

RESEARCH ARTICLE

Screening for Breast Cancer in a Low Middle Income Country: Predictors in a Rural Area of Kerala, India

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Abstract

Background: In India, breast cancer is the leading malignancy among women in a majority of the cancer registries. Therefore it is important to understand screening practices and its predictors, including in rural areas with high female literacy and good health indices. **Materials and Methods:** A cross-sectional study with multistage sampling was conducted in Vypin Block, Ernakulam district, Kerala, India. Four Panchayats (self administration units) were randomly chosen and a woman in every second household was invited to participate from the tenth ward of each. Thus a total of 809 women were interviewed. **Results:** The majority of the respondents (82.1%) were not aware of risk factors and about a third (37.9%) were not aware of symptoms of breast cancer. About half of the population studied (46.6%) had undergone screening. Age (35-50 years), being married, health professionals as source of information and working were significant predictors of screening. Logistic regression showed that older women (35-50 yrs) were more likely to practice screening. Out of the never screened, about a third (35%) were desirous of doing it, but had not for various reasons and 53.5% were not willing to screen. The reasons identified for not screening among those desirous of doing it were grouped into knowledge 66 (43.4%), resources 23 (15.1%) and psychosocial 32(21.1%) factors. Unmarried women were significantly more likely to express factors related to all the three domains. **Conclusions:** This study showed that in spite of the absence of a population-based screening program, about half of the study population had undergone some type of screening. The older women (35-50 years) in particular were significantly more likely to practice screening. At this critical juncture, a high quality breast cancer awareness and screening initiative can help to consolidate the gains and tackle knowledge, resource and psychosocial barriers.

Keywords: Screening - breast cancer - predictors - rural India - Kerala

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Introduction

Breast cancer is the most common cancer among women both in developed and developing regions with 690,000 new cases estimated in each region (Ferlay et al., 2010). In India breast cancer is the leading cause of cancer among 16 of 20 populations based cancer registries. The two south Indian registries Bangalore and Thiruvananthapuram, had the highest age adjusted incidence rate at 36.1 and 33 per 100,000 respectively (ICMR, 2010). And it is predicted that the burden of breast cancer in India will continue to grow, as indicated by pooled data on the increase in absolute numbers of breast cancers by 38% from 1998-2005 (Takiar and Vijay, 2010).

In low middle income countries like India twice as many breast cancer cases are recorded in women between 15-49 years, than in developed countries where two thirds of the cases are among women over 50 (Forouzanfar et al,

2011) indicating the increasing public health burden. Also, of concern is the fact that, more than half of the breast cancer patients die of the disease because of limited access to early detection and treatment (Sankaranarayanan et al., 2011) and presenting in the late stages of the disease. This is indicated by the five-year survival rate of 56% among patients diagnosed with breast cancer at a later stage in comparison to 85% for cases diagnosed early (Gupta, 2009). Early detection and immediate treatment is the most effective way to reduce the burden of breast cancer and improve survival (Tabar et al., 1985; Nystrom 2000). Thus, earlier age of onset of breast cancer and late detection are cause for concern indicating a dire need for better awareness and screening practices among women.

Breast cancer is amenable to early detection by screening methods like breast self-examination, clinical breast examination, and mammography (Sankaranarayanan and Boffeta, 2010). The pros and cons of each screening method for countries vis a vis its resource status have been

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debated extensively. Mammography screening programs are expensive (Silvia et al., 2012) and not cost effective for countries like India (Okonkwo et al., 2008); Cancer detected by mammography are trivial cancers, some of which may spontaneously regress (Zahl et al., 2008; Jatoi and Anderson, 2009) Moreover, systematic reviews show that to identify one woman with cancer over a period of 10 years by mammographic screening, 2000 women have to be screened for 10 years and 10 healthy women have to undergo unnecessary diagnosis and treatment as breast cancer patients (Kosters and Gotzsche, 2008). The Breast Health Global Initiative advocates breast cancer awareness and breast self examination as a means of early detection in developing countries (Sara et al., 2010). In addition, cost effectiveness of Breast Self Examination (BSE) and Clinical breast examination (CBE) will permit its use as a screening modality for early detection of breast cancer in low middle income countries. Though there are conflicting reports about BSE, there is no definitive evidence that BSE or BSE instruction is ineffective (Robert et al., 2006). However, it has been seen that most women either are not aware of the methods or do not practice it or perform it wrongly (Moss, 2008; Okonkwo et al., 2008; Somdutta and Baridalyne, 2008).

There are no organized screening programs for any of the common cancers in India and the Regional cancer centers only provide opportunistic screening (Dinshaw et al., 2005). Increasing breast health awareness is a key element of intervention at all resource levels (Robert et al., 2006). Though there are conflicting reports regarding the efficacy of BSE, it is accepted that periodic, consistent BSE facilitates breast health awareness, women empowerment and responsibility for health (WHO, 2013). Other than awareness, inhibitory factors like cultural attitude, psychosocial issues and lack of resources also play a key role (Lierman et al., 1991; Parsa et al., 2006) in determining whether women undergo screening. A study carried out in 2006 in Ernakulam district showed that 22.6% of women were doing BSE (Aswathy et al., 2006).

In the absence of a national screening program for breast cancer it is pertinent to assess the awareness regarding breast cancer, risk factors, and early means of detection. Very limited data on breast cancer awareness and practices of screening is available from India. Kerala is considered a model state as far as health is considered and this study was conducted to determine the screening practices and predictors in the absence of a state wide screening programme.

Materials and Methods

The study was conducted in a rural, coastal area of Kerala State, India, Vypin Block with a population of 2, 22,008 (census 2001). The minimum calculated sample size was 400 on the basis of studies done in the area, and with an assumed non response rate of 30% the sample size was calculated to be 520 with a relative precision of 20%. In order to give adequate representation from all the Panchayats in the Block a multistage (two stage) sampling was done. Four Panchayats (self administration unit)

were randomly chosen from seven Panchayats in Vypin Block. A woman in every second household was invited to participate by systematic sampling from the tenth ward of the four randomly selected Panchayats. We began from the North end of each Panchayat till at least 200 women were interviewed. In a household if there was more than one woman in the 15-50 yrs age group, all of them were interviewed. Thus a total of 809 women were interviewed after explaining the purpose of the study, obtaining consent and assuring confidentiality. The study was carried out between Jan 2009 to Oct 2009. A pre tested semi structured questionnaire was used and the field personnel who administered the questionnaire were trained. Knowledge regarding the common cancers affecting women, the screening methods of breast cancer, practices were collected by interview. Statistical analysis was performed using SPSS version 11. Modified Prasad's scale was used to calculate socioeconomic status according to Consumer Price Index for the year 2009 (Agarwal, 2008). A p level of <0.05 was considered to be significant.

Aspects of knowledge such as symptoms of breast cancer, causes/risk factors and early detection of breast cancer, name of the screening tests were scored with a maximum of 1 for each. A knowledge score of more than or equal to 2 was considered to be good knowledge and less than 2 was considered to be poor.

Results

The mean age of the women in the study was 34.5 + 9.23 yrs. The socio demographic profile showed that more than half of the women (54.8%) were Hindus' by faith. A majority of the respondents (64.4%) had about 8-12 years of schooling (high school and higher secondary) and only 15.4% had seven years of schooling (primary and middle school education). The study population comprised of 91.5% in the non working group which included homemakers and unemployed women. A majority of women 88.4% were ever married including widows and 11.6% were never married (Table 1). A majority

Table 1. Sociodemographic Profile of Study Population

		Frequency(%)
Age	15-34	375 (46.4)
	35-50	434 (53.6)
Religion	Christians	309 (38.2)
	Hindus	443 (54.8)
	Muslims	57 (7)
Occupation	Working	69 (8.5)
	Not working	740 (91.5)
Education	7yrs of schooling	125 (15.5)
	8-12yrs of schooling	521 (64.4)
	>13 yr	163 (20.1)
*Type of family	Nuclear	490 (60.6)
	Joint	316 (39.1)
**Economic status	High	7 (1.1)
	Middle	53 (8.2)
	Poor&below poverty line	587 (90.7)
Marital status	Ever married	715 (88.4)
	Never married	94 (11.6)

*type of family available only on 806; **Economic status revealed by 647 only

(60.6%) of the respondents belonged to nuclear families. Almost one third of the respondents (35.1%) cited health professionals and about half of the respondents (54.1%) audiovisual media as the source of information regarding breast cancer. The vast majority (90%) of the surveyed respondents in the study were poor.

Breast cancer was cited by 79.9% of women as a type of cancer affecting women. Among the symptoms of breast cancer, lump was stated by 55.8%, pain by 13.5% and a difference in shape by 5.6% and discharge by 2.3%. About a third of women (37.9%) said that they didn't know the symptoms of breast cancer. The causes or risk factors of breast cancer were reported by 9.8% as an absence of breast feeding, 4.6% as related to fatty food, 2.6% as

hereditary and 0.2% as infertility. An overwhelming 82.1% said that they didn't know.

About three fourths (78.6%) of the respondents said that there is a test to detect breast cancer early and 93.8% said that it is necessary to undergo the screening test. The screening tests were reported as BSE by 41.4%, Mammography 12.8% and ultrasound scanning by 1.1%. About half (48.5%) of the respondents said that they did not know the name of any screening test. Scoring the knowledge of the respondents regarding symptoms, risk factors, screening test to detect breast cancer early and name of the screening tests it was found that only 17.3% had a score of >2 indicating good knowledge.

It was heartening to note that almost half (46.6%) reported to have done screening tests like BSE and or Mammography. Out of the 377 (46.6%) who had done screening tests 97.3% had done Breast Self Examination only, 3.4% had done Mammography and 4.7% had done both. A notable feature was that none of the respondents

Table 2. Predictors of Screening, Sociodemographic Predictors and Predictors in Relation to Specific Knowledge Regarding Breast Cancer

	Screening done Yes	Total	OR	CI	p
A. Sociodemographic predictors					
Age					
15-34	132 (35.2%)	375	1		<0.001
35-50	245 (56.5%)	434	2.38	1.79-3.17	
Religion					
Muslim	25 (43.9%)	57	1		0.664
Hindu	202 (45.6%)	443	0.93	0.53-1.62	
Christian	150 (48.5%)	309	0.82	0.46-1.46	
Education (schooling)					
7 yrs	52 (41.6%)	125	1		0.07
8-12yrs	237 (45.5%)	521	0.85	0.57-1.26	
>13 yrs	88 (54%)	163	0.60	0.37-0.97	
Marital status					
Never married	24 (25.5%)	94	1		0.001
Ever married	353 (49.4%)	715	2.8	1.74-4.6	
Occupation					
Non working	334 (45.1%)	740	1		0.006
Working	43 (62.3%)	69	2.01	1.20-3.34	
Socioeconomic status^a					
Poor	279 (47.5%)	587	1		0.003
Middle	37 (69.8%)	53	2.55	1.38-4.69	
High	4 (57%)	7	1.47	0.32-6.63	
Type of family					
Nuclear	225 (45.9%)	316	1		0.544
Joint	152 (48.1%)	490	0.916	0.69-1.21	
Family history of breast cancer					
No	335 (45.6%)	734	1		0.563
Yes	42 (56%)	75	1.5	0.93-2.44	
Source of Information^b					
Others	208 (43.1%)	483	1		
Health workers and professionals	168 (60.9%)	276	2.05	1.52-2.78	0.00
B. Predictors in relation to specific knowledge regarding Breast cancer					
Knowledge of Cancers Breast					
Others	336 (52.6%)	639	3.5	2.37-5.12	0.00
Others	41 (24.1%)	170	1		
Knowledge of symptoms					
Good	287 (59.54%)	482	3.8	2.86-5.24	0.00
Poor	90 (27.5%)	327	1		
Knowledge of risk factors					
Good	104 (72.22%)	144	3.733	2.51-5.54	0.00
Poor	273 (41.05%)	665	1		
Knowledge of screening					
Good	377 (55.1%)	684	6.236	5.04-7.70	0.00
Poor	0 (0%)	125	1		
Knowledge of screening tests					
Good	377 (84%)	449	2.228	2.05-2.421	0.00
Poor	0 (0)	360	1		

^a159-no response; ^b50-don't know

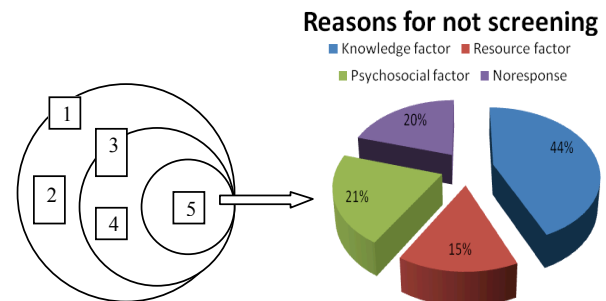


Figure 1. Distribution of Sample Population as per their Screening Status, Willingness to Undergo Screening in Future and Reasons for not Undergoing Screening. 1) Sample population=809; 2) Ever screened=377/809=46.6%; 3) Never screened=432/809=53.4%; 4) Not willing to be screened in future and non responders=231/432=53.5% and 49/432=11.3%; total=64.8%; 5) Willing to be screened=152/432=35.2%

Table 3. Reasons for Not Screening in Relation to Socio-demographic Variables

	Knowledge	Psychological	Resource	Total	p
Age					
15-34 yrs	45 (56.2%)	17 (21.2%)	18 (22.5%)	80	0.132
>35yrs	21 (51.2%)	15 (36.5%)	5 (12.2%)	41	
Religion					
Christian	23 (46.9%)	13 (26.5%)	13 (26.5%)	49	0.326
Hindu	39 (60%)	18 (27.6%)	8 (12.3%)	65	
Muslim	4 (57.1%)	1 (14.3%)	2 (28.6%)	7	
Education					
Primary & middle	12 (66.6%)	5 (27.7%)	1 (5.5%)	18	0.587
High school	39 (52.7%)	20 (27%)	15 (20.2)	74	
Graduate & above	15 (51.7%)	7 (24.1%)	7 (24.1%)	29	
Marital status					
Unmarried	12 (57.1%)	1 (4.7%)	8 (38.1%)	21	0.009
Married	54 (54%)	31 (31%)	15 (15%)	100	
Economic status					
Low	47 (52.8%)	28 (31.5%)	14 (15.7)	89	0.110
Middle	1 (20%)	2 (40%)	2 (40%)	5	
High	2 (100%)	0	0	2	
Occupation					
Not working	64 (54.7%)	30 (25.6%)	23 (19.6%)	117	0.434
Working	2 (50%)	2 (50%)	0	4	
Knowledge score					
Poor	64 (56.1%)	28 (24.5%)	22 (19.3%)	114	0.161
Good	2 (28.5%)	4 (57.1%)	1 (14.3%)	7	

mentioned Clinical Breast Examination as a means of screening for Breast Cancer as for an educated populace going to the doctor in case of any issue is the norm and therefore they did not cite it. Performance of daily, weekly and monthly BSE was reported by 5.3%, 5.6% and 27.2% respectively. Two thirds (66.3%) of the women said that they do BSE only sometimes. Of the 6 women who had done mammography the majority (90%) said that they do it, when the doctor asks them to.

On exploring the factors predicting screening it was found that age 35-50 years (OR 2.3, CI 1.796-3.172), married women (OR=2.8, CI 1.749-4.625), health professionals as source of information (OR=2.05 CI 1.52-2.78) and working women (OR=2 CI 1.209-3.341) were significant predictors. Women belonging to middle socioeconomic group was significantly more likely to undergo screening (OR=2.5 CI 1.38-4.69) as compared to those in the poor group. On exploring screening vis-a-vis specific knowledge regarding the various aspects of cancer such as symptoms of breast cancer, etiological factors of breast cancer, knowledge regarding screening tests they were 3.8, 3.7, 6.2, 2.2 times more likely respectively to have undergone a screening test at $p=0.000$. Those who had a family history of breast cancer were 1.5 times more likely to undergo a screening test though this was not significant. (Table 2). A logistic regression was done on the above variables and older women (35-50) years were found to be a significant (OR=2.2, CI 1.466-4.589, $p=0.001$) independent predictor of screening practice.

Almost half (46.6%) of the study population had ever screened and the rest (53.4) had never screened. Out of the never screened 35% were desirous of doing it, but had not done it due to various reasons, 53.5% were not willing to screen and 11.3% did not respond. (Figure 1)

The reasons identified for not screening among those desirous of doing it were grouped into knowledge 66(43.4%), psychosocial 32(21.1%) and resource 23 (15.1%) factors. The non responders accounted for 31 (20.4%). The knowledge factors included no awareness, no symptoms, didn't feel it was necessary, no one is doing it and never thought of it. The resource factors included no money, no time, lack of facility. The psychosocial factors included not interested, anxiety regarding results /fear and embarrassment and non specific response

The association between the different types of factors for not screening and socio demographic variables was tested with age categories, religion, education, marital status, economic status and occupation. Unmarried women were significantly more likely to express factors related to knowledge (57.15%), resource (38.1%) and psychosocial (4.7%) domains as compared to 54%, 15% and 3% among married women respectively to undergo screening (Table 3)

Discussion

About half of the women studied (46.6%) had undergone some form of screening in this study in sharp contrast to 0.6% in a north Indian state who then reported surgical removal of breast (Somdutta and Baridalyne, 2008).

Older women (35-50 years), married, working women and women belonging to higher income groups, specific knowledge vis a vis symptoms, risk factors etc were found to significantly predict the probability of screening. As far as the socioeconomic status is concerned, this is in agreement with other studies (Hackshaw and Paul, 2003). There are contrasting results on association with age in the literature. Hospital and community based survey in Malaysia did not find a relationship with age (Dahlui et al., 2012; Subramaniam et al., 2013) whereas in Taiwan (Wu et al., 2012), older women were more likely to undergo screening and another study showed a higher probability of screening among younger women. In this study after multiple logistic regression age was found to be an independent predictor of breast cancer screening (Hackshaw and Paul, 2003).

Only 8.1% had done mammography alone or in combination with BSE on the advice of a doctor. This is borne out by the fact that mammography screening is expensive and is not feasible in low and middle income countries. In this context breast awareness is a clinically useful strategy in which women are made aware of what is normal for them and what changes to look and feel for (Bevers, 2009; Sankaranarayanan and Boffeta, 2010).

In this study 27.2% of the women reported doing monthly BSE. Currently, National Comprehensive Cancer network (NCCN) panel of USA recommends monthly BSE as an option for women aged 20 and above so that women can be familiar with their breast and promptly report changes. (NCCN, 2013). Even in the absence of a screening programme the screening prevalence was found to be 46.6% in the study area and this was found to have increased from 22.6% in the same area in 2006 (Aswathy et al., 2006). This could be in tandem with the increasing rates of Breast cancer in the region as indicated by a 4% annual increase in incidence of breast cancer in the South Indian population registry, Chennai from 1995 to 2005 (ICMR, 2009). Though, a limitation here is that the technique of BSE was not looked into and we have relied on self reports. Those who had a family history of breast cancer were 1.5 times more likely to undergo a screening test indicating a trend, though not significant.

In this study, lump was cited as a symptom of breast cancer by 55.8% comparable to 47.2% in a study in northern part of India in 2008 (Puri et al., 2009). Whereas, in 2007 in Delhi only 26.5% were aware of at least a symptom/sign of Breast cancer (Somdutta and Baridalyne, 2008). Other symptoms in the north Indian study included nipple discharge, pain in breast and change in breast size mentioned by 28.7%, 41.2% and 13.5% respectively (Puri et al., 2009).

In the present study, risk factors of breast cancer were reported by 9.85% as an absence of breast feeding, 2.59% as hereditary and 4.56% as being related to fatty food. The risk factors cited in the other study included late initiation of breast feeding (15.3%) and not practicing breast feeding (16.9%) (Somdutta and Baridalyne, 2008). In another study 2.7% mentioned advancing age as a risk factor while 3.6% believed that risk is more at younger age, 13.5% believed that breast feeding protects against breast cancer whereas 1.5% thought that breast feeding

is a risk factor (Puri et al, 2009). Only 15.9%-29.4% in two north Indian studies (Somdutta and Baridalyne, 2008; Puri et al., 2009) were aware that Breast cancer can be detected early in contrast to 78.6% in this study. Only 55.5% were aware of breast cancer as a disease among women (Somdutta and Baridalyne N, 2008) in Delhi. In this study 41.4% of women were aware of BSE in contrast to only 11% of women in Delhi and 33% in another north Indian state (Somdutta and Baridalyne, 2008; Puri et al., 2009). Only 6 (1.8%) women knew about early detection by mammography (Somdutta and Baridalyne, 2008) in sharp contrast to 12.8% in this study. Thus, overall the women in this study appeared to be more knowledgeable than in other Indian studies, attributable to higher literacy levels among women.

In the study in Delhi, television was cited as the most common source of information. Other sources of knowledge were neighbours and relatives (Somdutta, 2008). Here, though audiovisual media was a major source of information, it appeared that women were more likely to act on information from health professionals as this was found to be significant predictor for screening.

In this study 27.3% of the women who practiced BSE did it correctly, monthly in contrast to 46.7-55.6% in Taiwan, Malaysia and other countries (Feldman;1981; Dahlui et al., 2012; Wu et al., 2012). But, 66.3% of the women who reported doing BSE did it only sometimes indicating the need for sustained, high quality educational programmes. Forgetfulness or being too busy appeared to be the two most frequently reported reasons for not doing BSE among the more educated subjects (Sharon, 2000). In this study out of the never screened 35% were desirous of doing it but had not done it due to various factors. The knowledge factors were most commonly reported at 43.4% followed by psychosocial factors at 21.1%. Knowledge factors seems to stem from an absence of preventative behavior such as 'no symptoms', 'didn't feel it was necessary', 'no one is doing it and never thought of it'. This compares to the Taiwanese study where Universal health care is available and where 70% of respondents mentioned reasons like no need to get screened, no symptoms (Wu et al., 2012). Similarly, in Korea women did not perceive the need for breast cancer screening if they did not have any symptoms (Im et al., 2004).

The psycho social factors in the study was not interested, pain/fear and embarrassment and non specific responses. Fear of results, fear of treatment and fear of the test itself could be a barrier to screening behavior which are not expressed routinely and is only acknowledged by a very small proportion of women (Rao et al., 2005). The fear of finding a lump was a significant barrier reported in other countries also (Dunbar et al., 1991; Sensiba and Stewart, 1995). BSE has its own merits in bringing about an increase in awareness among women, empowering them and motivating them to be responsible for their health (WHO, 2013). Women who have positive attitudes about BSE, positive social influences, greater perception of the importance of early detection and thought breast cancer would have less impact on their lives were more motivated to practice BSE (Feldman et al., 1981). In another study having a relative with Breast Cancer prompted 89% of

the women to practice BSE and media was the stimulus for 81% of the sample (Dunbar et al., 1991). In our study too having a family history with breast cancer prompted 1.5 times more screening though not significant. Resource factors such as no time, no money and lack of facility nearby were also reported. Most women had difficulty remembering to do BSE (Wu et al., 2012) and the more educated subjects said that they were too busy or forgot (Feldman et al., 1981).

A common thread running through the barriers in the knowledge, resource and psychosocial domain like 'no awareness', 'never thought of it', 'no symptoms', 'fear of test/result', 'no time', 'no money' also relate to the social position of women in the family. Women have always occupied a lower position, have subordinated their own needs, including health care needs to the needs of other family members (Berner et al., 2001; Im et al., 2004). Therefore, it is also necessary to study the role played by social support, position of women in determining screening.

In conclusion, the absence of a screening programme and rise of background breast cancer rates have led the women in the 35-50 year age group to significantly practice screening. This study in Kerala, a southern state in India with good health indices and high educational levels (Kerala Government) shows that it is possible to have half of the study population practice screening with good specific awareness regarding symptoms, risk factors, screening tests though the overall awareness is poor. While the controversy regarding the usefulness of BSE persists, its role in promoting breast health awareness cannot be contested. In any middle income country like ours, importing expensive solutions like mammography is not the answer (Ferlay et al., 2010). Imparting a high quality breast cancer awareness and early diagnosis initiative at this juncture can help to consolidate the gains and also tackle knowledge, resource and psychosocial barriers.

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