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Association of risk factors and breast cancer among women treated at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: a case–control study

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ABSTRACT

Objectives Many factors known to increase the risk of breast cancer, such as age, family history, early menarche and late menopause are not modifiable. Modifiable factors include obesity, use of menopausal hormones and breast feeding. This study aimed to assess risk factors associated with breast cancer among women at Tikur Anbessa Specialized Hospital.

Design Facility based case–control study.

Methods Case–control study was conducted from May 2018 to June 2019. A total of 230 cases and 230 controls participated in the study. Data were analysed using SPSS software. Multivariable logistic model based analysis was conducted to control the effect of potential confounding factors. ORs and 95% CI for the likelihood of developing breast cancer were calculated.

Results The odds of breast cancer was higher among women between 40 and 49 years (adjusted OR (AOR): 3.29, 95% CI 1.39 to 7.77), and being unemployed (AOR: 4.28, 95% CI 2.00 to 9.16). Regarding life style risk factors, women consuming solid oil and using wood or animal dung as source of fuel had significantly higher odds of breast cancer. In addition, the odds of breast cancer was significantly higher among postmenopausal women, women who had previous benign surgery and women with early menarche (<12 years). On the other hand, the odd of breast cancer was significantly lower among women who had moderate physical activities.

Conclusion This study showed that occupational status, consumption of solid oil, and using wood or animal dung as source of fuel, early menarche, menopausal status and previous benign breast surgery were associated with breast cancer. On the other hand, physical activity was protective factor. Therefore, there is a need to design appropriate intervention to educate women about life style change or behaviour modification to decrease their breast cancer risk.

BACKGROUND

There are several established risk factors for breast cancer. Most factors which increase the risk of breast cancer are not modifiable; these include age, family history, early menarche and late menopause. Factors that are modifiable include postmenopausal obesity, postmenopausal hormonal replacement therapy and breast feeding. Genetic risk factors like mutations in BReast Cancer gen 1 and BReast Cancer gen 2 are also the most prominent cause of breast cancer.[1 2] This is established through studies conducted in various countries.[3]

Similarly study from Tanzania found that women who had their first full-term pregnancy at <30 years were more likely to have luminal-B and triple negative subtypes relative to luminal-A subtype.[4] Another study done in Cairo also revealed that the most common risk factors for breast cancer were family history of breast cancer and using hormonal contraceptives.[5]

Breast cancer poses a substantial public health threat in Ethiopia.[6] According to Addis Ababa City Cancer Registry, breast cancer accounts, 33% of cancers among females.[7] However, based on various studies conducted in the country there was poor community awareness towards the disease.[8 9] Most patients and their families do not properly know about cancer and its treatment options. As a result, 80%–90% of cancer patients

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ To our knowledge this was the first research conducted among breast cancer patient in Ethiopia at the time of the study.
⇒ During selection of control group, breast physical examination has been made by experienced oncology resident.
⇒ Further analysis was not conducted by different ethnic group due to limited sample size and shortage of budget.
⇒ Even though breast physical examination may be the only available breast cancer screening modality in resource limited countries like Ethiopia, and it has been made by experienced physician, it may not be highly sensitive to detect potential breast mass.

already suffer from advanced and incurable cancers at the time of diagnosis.[9 10]

Even though many studies found different risk factors, such risk factors are not studied well, especially for most resource limited countries. For a country like Ethiopia with a huge population, different, ethnic geographical variations, life style and cultural habits, information on breast cancer associated risk factors are significantly limited. Targeting and supporting these populations to reduce their risk is an essential component of population health. Therefore, this study was aimed to assess risk factors for breast cancer among women at Tikur Anbessa Specilaized Hospital. The result of this study will help to identify possible risk factors which can be used for policy makers to raise community awareness, for reduction in morbidity and mortality.

MATERIALS AND METHODS
Study design and period
Facility based case–control study was conducted between May 2018 and June 2019 in Addis Ababa at Tikur Anbessa Specialized Hospital (TASH) Oncology Department, which is the largest hospital in Ethiopia with 700 beds.[11] This hospital is the country's sole cancer referral centre which provides surgery, chemotherapy, radiotherapy and palliative care.

Eligibility criteria
During the study period, all consenting newly diagnosed breast cancer patients, with confirmed histology result, no observable mental disorders, no history of chronic disease and aged 18 years and above were included in the study. Women accompanying breast cancer patients who had no biological relationship with selected cases were included as a control in the study. Controls were breast mass free women by physical examination.

Sampling and sample size determination
Since there was only one referral centre for cancer treatment during the study period, the existing centre (TASH) was used for the study. All voluntary and eligible cases and controls that came to TASH during the study period were recruited by using convenient sampling technique. Sample size was calculated by taking age (≥65 years) as a risk factor for breast cancer, 80% power, 0.05 significance level at 95% CI and 1:1 ratio of case to control. Percentage of exposed among control group was 11.9%, percentage of exposed among cases was 21.6%[12] and OR of assumed to be 2.05. Accordingly, a total of 460 participants (230 cases and 230 controls) participated in this study.

Data collection analysis and management
Informed consent was obtained from each study participant prior to data collection. Participants were interviewed by experienced and trained nurses in a convenient place to maintain privacy and confidentiality. Breast physical examination was conducted by oncology

residents in order to select eligible controls. Data entry and analysis was done using SPSS Software, V.20. Binary logistic regression was conducted to see the association between breast cancer and risk factors. Finally, stepwise multivariable analysis was done to adjust for potential confounding variables by selecting variables which have p value ≤0.05 in bivariate analysis. The association between breast cancer and different variables was assessed. These variables include socio demographic variables including age, educational status, occupational status and income. Anthropometric and life style variables included in the model were, weight, body mass index (BMI), fruit intake, milk intake, consumption of solid/saturated oil, source of fuel, frequency of strenuous exercise and frequency of moderate exercise. In addition, age at menarche, menopausal status, family history with first degree relatives, and previous benign disease/previous breast srgery were also included. P value less than 0.05 were considered as statistically significant while adjusted ORs with 95% CI were used to see the strength and direction of the association.

In our analysis, potential confounding variables associated with breast cancer were included in the stepwise multiple logistic regression model. After this analysis, income, educational status, height, weight, BMI, fruit intake and frequency of strenuous exercise wereconsidered as potential confounding variables.

When conducting logistic regression analysis, for most of the study variables, reference group was selected by considering the most normative group or if the group is considered as preventive factor for negative outcomes. However, for some variables like weight and BMI, the highest category was considered as a reference category, since there was inverse relationship between higher BMI and higher weight in our study. For some variables including consumption of vegetable, fruit, meat and milk, the lowest category was considered as references based on similar studies.

Study variables
Based on American Cancer Society fact and figure for breast cancer, age at diagnosis was categorised as less than 40, 40–49, 50–59 and 60 years and above. BMI was calculated and categorised as follows <25 normal, 25–29.9 overweight and >30 obese. Menarche was defined as the age at which the first menses was occurred. Age at first live birth was defined as the age when the first full-term birth occurred. Abortion was defined as the termination of pregnancy before 28 weeks of pregnancy. Parity was defined as the number of pregnancies that a participant had. Women who had sisters/mothers/daughters with breast cancer were categorised as having a first-degree family history of breast cancer. Women were classified as menopausal if they had not menstruated during the past 1year before the date of data collection. Breast surgery was defined as weather study participant had surgery for non-cancer lump.

Data quality assurance

The data collection tools were prepared in English and translated to the local language in order to facilitate understanding by the study participants. The data collection tools were pretested in 5% of breast cancer patients not included in the study. Daily supervision was made on all questionnaires collected each day. This research was conducted based on research requirements, regulations and policies that safeguard the well-being of study participants and to ensure the reliability and integrity of this finding. Therefore, all methods were carried out in accordance with relevant guidelines and regulations.

Patient and public involvement

Neither patients nor the public were involved in the design of this study.

RESULTS

Bivariate analysis of sociodemographic characteristics and anthropometric factors

In this study, a total of 230 breast cancer cases and 230 healthy controls were participated. The mean age (±SD) was 42.83±12.06 for cases and 39.33±11.14 years for controls. The odds of breast cancer was significantly higher among women aged 40–49 and >60 years. The odds of developing breast cancer among illiterate was 4.43 times higher (95% CI 2.83 to 6.94, p=0.0001) compared with literate women. Similarly, the odds of breast cancer was also 3.03 times higher (95% CI 2.06 to 4.44, p=0.0001)) among unemployed women as compared with employed. It was also 2.43 times (95% CI 1.43 to 4.14, p=0.001) higher among women with lower conomic status as compared with women with higher economic status (monthly income >2000 Ethiopian Birr) per month. However, there was no significant association between breast cancer with place of residence and marital status. The odds of breast cancer was 2.13 times higher (95% CI. 1.06 to 4.28, p=0.034) among women with less than 59 kg as compared with women greater than 75 kg. Similarly, the odds of breast cancer was 2.48 times higher (95% CI 1.07 to 5.75, p=0.035) among women with BMI 25–29.9 kg/m^2 (table 1).

Life style risk factors associated with breast cancer

In this study, neither cases nor controls had used horone replacemnet therapy (HRT). On the other hand, three cases and none of the controls were smokers. However, 49 (21.3%) of cases and 66 (28.7%) of the controls had a history of alcohol consumption. Regarding dietary habit, there was no significant association between vegetable and meat intake with breast cancer. This study also indicated that the odd of breast cancer was 4.04 times higher among women who had used solid oil. Similarly, the odd of breast cancer was 6.46 times higher among women who had used wood or animal dung as compared with use of electric as a source of fuel. Regarding physical activity, women who had strenuous physical activities like running, swimming

Table 1 Sociodemographic characteristics and anthropometric risk factors associated with breast cancer

Variables	Case N (%)	Control N (%)	Bivariate analysis COR (95% CI)	P value
Residence				
Rural	67 (29.1)	56 (24.3)	1:00	
Urban	163 (70.9)	174 (75.7)	0.783 (0.517 to 1.19)	0.247
Age group (years)				
<39	106 (46.1)	136 (59.1)	1:00	
40–49	58 (25.2)	45 (19.6)	*1.65 (1.04 to 2.63)*	0.034
50–59	39 (17.0)	36 (15.7)	*1.39 (0.827 to 2.34)*	0.214
>60	27 (11.7)	13 (5.7)	*2.67 (1.31 to 5.41)*	0.007
Marital status				
Ever married	207 (90.0)	201 (87.4)	1:00	
Never married	23 (10.0)	29 (12.6)	0.770 (0.431 to 1.38)	0.378
Education level				
Literate	130 (56.5)	196 (85.2)	1:00	1:00
Illiterate	100 (43.5)	34 (14.8)	4.43 (2.83 to 6.94)	0.0001
Occupation				
Employed	70 (30.4)	131 (57)	1:00	1:00
Unemployed	160 (69.6)	99 (43.0)	3.03 (2.06 to 4.44)	0.0001
Income	(N=108)	(N=127)		
≥2000	52 (48.1)	88 (69.3)	1:00	1:00
<2000	56 (51.9)	39 (30.7)	2.43 (1.43 to 4.14)	0.001
Height (m)				
≥1.60	102 (44.3)	91 (39.6)	1:00	1:00
<1.52	48 (20.9)	32 (13.9)	1.34 (0.788 to 2.27)	0.280
1.53–159	80 (34.8)	107 (46.5)	0.667 (0.445 to 1.00)	0.050
Weight (kg)				
>75	14 (6.1)	25 (10.9)	1:00	
<59	143 (62.2)	120 (52.2)	2.13 (1.06 to 4.28)	0.034
59.1–65	37 (16.1)	52 (22.6)	1.27 (0.583 to 2.77)	0.546
65.1–74	36 (15.7)	33 (14.3)	1.95 (0.869 to 4.36)	0.105
BMI (kg/m^2)				
Obese (>30)	10 (4.3)	22 (9.6)	1:00	
25–29.9 (overweight)	54 (23.5)	48 (20.9)	2.48 (1.07 to 5.75)	0.035
Normal (<25)	166 (72.2)	160 (69.6)	2.28 (1.05 to 4.97)	0.038

Bivariate analysis using binary logistic regression. 1:00 is OR for reference/comparison group.
BMI, body mass index; COR, crude OR.

less than 5 hours per week had 0.343 times lower risk of breast cancer. Similarly, women who had moderate physical activity such as walking, playing tennis less than 5 hours per week had 0.228 times less risk (table 2).

Reproductive risk factors associated with breast cancer

In this study, the odds of breast cancer was 3.16 times higher among women who had age at menarche less than

Table 2 Association of life style risk factors with breast cancer

Variables	Case N (%)	Controls N (%)	Bivariate analysis	
			COR (95% CI)	P value
Smoking				
No	227 (98.7)	230 (100)	1:00	
Yes	3	0 (0.0)	1.01 (0.998 to 1.03)	0.082
Alcohol intake				
Non-drinker	181 (78.7)	164 (71.3)	1:00	
Drinker	49 (21.3)	66 (28.7)	0.673 (0.439 to 1.03)	0.068
Vegetable intake				
Once a week or less	166 (72.2)	158 (68.7)	1:00	
More than once a week	64 (27.8)	72 (31.3)	0.846 (0.567 to 1.26)	0.414
Fruit intake				
Once a week or less	194 (84.3)	210 (91.3)	1:00	
More than once a week	36 (15.7)	20 (8.7)	1.95 (1.09 to 3.48)	0.024
Meat				
Once a week or less	207 (90.0)	218 (94.8)	1:00	
More than once a week	23 (10.0)	12 (5.2)	2.02 (979 to 1.4.16)	0.057
Milk take				
Once a week or less	189 (82.5)	207 (90.8)	1:00	
More than once a week	40 (15.7)	21 (9.2)	2.086 (1.19 to 3.67)	0.011
Solid oil				
No	45 (19.6)	114 (49.6)	1:00	
Yes	185 (80.4)	116 (50.4)	4.04 (2.67 to 6.12)	0.0001
Source of fuel				
Electric	54 (23.5)	111 (48.3)	1:00	
Wood/animal dung	88 (38.3)	28 (12.2)	6.46 (3.78 to 11.03)	0.0001
Charcoal/kerosene	3 (1.3)	20 (8.7)	0.308 (0.088 to 1.08)	0.066
Combination	85 (37.0)	71 (30.9)	2.46 (1.57 to 3.87)	0.0001
Strenuous exercise				
No exercise	209 (90.9)	203 (88.3)	1:00	
<5 hours per week	6 (2.6)	17 (7.4)	0.343 (0.133 to 0.887)	0.027
5 hours and above per week	15 (6.5)	10 (4.3)	1.46 (0.640 to 3.32)	0.370
Moderate exercise				
No exercise	173 (75.2)	126 (54.8)	1:00	
<5 hours per week	21 (9.1)	67 (29.1)	0.228 (0.133 to 0.392)	0.0001
5 hours and above per week	36 (157)	37 (16.1)	0.709 (0.424 to 1.18)	0.188

Bivariate analysis using binary logistic regression. 1:00 is OR for reference/comparison group.
COR, crude OR.

12 years. On the other hand, there was no significant association between abortion, as well as age at first birth with breast cancer. Similarly, the odds of breast cancer was 2.34 times higher among postmenopausal women. In addition, women who had previous breast surgery were 8.82 times more likely to develop breast cancer. However, there was no statistically significant association between breast cancer and age at menopause, use of oral contraceptive, duration of breast feeding and age at last birth. However the association between breast cancer with family history of first degree relatives was declined after stepwise multiple logistic regression models was applied (table 3).

Multivariable analysis of sociodemographic, anthropometric and lifestyle factors

The finding indicated that the odds of breast cancer were 3.29 times higher among women with 40–49 age groups as compared with women 39 years or less. It was also found that the odds of breast cancer were 4.28 times

Table 3 Association of reproductive risk factors with breast cancer

Parameter	Case N (%)	Control N (%)	Bivariate analysis COR (95% CI)	P value	Multivariable analysis AOR (95% CI)	P value
Age at menarche (years)						
>15	20 (11.2)	60 (28.6)	1:00		1:00	1:00
12–15	150 (83.8)	144 (68.6)	3.13 (1.79 to 5.45)	0.0001	5.94 (1.84 to 19.15)	0.003
<12	9 (5.0)	6 (2.9)	4.50 (1.42 to 14.21)	0.010	3.16 (1.78 to 5.56)	0.001
Family history of breast						
No	215 (93.5)	226 (98.3)	1:00		1:00	1:00
Yes	15 (6.5)	4 (1.7)	3.94 (1.29 to 12.07)	0.016	2.60 (0.765 to 8.81)	0.126
Menopausal status						
Premenopausal (ref.)	122 (53.0)	161 (70.0)	1:00		1:00	1:00
Postmenopausal	108 (47.0)	69 (30.0)	2.06 (1.41 to 3.03)	0.001	2.34 (1.50 to 3.64)	0.001
History of benign breast disease						
No	211 (91.7)	226 (98.3)	1:00		1:00	1:00
Yes	19 (8.3)	4 (1.7)	5.09 (1.70 to 15.19)	0.004	8.82 (1.96 to 39.60)	0.005

Stepwise multiple logistic regression. 1:00 is OR for reference/comparison group.
Adjusted for: age at menarch, menoposal status, history of surgery and family history with first degree relatives.
AOR, adjusted OR; COR, crude OR.

higher among unemployed women. Regarding life style, milk intake and consumption of solid oil was significantly associated with breast cancer. Similarly, the odd of breast cancer was 5.30 times higher among women who had used wood or animal dung as source of fuel as compared with women who used electric. On the other hand, the odds of breast cancer were 0.276 times lower among women who had moderate physical activities like swimming, table tennis and basketball less than 5 hours per week as compared with women who had no history of exercise. However, the association between breast cancer with educational status, income, height, weight, BMI and frequency of strenuous exercise was declined after stepwise multiple logistic regression models was applied (table 4).

DISCUSSION

In this study, potential risk factors associated with breast cancer were examined. This study revealed that various risk factors, including demographic, life style, reproductive, hormonal factors, are associated with incidence of breast cancer.[13][14]

There was no significant association between place of residence and marital status and risk of breast cancer in our study. This finding was supported by study from Uganda.[15] However, it is different a study done in India that showed significant relationship between breast cancer and being married.[16] The odd of breast cancer was higher among women aged between 40 and 49 years. Similarly, the odd of breast cancer was 4.43 times higher among illiterate compared with literate women. This finding is supported by a similar study done in Bangui, which indicated that the odd of breast cancer was higher

among illiterate.[17] However, this association was declined after stepwise multiple logistic regression model was applied. It was also found that the odd of breast cancer was 4.28 times higher among unemployed compared with employed women. This might be due to employed women may have more family income and they may spend money for screening and medical care. Early screening (early screening identify cancer at early stage) as a result of their better economic level and awareness could explain such difference. This finding is also supported by the previous study done in Bangui.[17] However, the current study was incomparable with another study in India which reported a higher risk of breast cancer among women with higher educational status.[18]

Even though, BMI was associated with increased risk of breast cancer,[19] in this study, both weight and BMI of cases were lower than controls. This lower weight and BMI among cases could be due to loss of weight among cases as a result of advanced stage of their disease at time of diagnosis. This finding is comparable with the study done in Malaysia.[20] However, there is also a study which had found postmenopausal women with normal BMI and relatively high body fat levels were associated with an elevated risk of invasive breast cancer and the study explained that normal BMI categorisation may be an inadequate proxy for the risk of breast cancer in postmenopausal women.[19] In this study, there was no significant association between alcohol consumption, vegetable and meat intake with breast cancer. However, this finding is not supported by similar studies conducted in different parts of USA, which observed that a higher intake of fruits and vegetables was associated with a lower breast cancer risk.[21–23] This difference could be due to the difference in

Table 4 Association of sociodemographic, anthropometric and lifestyle factors with breast cancer

Variables	Case N (%)	Control N (%)	Bivariate analysis		Multivariable analysis	
			COR (95% CI)	P value	AOR (95% CI)	P value
Age group (years)						
≤39	106 (46.1)	136 (59.1)	1:00		1:00	1:00
40–49	58 (25.2)	45 (19.6)	*1.65 (1.04 to 2.63)*	0.034	*3.29 (1.39 to 7.77)*	*0.007*
50–59	39 (17.0)	36 (15.7)	*1.39 (0.827 to 2.34)*	0.214	*1.81 (0.661 to 4.96)*	*0.248*
>60	27 (11.7)	13 (5.7)	*2.67 (1.31 to 5.41)*	0.007	*2.44 (0.515 to 11.55)*	*0.261*
Occupation						
Employed	70 (30.4)	131 (57)	1:00	1:00	1:00	1:00
Unemployed	160 (69.6)	99 (43.0)	3.03 (2.06 to 4.44)	0.0001	4.28 (2.00 to 9.16)	0.0001
Milk intake						
Once a week or less	189 (82.5)	207 (90.8)	1:00		1:00	1:00
More than once a week	40 (15.7)	21 (9.2)	2.086 (1.19 to 3.67)	0.011	2.56 (1.02 to 6.43)	0.045
Solid oil						
No	45 (19.6)	114 (49.6)	1:00		1:00	1:00
Yes	185 (80.4)	116 (50.4)	4.04 (2.67 to 6.12)	0.0001	6.77 (3.17 to 14.48)	0.0001
Source of fuel						
Electric	54 (23.5)	111 (48.3)	1:00		1:00	1:00
Wood/animal dung	88 (38.3)	28 (12.2)	6.46 (3.78 to 11.03)	0.0001	5.30 (1.59 to 17.64)	0.007
Charcoal/kerosene	3 (1.3)	20 (8.7)	0.308 (0.088 to 1.08)	0.066	0.112 (0.012 to 1.01)	0.051
Combination	85 (37.0)	71 (30.9)	2.46 (1.57 to 3.87)	0.0001	2.45 (1.16 to 5.15)	0.019
Moderate exercise						
No exercise	173 (75.2)	126 (54.8)	1:00		1:00	1:00
<5 hours per week	21 (9.1)	67 (29.1)	0.228 (0.133 to 0.392)	0.0001	0.276 (0.114 to 0.628)	0.002
5 hours and above per week	36 (157)	37 (16.1)	0.709 (0.424 to 1.18)	0.188	0.496 (0.182 to 1.36)	0.172

Stepwise multiple logistic regression. Adjusted for age, income, education, occupation, height, weight, body mass index, fruit intake, milk intake, solid oil intake, sources of fuel, frequency of moderate exercise, frequency of strenuous exercise, 1:00 is OR for reference/comparison group.
AOR, adjusted OR; COR, crude OR.

type, frequency and amount of such fruit and plant based dietary pattern. The other possible explanation could be consumption of such kinds of diet may be limited among study participants due to limited purchasing power.

However, the odd of breast cancer was 2.56 times higher among women who had consumed milk for more than once a week, compared with women who had consumed milk once a week or less. This finding is supported by study done in Western Mexico.[24] Similarly, the Mexico study also support our finding regarding consumption of meat which was not associated with breast cancer.[24] This association with milk intake has been explained that high milk intake results in the consumption of cow oestrogen metabolites as well as a high caloric intake, both of which increasing the risk of breast cancer.[24] However, this finding is not comparable with different studies which revealed that dairy consumption was inversely associated with the risk of developing breast cancer.[25–27] This difference could be due to the amount, dairy-type and time of consuming such products. In this study, there are two unexpected results which had significant association with

breast cancer. The first result was the odd of breast cancer was 6.77 times higher among women who used solid oil; since it is saturated fat, it may contain other factors which can increase the risk of breast cancer and the finding was supported by study done in China.[28] This finding also supported by study done in USA that revealed consumption of saturated fat is associated with increased breast cancer risk.[29] The second result was that the odds of breast cancer was 5.3 times higher among women who had used wood or animal dung as a source of fuel. This was supported by study done in USA which revealed that indoor burning either wood or natural gas for long time was associated with higher risk of breast cancer.[30]

Based on the result of bivariate analysis, the odds of breast cancer were lower among women who had average duration of strenuous exercise of less than 5 hours per week; however, the association was not significant after adjusted for confounding variables. On the other hand, women who had moderate physical activity of less than 5 hours per week had reduced risk of breast cancer. This finding is comparable with the studies done in UK and

Sudan which indicated that physical activity was associated with a reduction in breast cancer risk.[31 32] And this study also supported by systematic review and meta-analysis conducted in China stated that physical activity is significantly associated with a decrease in the risk of breast cancer.[33]

In this study, only 5.0% of cases and 2.9% of controls had menarche at less than 12 years of age. Late menarche (>15 years) was found to be significant protective factor for breast cancer, compared with earlier age at menarche (<12 years), this finding was supported by study done in Morocco.[34] This finding was also in agreement with study done in UK which found that breast cancer risk increased by a factor of 1.050 (95% CI 1.044 to 1.057; p<0.0001) for every year younger at menarche, and independently by a smaller amount (1.029, 95% CI 1.025 to 1.032; p<0.0001), for every year older at menopause.[35] Our study did not find association with age at first full-term pregnancy, which was different from a study done in Morocco.[34] On the other hand, this finding was comparable with study done in Uganda which revealed absence of association between breast cancer and early age at first pregnancy.[15]

In this study, the odd of breast cancer was 2.34 times higher among postmenopausal women. This finding is comparable with a study done in Malaysia, which indicated that postmenopausal women had 52% increased risk of breast cancer.[20] This finding was also comparable with different studies conducted in India.[3 16] It was also found that 19 (8.3%) of cases and 4 (1.7%) of the controls had previous breast surgery. Women with previous benign breast surgery were 8.82 times more likely to have breast cancer. This finding was supported by studies conducted in India Malaysia and Sudan.[17 20 32]

In our study, oral contraceptive was not significantly associated with breast cancer, which was also supported by other study done in India.[36] However, this finding is not supported by study done in Cameroon[37] and it also contradicts with study in Denmark that found approximately 20% higher risk of breast cancer among women who currently use hormonal contraceptives. Similar studies conducted in India and UK also reported an increased risk of being diagnosed with breast cancer in women who have used hormonal contraception.[16 38 39] This difference could be due to length of contraceptive use and type of contraception. There was no significant association between breast cancer and parity as well as duration of breast feeding, which is comparable with two studies done in India.[14 36]

Study limitation

Some limitations should be considered to elucidate the findings of this study. Primarily the finding of our study was based on self-reporting and that could have introduced recall biases regarding their past exposure for different possible risk factors. This may result under-reporting of the outcome under study. Since this is a case–control study, all the association may not be necessarily casual. The other most important limitation could be

even though breast physical examination may be the only available breast cancer screening modality in resource limited countries like Ethiopia, and it has been made by experienced physician, it may not be highly sensitive and may miss a potential breast mass.

Conclusion and recommendation

This study was a case–control study which serves as an indicative study usually used to provide early clues and inform further research using more rigorous scientific methods. In this study, socio demographic, lifestyle, anthropometric and reproductive risk factors were assessed. The finding indicated that the odds of breast cancer decreased among young age and employed women. Regarding lifestyle factors, the odds of breast cancer was 6.8 times higher among women who consumed solid oil. In addition, women who used wood or animal dung as a source of fuel had 5.3 times higher odds of breast cancer. However, the odds of breast cancer decreased among women who had moderate physical exercise less than 5 hours per week. Finally, the odd of breast cancer was higher among women with early menarche (<12 years), postmenopausal women and women with previous benign breast surgery. Since there was significant association between most of the modifiable risk factors and breast cancer, it is essential to design appropriate life style modification strategies which may contribute to prevent breast cancer. There is a need to design appropriate intervention to educate women about lifestyle change or behaviour modification to decrease their breast cancer risk. In addition, since there are varieties of culture, food choice, feeding habit, physical activities and other risk factors, it is important to conduct future studies with a larger sample size including different regions or diverse population in order to come up with more representative evidence.

physicians and their results were given for free in order to get early diagnosis and treatment. Confidentiality and privacy were maintained throughout the study.

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