Ref		
18.5-22.9 kg/m^2	1.45	0.56-25.46	0.169
≥23 kg/m^2	3.79	0.23-9.17	0.689

Multivariate analysis (with adjusted Odds Ratio) showed that the risk factors such as Age at first child: <18 years. [OR .08 (95% CI 1.19 - 92.72) p=0.045], Vegetarian Diet [OR .22 (95% CI .07- .706) p<0.007], seemed to be significantly associated with reduced risk of developing breast cancer.

Table 41: Univariate analysis for risk factors of breast cancer

(Cases and community controls)

Particulars	Unadjusted OR	95% CI	p value
Religion:			
Hindu /Others	6.29	2.39-16.5	**<0.001**
Education:			
PUC+ College	Ref		
High school	2.86	0.662-12.382	0.159
Primary	6.03	1.33-27.27	**0.020**
Illiterate	53.66	4.79-601.2	**0.001**
Occupation:			
Housewife/Working	0.06	0.02-0.18	**<0.001**
Family Type:			
Broken	Ref		
Nuclear	13.80	1.56-122.21	**0.018**
Joint	13.87	1.54-124.81	**0.019**
SES:			
Class I	Ref		
Class II	0.46	0.11-2.02	0.308
Class III	0.5	0.12-2.03	0.334
Class IV + V	5.40	1.34-21.73	**0.017**
Menstrual history:			
Hysterectomy	Ref		
Attained menopause	9.0	1.66-48.69	**0.011**
Not attained menopause	7.67	1.46-40.08	**0.016**

As compared to Religion highest risk of breast cancer seen among Hindus with odds ratio of 6.29 and p<0.001. As compared to education, highest risk of breast cancer is seen among illiterate with odds ratio of 53.66, CI 4.79-601.2 and p=0.001. House wives had lower risk as compared to working women with odds ratio of 0.06 and p<0.001. As among the hospital controls in community controls also the number of women in broken family were less hence the reverse result has occurred. No biological plausibility could be explained. Women belonging to classes IV+V of socio economic class had risk of developing breast cancer 5.40 times more compared to women belonging to class I (CI 1.34-21.73, P=0.017). Hysterectomy seems to be protect women from breast cancer as compare to attaining menopause naturally or not attaining menopause, as the risk of breast cancer being 9 times higher in them.. This difference was statistically significant with p=0.011.

Table 42: Multivariate analysis for risk factors of breast cancer (cases and community controls)

Particulars	Adjusted OR	95% CI	p value
Religion:			
Hindu /Others	7.05	1.62-3.81	**0.009**
Education:			
PUC+ College	Ref		
High school	3.22	0.21-52.46	0.394
Primary	6.32	0.41-96.65	0.185
Illiterate	19.24	0.72-517.54	0.078
Occupation:			
Housewife/Working	0.04	0.01-.28	**0.001**
Family Type:			
Broken	Ref		
Nuclear	7.29	1.56-247.36	0.269
Joint	9.14	0.27-38.74	0.216
SES:			
Class I	Ref		
Class II	10.10	0.53-258	0.120
Class III	0.5	0.52-200	0.126
Class IV + V	142.8	6.17-286.3	**0.002**
Menstrual history:			
Hysterectomy	Ref		
Attained menopause	11.38	0.43-298.7	0.145
Not attained menopause	14.91	0.54-408	0.110

Multivariate analysis (with adjusted Odds Ratio) showed that the risk factors such as Religion [OR 7.05 (95% CI 1.62-3.81) p=<0.009], Occupation [OR .04 (95% CI .01-.28) p=0.001], SES class IV+V [OR 142.8 (95% CI 6.17-286.3) p=0.002], were independently associated with breast cancer.

DISCUSSION

The present study was conducted at Dr. Prabhakar Kore Charitable hospital, Belagavi, and Ashok Nagar, which is one of the urban field practice area of Department of Community Medicine, Jawaharlal Nehru Medical College, Belagavi, from January to December 2015. This study included 42 newly diagnosed cases of breast cancer and 168 age matched controls. A comparison of the present study and other studies in relation to breast cancer and related risk factors are given in following tables.

I. Socio-demographic profile of study participants

Table 1: Age distribution of study participants

In the present study majority i.e. 40.5%, 38.0% and 36.9% respectively out of 42 cases, 84 hospital and 84 community controls, belonged to 41-50 years, followed by 31-40 years (28.6%, 29.8% and 29.8 respectively) least were ≥60 years (14.2%, 14.2% and 15.5% respectively).

In contrast in a study conducted in Nagpur, Maharashtra, among 105 cases and 210 community based controls, maximum numbers of cases were observed in 40-49 years (38%) followed by 50 –59 years (22%), 20% were <40 years and 21% were ≥60 years.[1] Compared to our study less number of patients were <40 years and more patients were aged >60 years.

In another study done in Tehran, Iran, among 286 cases, 87 (30%) were in the age group of ≤39, 84 (29%) were in the age group of 40-49, 57 (20%) were in 50-59 years and 58 (21%) were ≥60 years. Whereas among 249 controls, 101 (41%) were in the

age group of ≤39, 68 (27%) were in the age group of 40-49, 44 (18%) were in 50-59 years and 36 (14%) were ≥60 years.[5] Controls were less than the cases.

A study conducted in Isfahan, Iran among 216 cases, 12 (6%) were in the age group of <30years, 127 (59%) were in the age group of 30-50years and 77 (35%) were >50 years. among 41 controls, 14 (34%) were in the age group of <30yr, 17 (41%) were in the age group of 30-50yr and 10 (25%) were >50 years.[6] In this study age was not matched and controls were less than the cases. Some amount of bias would have occurred.

Table 2: Distribution of study participants according to residence

In our study, among the cases, majority of participants, i.e. 57 % were from rural and 42.9 % were from urban area, among hospital controls 72.6 % were from rural and 27.4% were from urban area, whereas among community controls all women were from urban area.

Another case-control study, carried out at the Pereira Rossell Women's Hospital, Montevideo, where among 253 breast cancer cases and 497 frequency-matched healthy controls, majority of participants, i.e. 98% were from urban and 2% were from rural area.[8]

Unlike our study, a study done in New Delhi, showed that, among 115 cases, majority of participants, i.e. 65 (56.5 %) were from urban and 50 (43.5 %) were from rural area and among 217 controls 150 (69%) were from urban and 67 (31%) were from rural area.[9]

Table 3: Distribution of study participants according to religion

In the present study majority i.e. 85.7%, 89.2% and 48.8% respectively out of 42 cases, 84 hospital and 84 community controls, belonged to Hindu religion, followed by Muslim (11.9%, 10.7% and 51.2% respectively) least were Christian (2.4%).

The distribution was similar to the study conducted in Nagpur, Maharashtra, which comprised of 88 (84%) Hindus, 15 (14%) Muslims and 2 (2%) Christian were among 105 cases and among 210 controls, 177 (84%) were Hindus followed by 29 (14%) Muslims and 4 (2%) Christian.[1]

In another study conducted in New Delhi, Cases showed more number of Hindus, less number of Muslim and least were Christians. Among 217 controls, 61% were Hindus, 36% Muslims and 3% Christians.[9]

A study conducted in southern India showed similar distribution, among cases more were Hindus (82%) less Muslims (14%) and least (4%) Christian. Among controls, 73% were Hindus followed by 19% Muslims and 8% Christian.[24]

Table 4: Distribution of study participants according to literacy status

In the present study majority i.e. 54.7%, 46.4% and 32.1% respectively out of 42 cases, 84 hospital and 84 community controls, were illiterates, followed by those who had studied up to primary school (26.2%, 30.9% and 36.9% respectively), 2.3%, 19.5% and 27.4% respectively were educated up to High school, least were educated up to Pre-University College (4.6%, 2.3% and 2.3% respectively).

A study done in Iran, showed that among 286 cases 30.0% were illiterates, 41.0% had studied till primary school, 21.0% till secondary school and 9.0% till University. Whereas among 249 controls, 36.0% were illiterates, 41.0% had studied till primary school, 17.0% till secondary school and 6.0% till University.[5]

A study done in New Delhi, among 115 cases and 217 controls showed that, 60.0% were illiterates, 20.0% had studied till high school and 20.0% had studied above high school.[9]

In contrast to our study a study conducted in southern India showed that, among 63 cases of breast cancer majority 54.0% had studied 5-10 years, followed by 21.0% studied >10years, 6.0% 1-4yrs and only 19.0% were illiterates. Among 252 controls 60.0% had studied 5-10 years, 10.0% studied >10years, 10.0% 1-4yrs and 20.0%) were illiterates.[24]

Table 5: Distribution of study participants according to their occupation.

In our study, among cases 45.3% were housewives, 11.8% were working (govt. or pvt. Job), rest (42.8%) were doing other works. Among hospital controls 76.2% were housewives, 4.8% were working, rest (19.0%) were involved in other works. Among community controls 92.8% were housewives and 5.9% were working, other were 1.2%.

In contrast to our study, a study conducted in New Delhi, showed that among 115 cases 97% were unemployed and 3% were employed. Among 217 controls 89% were unemployed and 11% were employed.[9]

A study conducted in Isfahan, Iran showed findings simmilar to our study, out of 216 cases 63% were housewives, 37% were working. Among 41 controls 73% were housewives, 27% were working.[6]

Table 6: Distribution of study participants according to type of family

Among cases 47.6% women belonged to joint family, 38% to nuclear and 14.2% to broken family. Among hospital controls 56% were from joint, 42.8% from nuclear and 2.4% were from broken family. Among community controls 56% were from joint, 44% from nuclear and 1.2% were from broken family.

Unlike our study, a study done in southern India showed that, 83% were from nuclear, 17% from joint family. Among controls 81% were from nuclear and 19% from joint family. None belonged to broken family.[24]

Table 7: Distribution of study participants according to socioeconomic status

As regards to socio-economic status, majority i.e. among cases, 28.4% belonged to each of class IV and V, followed by class III (19.0%), 14.2% to class II, and 9.5% to class I. Among hospital controls majority of them i.e. 30.9% belonged to each of class III and IV, 22.6% to class II, 10.7% to class I, and 4.7% to class V. Among community controls, 42.8% belonged to class III, 34.5% to class II, 11.9% to class IV, and 10.7% to class I.

Similarly, the results from a study conducted in New Delhi, showed that 47% of cases belonged to class V followed by class IV (42%) and 11% belonged to class III.[9]

II. Association between risk factors and breast cancer

Table 8 & 23: Association between residence and breast cancer

Association between residence and breast cancer among hospital controls was not statistically significant (p=0.080) but among community controls it was significant with p=<0.001. The reason of this difference may be because all women in control group were from urban area.

Another case-control study, carried out at the Pereira Rossell Women's Hospital, had not shown association between residence and breast cancer.[8] Similarly a study done in New Delhi, showed significant difference between breast cancer cases and controls in relation to place of residence (P<0.05)[9.]

Table 9&24: Association between religion and breast cancer

Association between religion and breast cancer among hospital controls was not statistically significant (p=0.560) but among community controls it was significant with p=<0.001.

A study conducted in Nagpur, Maharashtra, no association was observed between religion and breast cancer.[1] In another study conducted in New Delhi also did not find any significant difference between breast cancer and religion.[9]

Table 10&25: Association between literacy status and breast cancer

In the present study there was a statistical significant association between education and breast cancer among hospital controls (p = 0.007) as well as community controls (p = <0.001). This result also showed that incidence of breast cancer decreased as literacy status improved.

No significant association was found between education and breast cancer in different studies done in New Delhi[5] and in Iran. [9]

Table 11&26: Association between occupation and breast cancer

In our study, among breast cancer cases most were working and this difference was found to be statistically significant among hospital controls (p = 0.001) and community controls with p = <0.001.

a study conducted in New Delhi, showed a significant difference between breast cancer in relation to occupation (p=0.01).[9] Whereas In contrast to our study, a study conducted in Isfahan, Iran had not found association between breast cancer and occupation.(p=0.085).[6]

Table 12&27: Association between type of family and breast cancer

In present study about half of the cases belonged to joint family. Difference was found to be statistically significant for both hospital and community controls with p=0.035 and p=0.010 respectively. This difference was attributed to less number of women belonging to broken family. Hence the reverse association.

Unlike our study, a study done in southern India had not shown any association between type of family and breast cancer.[24]

Table 13&28: Distribution of study participants according to socioeconomic status

As regards to socio-economic there was a statistical significant association between socio-economic status and breast cancer among hospital controls (p=0.005) and

community controls (p=<0.001).Our result showed that incidence of breast cancer decreased as socio-economic status improved.

In contrast to our study another study conducted in New Delhi, had not found any significant difference between socioeconomic status and breast cancer.[9]

Table 14&29: Distribution of study participants according to marital status

In our study 90.5% of cases were married while all the controls were married. This difference was found to be statistically significant with p = 0.011.

A study done in Brazil showed that among hospital cases and controls 76.0% and 84.0% respectively were married. More number of cases (24.0%) were unmarried as compared to controls (16.0%). Among community cases and controls 77.0% and 88.0% respectively were married. 23.0% and 12.0% were single.[7] They did not find any association.

Table 15&30: Distribution of study participants according to attainment of menopause

In our study half of our cases had attained menopause, 1/3 had not attained menopause and 16.7% had undergone hysterectomy. Among hospital controls 58.3% participants had attained menopause, 40.5% had not attained menopause and only 1.2% had undergone hysterectomy. This difference was found to be statistically significant with p=0.004. Among community controls 54.8% participants had attained menopause, 42.9% had not attained menopause and 2.4% had undergone hysterectomy. This difference was found to be statistically significant with p=0.013.

Study conducted in Nagpur, showed similar findings that Majority of cases 54% had attained menopause and 46% had not attained menopause. Among controls 61% participants had attained menopause, 39% had not attained menopause. None had undergone hysterectomy. Risk was 7.9 times more among women who had menopause at or after 50 years of age compared to women who had menopause before 45 years. (O.R. =7.91,CI=2.86-19.15). Association between attainment of menopause and breast cancer was fount statistically significant with p<0.001.[1]

In contrast, a study done in Tehran, Iran among cases majority of them i.e. 65% had not attained menopause and 35% had attained menopause. Among controls 72% had not attained and 28% had attained menopause. Menopausal status was not associated significantly with increased risk for breast cancer (p=0.07)[5]

Table 16&31: Distribution of study participants according to age at menarche

In our study, among cases >75% were ≥13years and 23.8% were <13years, when they attained menarche, among hospital controls 84.5% were ≥13years and 15.5% were <13years, when they attained menarche. This difference was not statistically significant with p=0.254. Among community controls 84.5% were ≥13years and 15.5% were <13years, when they attained menarche. This difference was also not statistically significant with p=0.254.

In a study conducted in Nagpur showed that, among 105 cases majority of participants i.e. 73% were between 13 and 15years followed by 22% ≤12years and 5% in ≥16years, when they attained menarche. Among 210 controls 79% were 13-15years, 5% ≤12 and 16% were ≥16years, when they attained menarche.[1] These findings showed that Women who had menarche at early ages (≤12 years) were at increased

risk compared with women who had menarche between 13-15years of age (O.R. = 4.99, CI =2.26-10.99, p<0.001).

A study done in Brazil showed that among hospital cases and controls 41% were <12years and 59% were ≥12years, when they attained menarche. Whereas among community cases 47% were <12years, 53% were ≥12years and among community controls 45% were <12years and 55% ≥12years, when they attained menarche. They did not find any association between age at menarche and breast cancer.[7]

A study done in Wisconsin, Massachusetts, and New Hampshire showed that, among 3499 cases of breast cancer and 4213 controls 22% were <12years, 23% were in age of 12 years, 43% were in the age group of 13-14years and 11% were in ≥15years, when they attained menarche Population Attributable Risk of breast cancer for age at menarche was 57.3%.[18]

Table 17&32: Distribution of study participants according to age at first child

At the time of 1st child, among cases, majority of women 42.9% were ≥18years, 38.1% were <18years and 19% had not borne children, among hospital controls 73.8% had 1st child at the age of ≥18years, 25.0% <18years and 1.2% had not borne children. This difference was found to be statistically significant with p=<0.001. Among community controls majority 73.8% ≥18years, 26.2% were <18years. All the controls had children. This difference was found to be statistically significant with p=<0.001. Less number of women who had not borne children was the reason for reverse association.

In a study done in Nagpur, among 105 cases, majority of participants i.e. 54% give birth to 1st child between 21-25years, 35% before ≤20years and 11% after >25yr,

among 210 controls 57% give birth to 1st child before were ≤20years, 36% between 21-25years and 7% after >25years.[1] difference was found to be statistically significant for women who had first child after 25 years (O.R.=2.59, CI = 1.01- 6.55, p<0.01).[1]

In contrast a study done in Iran, majority of participants i.e. 51% gave birth to 1st child when they were <20years, 28% between 20-24years, 16% between 25-29years and 5% above ≥30years of age. Similarly 56% of controls gave birth to 1st child when they were <20years, 31% when they were between 20-24years, 11% between 25-29years and 2% after ≥30years.There was no significant association between age at first child and breast cancer (p=0.93).[5]

A study done in Wisconsin, Massachusetts, and New Hampshire showed that, among 3499 cases of breast cancer 19.0% gave birth to 1st child when they were <20years, 51.0% at 20-24years, 20% between 25-29years and 8% above ≥30years, among 4213 controls 22% gave birth to 1st child when they were <20years, 53% at 20-24years, 20% between 25-29years and 5% above ≥30years. This study did not find association between age at first child and breast cancer.[18]

Table 18&33: Distribution of study participants according to duration of breastfeeding

Among cases 69.0% and 9.5% women breastfed their child for >2 years and 1-2 years respectively, among hospital controls, 94.0% and 4.8% women breastfed their child for >2 years and 1-2 years respectively. Among community controls, 92.9% and 7.1% women had breastfed their child for >2 years and 1-2 years respectively. This difference was found to be statistically significant with p=<0.001. All had breast

cancer among those who did not breastfed their child, this shows that breastfeeding is protective against breast cancer.

In another study done in Nagpur, among cases 17.0%, 25.0%, 29.0% and 12% women totally breastfed their child for >2, 2-4, 5-6 and ≥7years respectively. 17% never breastfed had developed breast cancer. Among controls 6.0%, 26.0%, 42.0% and 23% women breastfed their child >2, 2-4, 5-6 and ≥7years respectively. 3% never breastfed. This difference had shown significant association with $p<0.001$.[1]

Another case-control study, carried out at the Pereira Rossell Women's Hospital, Montevideo, found that 45.0% of cases breastfed their child for 16 years and 42% women breastfed their child for ≥17months. 13% never breastfed their child. Among controls 44.0% and 45% of women breastfed their child for 1-16months and ≥17months respectively. 11% never breastfed their child. This study did not find association between duration of breastfeeding and breast cancer.[8]

Table 19&34: Distribution of study participants according to H/O benign breast disease

In the present study majority i.e. 97.6% cases and 98.8% controls did not have previous H/O benign breast disease among hospital controls. This difference was not statistically significant with $p = 1$. 97.6% cases and 100% community controls did not have previous H/O benign breast disease. This difference was not statistically significant with $p = .337$.

A study done in Brazil showed that among hospital cases 90.0%, among hospital controls 95.0% did not have previous H/O benign breast disease. Among community cases and controls, 91.0% and 96.0% respectively did not have previous H/O benign

breast disease. Did not find any association between H/O benign breast disease and breast cancer.[7]

Table 20&35: Distribution of study participants according to type of Diet

In our study, about 55% of women with breast cancer consumed non vegetarian diet and 45% consumed vegetarian diet 30% of hospital controls consumed non vegetarian diet and 70% consumed vegetarian diet. This difference was found to be statistically significant with p = 0.006**,** OR = 0.35 (.16 -.75). 56% of community controls consumed non-vegetarian diet and 44% consumed vegetarian diet. This difference was not statistically significant with p = 0.899. This showed vegetarian diet had protective effect on breast cancer.

Unlike our study a study done in Manipal, Udupi District, showed that 2/3 consumed non vegetarian and 1/3 consumed vegetarian diet. Among 94 controls, about 50% consumed non vegetarian diet. Difference was found to be statistically significant with p = 0.03**,** Unadjusted (OR 1.93, CI 1.05- 3.44) and adjusted risk (OR 2.80, CI 1.15-6.81) vegetarian diet showed protective factor against breast cancer.[4]

Similar to our study, a cohort study done in USA and Canada showed that, 53% of cases and 52% of controls were vegetarian.[23]

Table 21&36: Distribution of study participants according to family history

In the present study majority i.e. 93.0% of cases and 100% of both hospital and community controls did not have family history of breast cancer. This difference was found to be statistically significant with p=<0.035.

A study done in Brazil showed that among hospital cases and controls 76.0% and 90.0% respectively did not have positive family history of breast cancer. Among community cases and controls 74.0% and 85.0% did not have positive family history while 24% and 10% had positive family history. Had not found significant association between family history and breast cancer with odds ratio 1 and CI 2.6 (1.8-3.7).[7]

Table 22&37: Distribution of study participants according to BMI

In the present study, about 52.0% of women with breast cancer had BMI $\geq$23 kg/m^2, 33.3% had BMI between 18.5 to 22.9 kg/m^2 and 14.3% had BMI <18.5 kg/m^2. Among hospital controls about 61.0% had BMI between 18.5 to 22.9 kg/m^2, 35.0% with BMI $\geq$23 kg/m^2 and 5.0% with BMI <18.5 kg/m^2. This difference was found to be statistically significant with p=<0.009. Among community controls 23.8% had BMI 18.5 to 22.9 kg/m^2, 70.2% with $\geq$23 kg/m^2 and 6.0% with BMI <18.5 kg/m^2. This difference was not found statistically significant (p=0.102). As BMI increases, risk of developing of breast cancer is also increases.

Study done in New Delhi, unlike our study showed that 50% of case had BMI between 18.5-24.99, 30% with BMI between 25-29.99, 13% with BMI $\geq$30 and 7% with BMI <18.5. Among controls 56% had BMI 18.5-24.99. 28% with BMI between 25-29.99, 11% with BMI <18.5 and 5% with BMI $\geq$30.[9] Difference was found to be statistically significant with p=<0.02. This suggest that higher the BMI more the risk of breast cancer.

A study conducted in Eastern India showed that, 36% had BMI between 18.5-22.99, 34% with BMI between 23-27.49, 18% had BMI $\geq$27 and 12% had BMI<18.5. Among controls 34% had BMI 18.5-22.99, 30% had BMI between 23-27.49, 22%

with ≥27 14% had BMI <18.5.[13] Difference was found to be statistically significant with p = 0.002.

Table 38, 39, 40&41: Univariate and Multivariate analysis for risk factors of breast cancer

On performing Univariate analysis, the Risk factors such as Religion, lower level of education, Occupation, lower socio-economic status, Type of family, Age at menopause, Age at first child, Non-veg diet and BMI ≥23 were associated with breast cancer.

On performing Multivariate analysis and thereby removing the effect of confounders, the risk factors independently associated with breast cancer were Religion, Occupation, lower socio-economic status (class IV & V), age at first child <18yr and Non-vegetarian diet.

Study conducted in Nagpur showed similar findings about attainment of menopause, which showed significant association between attainment of menopause and breast cancer with OR = 7.41 and p<0.001.[1]

A study done in Manipal, Udupi District, showed that risk of breast cancer was 2.8 times more among women who consumed non-vegetarion diet.[4]

In contrast a study done in Iran there was no significant association between age at first child and breast cancer with OR=1 and p=0.93.[5]

Similar findings in the studies done in Brazil, New Delhi, Bhopal and southern India.[6,7,9,10,13,23,24]

CONCLUSION

The present case control study revealed that, maximum breast cancer cases were in the age group 41 -50 years. The risk factors such as lower socio-economic status, Religion, lower level of education, occupation, type of family, marital status of woman, age at attainment of menopause, absence of breast feeding, overweight, previous history of benign breast disease, family history of breast cancer were associated with breast cancer.

LIMITATIONS

The limitations of the study are:

- Community controls were chosen from urban area only.
- Memory bias could have occurred while assessing the duration of breastfeeding.
- Other risk factors like Associations of adipokines, insulin resistance with sex steroids in patients with breast cancer, Polymorphisms in some markers like FGFR2, CHEK2, B7-H4 BRCA1, BRCA2, PTEN, and TP53 were not studied in our study.

RECOMMENDATIONS

Based on the findings of our study, following recommendations are being suggested for prevention of breast cancer:

- Awareness regarding breast cancer and its risk factors should be given to women.
- Anganwadi workers, ASHA workers should be trained in helping women perform breast self-examination.
- Mass media should be used to create awareness regarding breast self-examination and clinical examination.
- NGOs should be involved in creating awareness about early detection of breast cancer.
- Opportunistic screening for breast cancer should be carried out at health care institutions for early detection of breast cancer.

SUMMARY

The present study titled "Risk factors of breast cancer among women admitted in tertiary care hospital - a case control study was conducted at Dr. Prabhakar Kore Charitable hospital, Belagavi, and Ashok Nagar, which is one of the urban field practice area of Department of Community Medicine, Jawaharlal Nehru Medical College, Belagavi.

The present study was undertaken to know the risk factors associated with the breast cancer and was carried out among newly diagnosed cases of breast cancer and age matched hospital and community control groups. The duration of the study was from 1st January to 31st December 2015.

The study population included 42 hospital based cases and 168 age matched controls (hospital and community). After obtaining informed consent, women were interviewed using pre-designed and pre-tested questionnaire.

In our study, majority i.e. 40.0% of cases, 38.0% of hospital controls and 37.0% of community controls, belonged to 41-50 years, followed by 31-40 years (28.6%, 29.8% and 29.8 respectively) least were ≥60 years (14.2%, 14.2% and 15.5% respectively).

Majority i.e. 85.7%, 89.2% and 48.8% respectively out of 42 cases, 84 hospital and 84 community controls, belonged to Hindu, followed by Muslim (11.9%, 10.7% and 51.2% respectively) least were Christian (2.4%) and majority 57.1%, 72.6% respectively out of cases and controls were residing in rural area.

Majority i.e. 54.7%, 46.4% and 32.1% respectively out of 42 cases, 84 hospital and 84 community controls, were Illiterate, 41.0% had studied till primary school, 21.0% till secondary school and 9.0% till University.

Majority (47.6%) were living in joint families. About 28.4% belonged to class IV and class V socio-economic status according to Modified B. G. Prasad classification.

Positive association was found between attainment of menopause and breast cancer with odd's ratio of 17.0 and p=0.011. The strength of association between non breastfeeding and Women who breastfed indicated by odd's ratio was 2.724. Risk of developing breast cancer due to overweight was 5.46 times higher for those with BMI $\geq$23 as compared to those with BMI between18.5-22.9. Non-vegetarian diet was found significantly associated with breast cancer (p= 0.007).

Unmarried women carried higher risk of suffering from breast cancer as compared to married women. This was found to be statistically significant with p = 0.011.

Risk of developing breast cancer was 2.23 time higher in women who were $\geq$18 years, when they delivered 1st child as compared to those who gave birth before the age of 18 years. But no statistically significant difference was observed between age at menarche and development of breast cancer with p=0.254.

Our study demonstrated that risk factors such as lower socio-economic status, religion, lower level of education, occupation, type of family, unmarried status, delayed age at attainment of menopause, absence of breast feeding, overweight, previous history of benign breast disease, family history of breast cancer were associated with breast cancer, in univariate analysis.

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ANNEXURE III – PROFORMA

RISK FACTORS IN BREAST CANCER AMONG WOMEN ADMITTED IN TERTIARY CARE HOSPITAL - A CASE CONTROL STUDY

SOCIO DEMOGRAPHIC DATA

Name : _____

Age :_____ years

Area of residence : _____

1. Religion: 1. Hindu

2. Muslim

3. Christian

4. Others (specify).

2. Education: 1. Illiterate

2. Primary school

3. High school

4. Pre-university I

5. Pre-university II

6. College

3. Occupation: House wife/ Govt. Job/ Private job / Business / others specify _____

Is your work is related to radiation exposure? Yes / No

4. Marital status:

1. Married

2. Widowed

3. Divorced / Separated

5. Type of Family: 1. Joint

2. Nuclear

3. Broken family

4. Problem family

6. a. Monthly income of the family:

b. Total number of family members:

c. Monthly per capita income:

d. B.G Prasad class :

7. When was your last menstrual period?

8. At what age did you attain menarche?

9. Have you used birth control measures?

a. yes

b. no

If yes what kind?

a. Birth control pill

b. condom

c. IUD

d. any other/specify

10. If you are taking birth control pill, how long you did you take? - _____years.

11. Have you taken Hormonal Replacement Therapy? Yes / No

If yes, how many years, specify _____

12. How many children you have?

13. What was your age, when you delivered your 1st child? _____ Years

14. Did you breast feed your children? Yes / No

If yes, Total duration

1st child _____years

2nd child _____years

3rd child _____ years

4th child _____years

Total duration of breast feeding _____years

15. Have you had any previous benign breast disease?

a. yes

b. no

If yes specify it?

16. What kind of diet you are taking?

a. Vegetarian, b. Non vegetarian.

17. Do you have any habits? Areca nut / Gutkha/ other tobacco products/ smoking/Alcohol

18. Does anyone in your family have Breast Cancer (male and female)?

a. yes

b. no

c. if yes, specify

19. Does any of yours first degree relatives had been diagnosed Ovarian Cancer?

20. Have you ever had exposure of radiation, like x-rays, CT, etc?

a. yes

b. no

c. If yes, specify how many times?

CLINICAL EXAMINATION

General Physical Examination

1. Built and nourishment: Poor / Moderate / Fair
2. Height: _____ cms Weight: _____ Kgs.
3. BMI:-

Investigations

1. Histopathology report:_____
2. Fine-Needle Aspiration Cytology report:_____

ANNEXURE IV- KEY TO MASTER CHART

RISK FACTORS IN BREAST CANCER AMONG WOMEN ADMITTED IN TERTIARY CARE HOSPITAL - A CASE CONTROL STUDY

A)

1- Case

2- Hospital control

3- Community control

B) Name of participants

C) Age of participants

D) Residence

1- Urban

2- Rural

E) Religion

1- Hindu

2- Muslim

3- Christian

4- Others

F) Education

1- Illiterate

2- Primary

3- High-school

4- Pre University -I

5- Pre University –II

6- College

G) Occupation

1- House wife

2- Govt.job

3- Pvt.job

4- Business

5- Others

H) Radiation exposure

1- Yes

2- No

I) Marital status

1) Married

2) Widow

3) Divorced

4) Unmarried

J) Type of family

1) Joint

2) Nuclear

3) Broken

K) Socio-Economic status (according to modified B.G. Prasad classification)

1) Class-I

2) Class- II

3) Class- III

4) Class- IV

5) Class- V

L) Menstrual history

1) Not attained Menopause

2) Attained menopause

3) Hysterectomy done

M) Age at menarche

N) Birth control measures

1) Yes – 1- Birth control pills

2- Condom

3- IUD

4-Others

2) No

O) OCP

1) No

2) Yes – 1- <1year

2- 1-2 years

3- 2-3 years

4- >3 years

P) Hormonal Replacement therapy

1) Yes

2) No

Q) Do you have child?

1) Yes – (No. of children)

2) No

R) Age at 1st child

S) Did you breast feed your children?

1) Yes (Actual total years of breastfeeding)

2) No

T) Previous H/O benign breast disease

1) Yes

2) No

U) Diet

1) Vegetarian

2) Non-Vegetarian

V) Habits

1) Yes – 1- Areca nut

2- Gutkha

3- Other tobacco products

4- Smoking

5- Alcohol

2) No

W) Family history of breast cancer

1) Yes – 1- Mother

2- Sister

3- Others

2) No

X) Family H/O ovarian cancer

1) Yes

2) No

Y) H/O Radiation exposure

1) Yes- how many times (1, 2, 3 or 4)

2) No

Z) Built

1) Poor

2) Moderate

3) Fair

AA) BMI

1) <18.5 kg/m^2

2) 18.5- 22.9 kg/m^2

3) $\geq$23 kg/m^2

AB) Diagnosis

1) Invasive ductal carcinoma (grade-1, 2, 3 and 4)

2) Infiltrating ductal carcinoma (grade-1, 2, 3 and 4)

ANNEXURE –I

ETHICAL CLEARANCE LETTER

K.L.E.UNIVERSITY'S
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)
(Accredited 'A' Grade by NAAC)

Website: http//www.jnmc.edu
E-Mail : dome@jnmc.edu

Phone: (+ 91-(0)831 Office : 2471350
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/ **Date: 14/11/2014**

To,

PG student in Community Medicine,
J.N.Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"RISK FACTORS IN BREAST CANCER AMONG WOMEN ADMITTED IN TERTIARY CARE HOSPITAL – A CASE CONTROL STUDY",** is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr.Hema Dhumale)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr.Ganga Pilli)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

ANNEXURE-II

INFORMED CONSENT

RISK FACTORS IN BREAST CANCER AMONG WOMEN ADMITTED IN TERTIARY CARE HOSPITAL – A CASE CONTROL STUDY

INVESTIGATORS: **DR. _____**

DR. _____

Introduction

Breast cancer is the most common malignancy affecting women worldwide. Breast Cancer is second most important cancer among Indian women, after cancer Cervix. There are nearly 2 to 2.5 million cancer cases at any given point of time in India. In Karnataka there are about 1.5 lakh prevalent cases of breast cancer and 35000 new cases added every year. The reasons for varying incidence of breast cancer among women are not fully understood, which are likely to be explained by reproductive and lifestyle factors such as literacy, diet, age at menarche and menopause, age at 1st delivery, abortion, family history of breast cancer. The present study attempts to find out some of the various risk factors of breast cancer among patients admitted in tertiary care hospital in Belgaum.

Explanation of procedures

In this study you will have to answer a few questions about your general health information, socio-demographic details, about menarche, menopause, hormonal contraception .The entire procedure may take 1/2 an hour.

Possible benefits

The investigator does not promise or guarantee that you will receive direct benefit being in the study. It will benefit the whole community because by this study we will know the risk factors associated with breast cancer, and accordingly the preventive and control measures can be taught.

Possible risks

There are no risks involved for participation in the study

Confidentiality

Your identity will not be revealed. All information collected will be collected and coded so that no one will know your identity.

Withdrawal

Participation in this study is voluntary. If you do not wish to participate in this study, you will not lose benefits to which you are entitled.

Costs of participation

The cost of the study will be borne by the researcher. There will be no additional cost to you for participating in this study.

Payment of participation

There will be no incentives to you for participating in this study.

Authorization to publish results

The Researchers may use the information gathered from this study for presentation in scientific journals. However your identity will not be disclosed in such presentation or publication.

Legal rights

By signing this consent form, you are not waiving any of your legal rights.

Questions

If you have any questions about this study, you may contact Dr. _____, Dr._____, If you have any questions about your rights as a study participant, you may contact Dr Ganga S. Pilli, Chairman, JNMC Institutional Ethics Committee on human subjects research at 0831- 2741701.

CONSENT STATEMENT

I volunteer and consent to participate in this study. I have read the consent or explained to me in my local languages. The study has been fully explained to me and I had been given the opportunity to ask questions and they have been answered to my satisfaction and that I have received a copy of this signed consent form.

Name of the participant: _____ Signature/ left thumb impression

Name of the eyewitness: _____ Signature/ left thumb impression

Name of the interviewer: _____ Signature

Date: