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Original Research Article

Risk factors for breast cancer among adult women residing in rural south Karnataka: a cross sectional study

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ABSTRACT

Background: There's a steady increase in breast cancer incidence among rural women since rural women are increasingly adopting urban lifestyles, reproductive habits and are also increasingly exposed to similar environmental factors as urban women due to economic development. Objectives was to assess the prevalence of risk factors of breast cancer among women aged 30 years and above residing in a rural South Karnataka
Methods: This cross-sectional study was conducted from June 2016 to January 2017 in villages under Ittamadu primary health centre area, Ramanagara Taluk, Ramnagara district. A total of 600 women aged 30 years or above participated in the study. A semi structured questionnaire was administered by interview method after getting written consent. Descriptive statistics and Chi-square test was used.
Results: This study revealed that the prevalence of risk factors (reproductive and non-reproductive) of breast cancer among adult women aged 30 years and above was between the least prevalence of 0.7% for family history of breast cancer to highest prevalence of 37.5% for age at menarche at less than 13 years of age.
Conclusions: Indian breast cancer patients present with advanced disease stage and have numerous poor prognostic factors, hence knowledge regarding the prevalence of risk factors is necessary to identify how many women are at risk of developing breast cancer as per the established risk factors to promote early detection and timely treatment for improved survival and quality of life of breast cancer patients.

Keywords: Breast cancer, Adult women, Prevalence, Risk factors, Rural

INTRODUCTION

Breast cancer is a malignant proliferation of epithelial cells lining the ducts or lobules of the breast.[1] According to global cancer statistics, Globocan, in 2020, there were 2,261,419 incident cases of breast cancer worldwide which accounts to 11.7% of all cancers among women, the highest in the world. It is estimated that in 2020 worldwide over 684,996 women have died due to breast cancer (6.9% of all cancer deaths).[2] At present, India reports around 100,000 new cases annually according to the Indian council of medical research (ICMR). About 30,000 women die from breast cancer in India annually.[3]

There's a steady increase in breast cancer incidence among rural women since rural women are increasingly adopting urban lifestyles, reproductive habits and are also increasingly exposed to similar environmental factors as urban women due to economic development.[4]

Several risk factors for breast cancer have been well documented. The three dates in a woman's life that have a major impact on breast cancer incidence are age at menarche, age at first full-term pregnancy, and age at menopause. These three factors can account for 70-80% of the variation in breast cancer frequency in different countries.[1]

It is well established that childless women and women having children later in life are at an increased risk of developing breast cancer. With the exception of 5-10% breast cancers where the main risk factor is genetic predisposition, in the remaining 90% of sporadic breast cancers, the identified risk factors are either reproductive, lifestyle or environmental factors, primarily through their influence on the hormonal milieu. No breast cancer risk factor, unique to the Indian population has been widely reported.[5]

The contribution of various modifiable risk factors, excluding reproductive factors, to the overall breast cancer burden has been calculated by Danaei et al. They conclude that 21% of all breast cancer deaths worldwide are attributable to alcohol use, overweight and obesity, and physical inactivity. In low- and middle-income countries, the proportion of breast cancers attributable to these risk factors was 18%, and physical inactivity was the most important determinant (10%).[6] It is important to know about risk factors because they can help identify women who might benefit from certain preventive strategies. Primary prevention of cancer consists of modification of factors that increase the risk of cancer.

Objective

The objective was to assess the prevalence of risk factors of breast cancer among women aged 30 years & above residing in rural South Karnataka.

METHODS

Study design, area, and duration

This cross-sectional study was conducted in Ittamadu primary health centre area, Ramanagara Taluk, Ramanagara District, Karnataka, India. The estimated population of the Ittamadu Primary health centre area is 10911. It consists of 3 subcentres: Ittamadu, Heggadagere and Banandur and a total of 15 villages and households. The study data were conducted from June 2016 to January 2017 and all women aged 30 years and above, who have given consent to participate in this study constituted the study population.

Sample size and sampling technique

Sample size was calculated using the prevalence of established risk factors for breast cancer to be 30% from previous study conducted by Lakshmi et al with a relative error of 15% within 95% confidence interval (CI) and design effect of 1.5 which came out to be 600.[7] The sampling technique used was probability proportionate to population size according to the population of the 3 subcentres, while selection of the samples was by simple random sampling using a currency note. In each sub center all the villages were listed and randomly one village was selected by simple random sampling. In that village, after reaching the centre of the village, one street was chosen randomly using a currency note. In that street, the first house was selected randomly using a currency note. From there onwards, house to house survey was conducted to cover the required number of women aged 30 years and above. One eligible subject was studied from each household. In case of more than one appropriate age adult woman in a sampling unit, one adult woman was selected randomly. In case, there was no eligible subject in the household, next household was approached. When the required number of women were not available, the next nearest village was surveyed till the sample size was obtained. The same procedure was followed in the other two sub centers to cover the sample size.

Tools and techniques-data collection

One visit was made to each household for data collection. During the visit, the eligible study subjects were interviewed face to face using a semi-structured questionnaire for background and associated variables after written informed consent was taken by each study participant.

All the potential risk factors for breast cancer and associated variables explored belonged to three variable categories-sociodemographic, reproductive and non-reproductive risk factors as described and defined below.

Sociodemographic factors: Age, gender, type of family, religion, socioeconomic status (Modified BG Prasad scale 2016), education, occupation and marital status.[8]

Reproductive Risk factors: Age at menarche ≤12 years, Nulliparity, age at first live birth >30 years, interval between menarche and age at first live birth ≥16 years, breastfeeding <12 months or no breastfeeding, history of using OCPs, age at menopause ≥55 years, family history of breast cancer, history of breast biopsy/ FNAC.

Non-reproductive risk factors: Consumption of Red meat >100 g per day, visible fat consumption >30 g per day, BMI≥25, history of tobacco chewing and duration of tobacco chewing, smoking or drinking alcohol, aerobic physical activity.

Ethical considerations

The study was approved by the institutional ethics committee. Patient consent form and participation information sheet were filled. Prior to data collection, informed written consent was obtained from each study participant after explaining the purpose of the study. All information that was collected was kept confidential. The study participants who were found to have more than 1 risk factor for breast cancer, were referred to Rajarajeswari hospital for screening and further management. Health education regarding the risk factors of breast cancer was given to all the study participants.

Statistical analysis

Data were entered and analyzed in SPSS statistics for Windows, version 16.0 (SPSS Inc., Chicago, Ill., USA) after data cleaning. Continuous data were expressed in terms of mean and standard deviation. Categorical variables were expressed in proportions.

RESULTS

Socio-demographic variables

It was observed that among 600 study participants, maximum number of study participants 205 (34.2%) belonged to the age group of 30-39 years, followed by 133 (22.2%) in the age group of 40-49, 108 (18%) belonged to the age group of 50-59 years, 104 (17.7%) in the age group of 60-69 years, and 43 (7.1%) belonged to 70 years and above. The mean age of the study participants was 49.95 years. Majority 594 (99%) of the study population were married and the mean age at marriage was 17.20 years.

Table 1 shows that with regard to religion, majority of the study participants were Hindus (89%) by religion. Nearly 77% of the study participants were homemakers followed by 17.84 percentages who were semi-skilled workers. Only 45.5% of the study participants had received formal education and the rest of the study participants were not literate. Majority of the study population belonged to class IV (41.5 percentages) socioeconomic status according to the revised modified B G Prasad classification.

Prevalence of reproductive risk factors of breast cancer

Table 2 shows that 34.7% of the study participants attained menarche at 12 years of age and below and 6.7% of the study participants (including unmarried women) did not have any children while majority of the participants (82.8%) had parity of 2 or more. The mean age at first live birth among the study participants (n=560) was found to be 19.34 years. It was observed that for 2.3% of the study participants, the age at first live birth was 30 years of age and above. Among those who had one or more children, 7.8% of the study participants did not breastfeed their child/children in their lifetime. Among those who breastfed their child/children (n=553), 4.7% breastfed for a duration of less than 12 months. In this study we found that parous women with >15 years interval between age at menarche and age at first live birth were 15 (2.68%) and the mean duration was 5.61 years. The study found that among the study participants who had attained menopause (n=301), 49 (16.3%) of them attained menopause at 55 years of age and above. Among those who attained menopause, it was found that 57 (18.93%) women had an interval of more than 40 years between age at menarche and menopause, while and the mean interval was 34.71 years. With regard to OCP use, 8.2% of the study participants gave a history of using OCPs at some point in their life. Among those who used OCPs (n=49), 14.3% were current users of OCPs, while 85.7% were past users of OCPs.

Table 3 shows that two percentages of the participants gave a history of undergoing a breast biopsy/ FNAC. In this study, 0.7% participants gave a family history of breast cancer and only one participant gave a history of breast cancer.

In assessing the symptoms of breast cancer which are also risk factors, none of the study participants gave a current history of nipple discharge, lump in the axilla as well as the current history of the skin changes over the breast at the time of the interview. There was no past and present history of using hormone replacement therapy among the women who attained natural menopause as well as those who gave a history of the bilateral salpingo-ophorectomy with/ or without hysterectomy. There was no history of the ovarian cancer among all the study participants.

Prevalence of non-reproductive risk factors of breast cancer

In this study, 526 (87.7%) study participants were non vegetarians, while 74 (12.3%) were vegetarians. Among those who consumed non vegetarian foods 425 (80.79%) consumed red meat. Based on red meat consumption (n=425), 34.1% of the study participants said they consumed more than 100 gm of red meat (mutton, pork or beef) per week.

About 180 (30%) study participants consumed more than 30 grams of visible fat per day. In this study, 239 (39.8%) study participants had a BMI of more than 25. About 213 (35.5%) study participants gave a history of tobacco chewing and among them 143 (67.1%) gave a history of more than 10 years' duration of tobacco chewing. None of the study participants reported the habits of smoking or drinking alcohol. With regard to aerobic physical activity, 599 (99.2%) participants did not fulfil the criteria for regular aerobic physical activity.

Table 1: Socio-demographic details of the study participants.

Characteristic	Number of women	Percentage (%)
Religion		
Hindu	536	89
Christian	40	7
Muslim	24	4
Total	600	100

Continued.

Characteristic	Number of women	Percentage (%)
Education		
Not literate	327	54.5
Primary (1st to 5th)	57	9.5
Upper primary (6th to 8th)	67	11.2
Secondary (9th and 10th)	114	19.0
Senior secondary/PUC	26	4.3
Graduate	7	1.2
Post graduate	2	0.3
Total	600	100
Occupation		
Homemaker	463	77.17
Professional	11	1.83
Skilled worker	8	1.33
Semi-skilled workers	107	17.84
Unskilled worker	11	1.83
Total	600	100
Socio-economic status (B G Prasad (2015)		
Class I (Upper)	20	3.3
Class II (Upper middle)	55	9.2
Class III (Middle)	203	33.8
Class IV (Lower middle)	249	41.5
Class V (Lower)	73	12.2
Total	600	100

Table 2: Distribution of study participants according to reproductive risk factors of breast cancer.

Variables	Number of women	Percentage (%)
Age at menarche (years)		
≤12	208	34.7
>12	392	65.3
Total	600	100
Parity		
No children	40	6.7
1 child	63	10.5
2 or more children	497	82.8
Total	600	100
Age at first live birth (years)		
12-19	335	59.8
20-29	212	37.9
30-37	13	2.3
Total	560	100
History of breastfeeding (n=560)		
Yes	553	98.75
No	7	1.25
Total	560	100
Duration of breast feeding among women who breast-fed their children (months) (n=553)		
<12	26	4.7
≥12	527	95.3
Total	553	100
Use of oral contraceptives		
Yes	49	8.2
No	551	91.8
Total	600	100
Attained menopause		
Yes	301	50.17
No	299	49.83
Total	600	100

Continued.

Variables	Number of women	Percentage (%)
Age at menopause (years)		
<55	252	87.3
≥55	49	16.3
Total	301	100

Table 3: Distribution of study participants according to family history of breast cancer, breast cancer, history of lump in the breast and history of FNAC/ breast biopsy

Variables	Number of women	Percentage (%)
Family history of breast cancer		
Yes	4	0.7
No	596	99.3
Total	600	100
History of breast cancer		
Yes	1	0.17
No	599	99.83
Total	600	100
Present history of lump in the breast		
Yes	3	0.5
No	597	99.5
Total	600	100
H/O breast biopsy/ FNAC		
Yes	12	2
No	588	98
Total	600	100

Table 4: Non-reproductive risk factors.

Variables	Number of women	Percentage (%)
Red meat consumption		
Consume	425	80.79
Do not consume	101	19.21
Total	526	100
Red meat consumption per week (gm)		
≤100	280	65.9
>100	145	34.1
Total	425	100
Visible fat consumption (gm/day)		
≤30	420	70
>30	180	30
Total	600	100
Body mass index (Kg/m^2)		
<25	361	60.2
≥25	239	39.8
Total	600	100
Tobacco chewing		
No	387	64.5
Yes	213	35.5
Total	600	100
Duration of tobacco chewing (Years)		
≤10	70	32.9
>10	143	67.1
Total	213	100
Aerobic physical activity		
No	599	99.2
Yes	1	0.2
Total	600	100

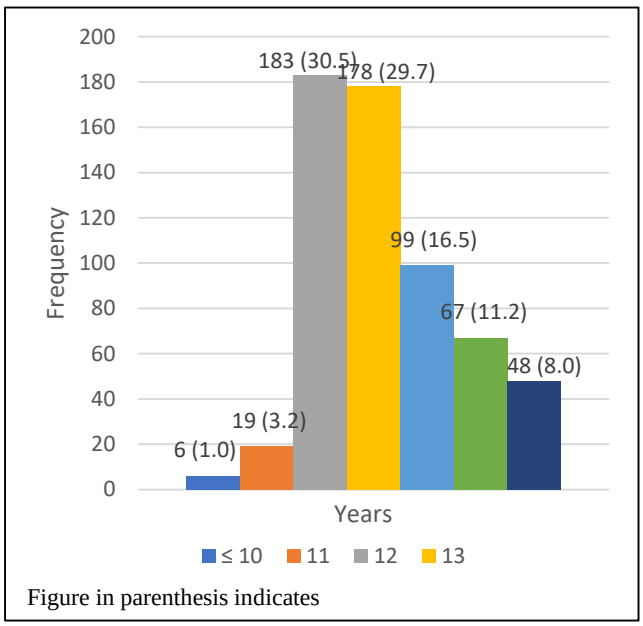

Figure 1: Distribution of study participants according to age at menarche (years).

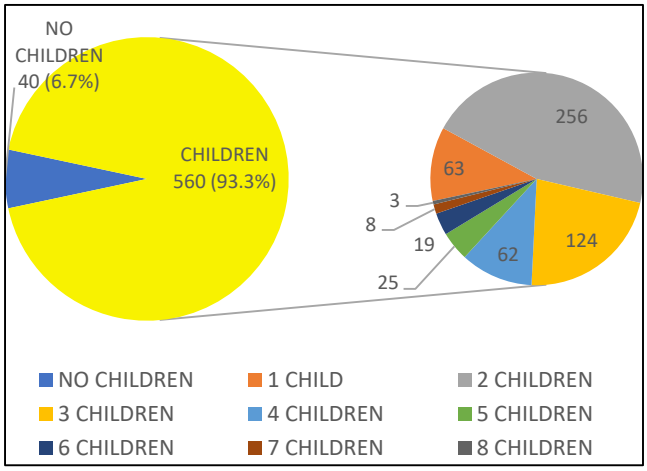

Figure 2: Distribution of study participants according to parity (n=600).

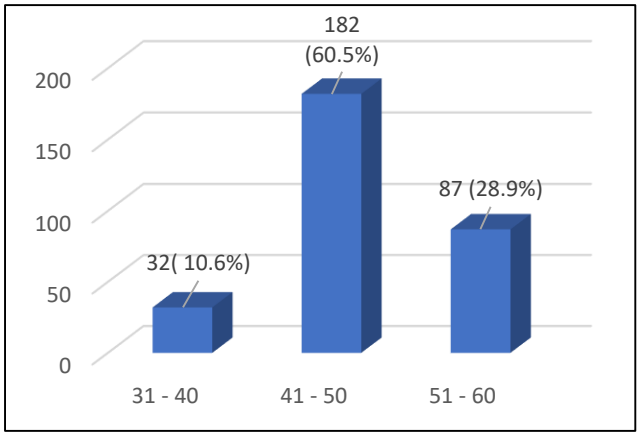

Figure 3: Distribution of study participants according to age at menopause (n=301).

DISCUSSION

This study was undertaken with the objective of assessing the prevalence of risk factors of breast cancer among adult women aged 30 years and above in a rural area as there is a paucity of studies on prevalence of risk factors for breast cancer done in rural areas. Women residing in rural areas have poor knowledge of the symptoms and risk factors for breast cancer, leading to delay in seeking treatment. Knowledge regarding the prevalence of risk factors of breast cancer among rural women, helps in identifying women at risk, it is easy to convince women to undergo screening for breast cancer and in turn helps in early diagnosis and treatment.

Socio-demographic factors

Age: In India, the average age of developing breast cancer has shifted over the last few decades and younger women are being affected. Epidemiological studies at regional and global levels suggest that this cancer occurs at a younger premenopausal age in Indian and Asian women compared to western women who get it more than a decade or more later. It was identified in this study that 32.2% belonged to the age group of 30-39 years. In a study done by Singh and Jangra et al most of the breast cancer patients, 49.2 % belonged to the age group of 30-45 years, followed by 25.8% at 45-60 years and the least beyond 60 years.[9]

Education: Higher education has been found to be associated with breast cancer incidence and the association was largely explained by the addition of known breast cancer risk factors. Educated women had fewer births and were older at their first birth than women with fewer years of education. They were more likely to have ever taken oral contraceptives and hormone replacement therapy.[10] In our study, we found that 1.5 % of the study population had received higher education (graduate and above), while 54.5% of the study participants were not literate. Education was associated with better awareness regarding the risk factors for breast cancer and early diagnosis of the condition, while poor awareness led to delay in seeking treatment and diagnosis at an advanced stage.

Socio-economic status: Majority of the study population belonged to class IV (41.5%) socioeconomic status according to revised modified B G Prasad classification. A study conducted by Rai et al reported that socio-economic status of breast cancer patients was higher as compared to controls.[11] Possible reasons for this association include: More years of education, delayed childbearing, more sedentary lifestyle, possible detection bias.[12]

Prevalence of reproductive risk factors of breast cancer

About 34.7% of the study participants attained menarche at 12 years of age and below. Early onset of menarche

was found to be associated with both pre- and post-menopausal breast cancer patients as the majority of breast cancer patients attained puberty at an age of ≤12 years.[13] Our findings are similar to a study done by Lodha et al on reproductive factors and breast cancer, found that 25.9% of the study participants attained menarche at an age of ≤12 years.[14] In this study, 6.7% of the study participants did not have any children. Nulliparity was associated with a 30% increase in risk compared with parous women, and for every 2 births, the risk was reduced by about 16%.[15] Our findings are much higher than the study by Khokhar where only 0.7% of the study participants had no child. In this study it was observed that for 2.3% of the study participants, the age at first live birth was 30 years of age and above. The risk of developing breast cancer is 4.18 times more among those women whose age at first live birth was after 30 years of age.[16] This finding is consistent with a study done by Khokhar et al where 4.3% of the study participants had their age at first live birth after the age of 30 years.[17]

In this study we found that women with >15 years interval between age at menarche and age at first live birth was 2.68%. The interval between these ages may also affect risk, since the breast is more susceptible to carcinogenic insults during this period than during the parous period. A study done by Li et al found that women with ≥16 years interval were at a higher risk of getting hormonally sensitive breast cancer when compared to those with ≤5 years interval.[18] Among those who attained menopause, this study found that the mean duration of between age at menarche and menopause was 34.71 years, whereas it is 32.44 years in India.[19,20] Our study found that 18.93% of the women had an interval of more than 40 years between age at menarche and menopause.

In this study, 7.8% of the study participants did not breastfeed their child/children in their lifetime. Among those who breastfed their child/children, 4.7% breastfed for a duration of less than 12 months. The findings are similar to a study by Saini, Devi et al.[21] The relative risk of breast cancer decreased by 4.3% for every 12 months of breastfeeding in addition to a decrease of 7.0% for each birth.[22]

In this study, 8.2% of the study participants gave a history of using OCPs at some point in their life. Among them, 7 were current users of OCPs, while 42 were past users of OCPs. Current use of any oral contraceptive was related to a marginally significant higher risk of breast cancer [23]. A similar study by Saini et al on risk factors of breast cancer, found that 8.6% of the study participants gave a history of OCP use.[21]

The study found that 16.3% of them attained menopause at 55 years of age and above. Late menopause increases the risk of breast cancer. Risk increases by almost 3% for each year older at menopause (natural or surgery induced), thus women who has attained menopause at 55 years rather than 45 years, has approximately 30% higher risk.[13]

In this study, 0.7% (4) participants gave a family history of breast cancer and only one participant gave a history of breast cancer. In 5% of breast cancer cases, there is a strong inherited familial risk. Women with close relatives who've been diagnosed with breast cancer have a higher risk of developing the disease. Mutations may be inherited (e.g., BRCA1 and BRCA2) or induced by chemical carcinogens, or may occur spontaneously.[7] The study found that 2.0% of the participants gave a history of undergoing a breast biopsy/ FNAC.

A similar observation was seen in a study by Khokhar. A, on high risk factors of breast cancer, where 2.3% of the study subjects ever had a FNAC/breast biopsy.[17] In a study done by Navneet Kaur et al in India, 2011, it was found that 6.3% of breast cancer patients gave a history of previous breast biopsy/FNAC.[24]

In assessing the symptoms of breast cancer which are also risk factors, none of the study participants gave a current history of nipple discharge, lump in the axilla and current history of skin changes over the breast at the time of the interview. In this study it was observed that 0.5% (3) of the study participants gave a present history of lump in the breast. There was no past and present history of using hormone replacement therapy among women who attained menopause, including those who give a history of hysterectomy and bilateral salpingoophorectomy. There was no history of ovarian cancer among all the study participants.

Prevalence of non-reproductive risk factors of breast cancer

Based on red meat consumption, 34.1 % of the study participants said they consumed more than 100 grams of red meat (mutton, pork or beef) per week. Carcinogenic byproducts such as heterocyclic amines and polycyclic aromatic hydrocarbons, created during high temperature cooking of meat; animal fat and heme iron from red meat; and hormone residues of the exogenous hormones for growth stimulation in beef cattle are some of the mechanisms that may explain the positive association between high intake of red meat and risk of breast cancer.[25]

The 30% of the study participants consumed more than 30 grams of visible fat per day. In a study done by Balasubramaniam et al on risk factors for breast cancer, breast cancer patients were found that women who consume visible fat of more than 30 g per day were having 3.6 times more risk than those who consumed upto 30 g per day.[26]

About 39.8% of the study participants had a BMI of more than 25. Singh et al in their study on obesity and breast cancer found that 52.2% of the study participants had a

BMI of ≥25 and the risk of developing breast cancer was 2.27 times more among those women with a BMI of ≥25 than those with a BMI of <25.[27]

In this study, about 35.5% of the study participants gave a history of tobacco chewing and among them 67.1% (143 out of 213) gave a history of more than 10 years' duration of tobacco chewing. The study by Mohite et al found that 72.8% of the study participants gave a history of more than 10 years duration of tobacco chewing and the risk of developing breast cancer was 2.5 times more among those with a history of tobacco chewing for more than 10 years.[28] In this study none of the study participants reported the habits of smoking or drinking alcohol. The risk of invasive breast cancer was highest in women who began smoking at an earlier age. When compared to women who never smoked, those who started smoking before their first menstrual cycle had a 61% higher risk, while those who started smoking after their first cycle, but 11 or more years before having a child, had a 45% higher risk.[29] The relative risk of breast cancer increased by 7.1% (95% CI 5.5-8.7%; p<0.00001) for each additional 10 g per day intake of alcohol, i.e., for each extra unit or drink of alcohol consumed on a daily basis.[30]

In this study, based on the criteria for physical activity, only one study participant fulfilled the criteria for regular aerobic physical activity, while 99.2% of the study participants did not fulfil the criteria for regular aerobic physical activity. In the American cancer society cancer prevention study ii nutrition Cohort, for example, women who walked at least 7 hours per week had a 14% reduction in the risk of postmenopausal breast cancer relative to women to who walked 3 hours per week. The most active women had a 25% reduction in risk relative to the least active women.[31]

Limitations

Recall bias – not all women were able to remember the exact age at menarche and age at first live birth especially post-menopausal women. There are chances that we may have missed a few women with risk factors. Quantifying red meat & visible fat consumption were done purely on the basis of dietary recall only.

CONCLUSION

This study revealed that the prevalence of risk factors of breast cancer among adult women aged 30 years and above was between the least prevalence of 0.7% for family history of breast cancer to highest prevalence of 37.5% for age at menarche at ≤12 years of age. In this study, 99% of the study population had at least one identified risk factor, while 87% of the study population had at least 2 identified risk factors. A health education program was conducted to educate the study participants about risk factors of breast cancer. Women identified with risk factors were referred to our hospital for further evaluation.

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