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From Awareness to Action: A Model-Based Cancer Education Program for Anganwadi Workers in Karnataka

Article History:

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Abstract: Background: In India, breast and cervical cancers continue to be among the leading causes of death in women. Limited awareness and delays in seeking medical help worsen survival outcomes. Anganwadi workers, who serve as community-level educators through the Integrated Child Development Services (ICDS), are in a unique position to spread cancer awareness, but this role remains largely untapped.

Aims & Objectives: To measure baseline knowledge and attitudes of Anganwadi workers toward breast and cervical cancer and to determine the effect of a structured health education program.

Methods: A pre-post interventional study was carried out among 180 Anganwadi workers in Belagavi Taluka, Karnataka. Knowledge and attitude levels were assessed using a validated tool. Participants attended a one-hour interactive session that included a lecture, demonstration, and distribution of pamphlets in the local language. Follow-up assessment was conducted one month later. Data were analyzed in SPSS v22, and paired comparisons were made using the Wilcoxon signed-rank test.

Results: Before the intervention, 88.3% of participants showed poor knowledge and 69.1% demonstrated poor attitudes. After the program, knowledge improved to 91.7% and positive attitudes to 89.5%, both changes being statistically significant ($p < 0.001$).

Conclusion: A structured educational program markedly improved knowledge and attitudes of Anganwadi workers. Incorporating such training within ICDS could help convert a missed opportunity into an effective public health strategy for early cancer awareness and detection.

Keywords: Breast cancer, Cervical cancer, Health education, Anganwadi workers, India

INTRODUCTION

Breast and cervical cancers are the two most common malignancies among women and major contributors to cancer-related deaths worldwide. As per GLOBOCAN 2020, breast cancer accounts for

2.3 million new cases each year, while cervical cancer adds more than 600,000 cases, with a higher burden in low- and middle-income countries like India [1]. In India, breast cancer is the leading cancer among women with an age-adjusted incidence of

25.8 per 100,000, followed by cervical cancer at 22 per 100,000. Together, they account for almost one-third of the female cancer burden [2,3].

Although preventive strategies such as breast self-examination, mammography, Pap testing, and HPV vaccination are available, their utilization in India remains low [4]. Barriers include lack of awareness, cultural beliefs, stigma, and poor access to screening facilities, particularly in rural areas [5]. As a result, nearly 70% of Indian women are diagnosed at advanced stages, leading to poor survival outcomes [6].

Health education is an important approach to improve awareness, attitudes, and health-seeking behaviour. Within the Integrated Child Development Services (ICDS), Anganwadi Workers (AWWs) form a key workforce delivering maternal and child health, nutrition, and preventive services. Their close contact with communities places them in a strong position to share information about non-communicable diseases, including cancer [7,8]. Studies show that training community health workers enhances their ability to provide accurate health messages and contributes to better population health outcomes [9,10].

Evidence suggests that knowledge of breast and cervical cancers among AWWs is generally poor, with misconceptions about risk factors and screening [11,12]. Structured training interventions, however, have been shown to improve knowledge, attitudes, and willingness to promote preventive practices [13–15]. Despite this, limited data are available from North Karnataka on the impact of such interventions.

This study was therefore planned to assess the effect of a structured health education program on the knowledge and attitudes of AWWs regarding breast and cervical cancer in Belagavi Taluka. Strengthening their knowledge can enhance community-level awareness and contribute to early detection, in line with the objectives of the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).

Rationale

Despite the high burden of breast and cervical cancers in India, awareness among women and community health workers remains low. Studies indicate that Anganwadi Workers (AWWs), who play a crucial role in community health education under the ICDS framework, often have limited knowledge and attitudes regarding these cancers [7,9,11,12,15]. This represents a missed opportunity to enhance early detection and prevention at the community level. Region-specific evidence,

particularly from North Karnataka, is also scarce [11,12,13].

AIMS & OBJECTIVES

Objectives:

- To assess the baseline knowledge and attitude of AWWs toward breast and cervical cancer.
- To determine the effectiveness of a structured educational program in improving their knowledge and promoting positive attitudes, thereby empowering them to serve as community-level advocates for cancer awareness.

METHODOLOGY

Study Design and Setting: A community-based pre-post interventional study was conducted in Belagavi Taluka, Karnataka, between June and September 2023. Belagavi was selected due to its extensive network of Anganwadi Centres (AWCs) functioning under the Integrated Child Development Services (ICDS) scheme, which serve as platforms for community-based health promotion.

Study Population and Sampling: Four Primary Health Centres (PHCs) were randomly selected—two urban (Ramnagar, Khasbag) and two rural (Vantamuri, Kiniye). Eligible participants were Anganwadi Workers (AWWs) employed at AWCs with ≥ 6 months of work experience and willing to participate. Those on long leave, unavailable during the training period, or with prior structured cancer awareness training were excluded.

A total of 180 AWWs were enrolled (90 urban, 90 rural). The sample size was calculated based on pre- and post-test means from a pilot study, with 80% power, 5% alpha error, and a 10% expected loss to follow-up, resulting in 178 participants, which was rounded to 180. Within selected PHCs, participants were enrolled using purposive sampling.

Study Tool and Validation: Data were collected using a pre-tested, structured questionnaire in Kannada, comprising three sections:

- Sociodemographic profile: Age, education, years of service, and marital status.
- Knowledge: Fifteen items covering risk factors, warning signs, and preventive measures.
- Attitude: Ten items assessing perceptions of screening, willingness to promote awareness, and stigma reduction.

Knowledge scores were categorized as poor (<50%), average (50–75%), and good (>75%), while attitude scores were categorized as negative (<50%), neutral (50–75%), and positive (>75%). The questionnaire was validated by five experts in Community Medicine and Oncology. A pilot test among 20 AWWs outside the study area ensured clarity, and internal consistency was acceptable (Cronbach's alpha: knowledge = 0.82; attitude = 0.79) [1,2]. A separate pilot involving 18 AWWs (10% of the sample) tested feasibility; these data were excluded from the final analysis.

Intervention:

Participants attended a structured one-hour health education program consisting of:

- Lecture (20 min): Burden, risk factors, signs/symptoms, and prevention of breast and cervical cancer.
- Pamphlets (10 min): Illustrated, easy-to-read materials in Kannada and Marathi, distributed before sessions.
- Demonstration (30 min): Breast self-examination and cervical cancer screening methods using models and flipcharts.

Sessions were interactive, allowing discussion and clarification of misconceptions. Similar training programs for community health workers in Andhra Pradesh and Maharashtra have improved cancer-related knowledge and practices [3,4].

Data Collection and Follow-up:

Data were collected at two points

- **Pre-test:** Baseline assessment using the questionnaire before the intervention.
- **Post-test:** Re-administration of the same questionnaire one month after intervention to assess retention.

Data collection was conducted during routine PHC review meetings after obtaining permission from Medical Officers. Questionnaires were self-administered in vernacular languages, with approximately 30 minutes provided for completion. Completed forms were cross-checked for completeness and accuracy.

Statistical Analysis: Data were entered in Microsoft Excel and analyzed using SPSS version 22. Descriptive statistics (mean, standard deviation, proportions) summarized baseline characteristics. Pre- and post-intervention changes in knowledge and attitude were evaluated using the Wilcoxon signed-rank test for paired data. Statistical significance was set at $p < 0.05$

Ethical Considerations: Ethical clearance was obtained from the Institutional Ethics Committee, JN Medical College, Belagavi (Ref: JNMC/IEC/2023/ 330). Written informed consent was obtained from all participants. Confidentiality was maintained through unique identifiers, and participation was voluntary.

RESULTS

Table 1: Sociodemographic Characteristics of Anganwadi Workers in Belagavi Taluka.

Variables	Characteristics	n	%
Area	Urban	90	50.00%
	Rural	90	50.00%
Age	18-30 yrs.	60	33.14%
	31-60 yrs.	120	66.08%
Marital Status	Married	127	70.07%
	Divorced	11	6.07%
	Widowed	42	23.02%
Level of Education	Secondary	120	66.08%
	Undergraduate	46	25.04%
	Graduate	8	4.04%
	Post Graduate	6	3.03%
Religion	Hindu	126	70.16%
	Muslim	48	26.05%
	Christian	6	3.03%
Family Type	Nuclear	127	70.07%
	Joint	53	29.07%
Ration Card	BPL	138	76.07%
	APL	42	23.02%
Income	<20000	125	69.06%
	≥20000	56	30.93%
Working Hours	<8 hours per day	155	86.18%
	≥8 hours per day	25	13.08%
Work Experience	1-2 years	7	4.04%
	2-3 years	33	18.23%
	More than 3 years	140	77.34%

n = 180 (100%) p = <0.001

Sociodemographic Characteristics & Education among Anganwadi Workers in Belagavi Taluka: The study population was equally distributed across rural and urban areas, with most participants aged 31–60 years (66.8%), married (70.7%), and belonging to nuclear families (70.7%). A majority had completed secondary education (66.8%), were Hindus (70.16%), and held BPL cards (76.7%). Most participants worked less than 8 hours daily (86.18%) and had over 3 years of work experience (77.34%).

Table 2: Impact of Health Education on Knowledge regarding Breast cancer among Anganwadi workers of Belagavi Taluka before and after intervention

Knowledge Questions on Breast Cancer	Yes n in %		Non in %		Not Sure n in %	
	Pre-test	Posttest	Pre-test	Posttest	Pre-test	Posttest
Have you heard of breast cancer	154 (85.1)	180 (100)	27 (14.9)	0 (0)	0	0 (0)
Is it a contagious disease	164 (91.1)	2 (1.1)	14 (7.7)	178 (98.3)	3 (1.7)	1 (0.6)
Most common cancer among female	27 (14.9)	178 (98.3)	114 (63)	2 (1.1)	40 (22.1)	1 (0.6)
Is it a curable disease	10 (5.5)	180 (0)	167 (92.3)	0 (0)	4 (2.2)	0 (0)
Early diagnosis and treatment of breast cancer increases the chance of recovery	14 (7.7)	180 (0)	148 (81.8)	0 (0)	19 (10.5)	0 (0)
Unequal breast size after puberty is normal	6 (3.3)	177 (97.8)	166 (91.7)	1 (0.6)	9 (5)	3 (1.7)
Non pain full lump in the breast is symptom of it	30 (16.6)	179 (98.9)	140 (77.3)	0 (0)	11 (6.1)	2 (1.1)
Normal breast feeding decreases the probability of acquiring it.	24 (13.3)	177 (97.8)	132 (72.9)	1 (0.6)	25 (13.8)	3 (1.7)
Auxiliary lymph node is symptom of it	10 (5.5)	180 (100)	157 (86.7)	0 (0)	14 (7.7)	0 (0)
Breast redness or change in color is the symptom of it	12 (6.6)	180 (100)	148 (81.8)	0 (0)	21 (11.6)	0 (0)
Nipple distract and nipple retraction is symptom of it	56 (30.9)	180 (100)	79 (43.6)	0 (0)	46 (25.4)	0 (0)
Do you know the method of detection of breast cancer	32 (17.7)	180 (100)	132 (72.9)	0 (0)	17 (9.4)	0 (0)
Smoking causes breast cancer	70 (38.7)	180 (100)	80 (44.2)	0 (0)	31 (17.1)	0 (0)
Alcohol consumption causes it	61 (33.7)	180 (100)	86 (47.5)	0 (0)	34 (18.8)	0 (0)
Aging causes breast cancer	32 (17.7)	178 (98.3)	123 (68)	3 (1.7)	26 (14.4)	0 (0)
Late menopause causes breast cancer	5 (2.8)	180 (100)	174 (96.1)	0 (0)	2 (1.1)	0 (0)
Breast cancer runs in family	27 (14.9)	178 (98.3)	133 (73.5)	3 (1.7)	21 (11.6)	0 (0)
Obesity causes breast cancer	21 (11.6)	162 (89.5)	140 (77.3)	15 (8.3)	20 (11)	4 (2.2)
Contraceptive use causes breast cancer	14 (7.7)	175 (96.7)	164 (90.6)	4 (2.2)	3 (1.7)	2 (1.1)
Treatment of breast cancer expensive	22 (12.2)	172 (95)	135 (74.6)	4 (2.2)	24 (13.3)	5 (2.8)

n = 180 (100%) p = <0.001

Pre- and Post-Test Knowledge on Breast Cancer among Anganwadi Workers: Pre-test findings revealed poor knowledge regarding breast cancer, with only 14.9% aware that it is the most common cancer among females,

38.7% recognizing risk factors, and 17.7% knowing detection methods. Following the educational intervention, knowledge improved significantly, rising to 98.3%, 100%, and 100% respectively, indicating a marked impact of the intervention.

Table 3: Impact of Health Education on Attitude regarding Breast cancer among Anganwadi workers of Belagavi Taluka before and after intervention

Attitude Questions on Breast Cancer	Strongly Agree n (%) Pre test	Strongly Agree n (%) Post test	Agree n (%) Pre test	Agree n (%) Post test	Neither Agree nor Disagree n (%) Pre test	Neither Agree nor Disagree n (%) Post test	Disagree n (%) Pre test	Disagree n (%) Post test	Strongly Disagree n (%) Pre test	Strongly Disagree n (%) Post test
Any women can suffer from breast cancer	9 (5)	161 (89)	1 (0.6)	20 (11)	29 (16)	0 (0)	80 (44.2)	0 (0)	62 (34.3)	0 (0)
Breast cancer transmits from one person to another	20 (11)	0 (0)	12 (6.6)	21 (11.6)	41 (22.7)	0 (0)	71 (39.2)	0 (0)	37 (20.4)	144 (79.6)
Screening helps in early detection of breast cancer	108 (59.7)	160 (88.4)	21 (11.6)	30 (16.6)	3 (1.7)	0 (0)	31 (17.1)	0 (0)	29 (16)	0 (0)
Screening is expensive	60 (33.1)	152 (84)	38 (21)	29 (16)	10 (5.5)	0 (0)	53 (29.3)	0 (0)	20 (11)	0 (0)
Screening causes no harm to the women	32 (17.7)	173 (95.6)	41 (22.7)	8 (4.4)	15 (8.3)	0 (0)	59 (32.6)	0 (0)	34 (18.8)	0 (0)
If screening tests are made free, would you wish to undergo screening	34 (18.8)	180 (100)	6 (3.3)	0 (0)	10 (5.5)	0 (0)	90 (49.7)	0 (0)	41 (22.7)	0 (0)
Do you think healthy lifestyle can reduce the risk of breast cancer	102 (56.4)	150 (82.9)	24 (13.3)	28 (15.5)	3 (1.7)	0 (0)	7 (3.9)	2 (1.1)	46 (25.4)	0 (0)

n = 180 (100%) p = <0.001

Pre- and Post-Test Attitude on Breast Cancer among Anganwadi Workers: Attitudes towards breast cancer improved significantly after the intervention, with awareness that any woman can develop the disease increasing from 5% to 89%. Willingness to undergo free screening rose from 18.8% pre-intervention to 100% post-intervention.

Table 4: Impact of Health Education on Knowledge regarding Cervical Cancer among Anganwadi workers of Belagavi Talukabefore and after intervention

Knowledge Questions on Cervical Cancer	Yesn in %		Non in %		Not Sure n in %	
	Pretest	Post test	Pretest	Post test	Pretest	Post test
Have you heard of cervical cancer	80 (44.19)	180 (100)	100 (55.24)	0 (0)	1 (0.57)	0 (0)
Bleeding in between the periods is the symptom of cervical cancer	74 (41.1)	176 (97.7)	96 (53)	4(2.22)	14 (7.7)	0 (0)
One sign of cervical cancer is a foul-smelling vaginal discharge.	12 (6.6)	175 (96.7)	154 (85.1)	0 (0)	15 (8.3)	0 (0)
Do you know any risk factor for cervical cancer	20 (11)	180 (100)	158 (87.3)	0 (0)	3 (1.7)	0 (0)
Can a history of HPV infection increase the likelihood of cervical cancer?	14 (7.7)	180 (100)	140 (77.3)	0 (0)	27 (14.9)	0 (0)
Does multiple sexual partners causes cervical cancer	17 (9.4)	180 (100)	129 (71.3)	0 (0)	35 (19.3)	0 (0)
Does early age sexual intercourse causes cervical cancer?	13 (7.2)	180 (100)	164 (90.6)	0 (0)	4 (2.2)	0 (0)
Does tobacco or smoking causes cervical cancer?	21 (11.6)	176 (97.2)	160 (88.4)	5 (2.8)	0 (0)	0 (0)
Does multiple pregnancies causes cervical cancer?	16 (8.8)	180 (100)	123 (68)	0 (0)	42 (23.2)	0 (0)
Does prolonged use of contraceptive pills causes cervical cancer	27 (14.9)	180 (100)	151 (83.4)	0 (0)	3 (1.7)	0 (0)
Do you know any methods of cervical screening?	11 (6.1)	178 (98.3)	130 (71.8)	3 (1.7)	40 (22.1)	0 (0)
Do you know any vaccine for cervical cancer?	18 (9.9)	176 (98.6)	133 (73.5)	4(2.2)	30 (16.6)	0 (0)

n = 180, p = <0.001

Pre- and Post-Test Knowledge on Cervical Cancer among Anganwadi Workers: Knowledge of cervical cancer among Anganwadi workers was limited at baseline, with only 44.9% aware of the disease, 11.6% aware of screening methods, and 9.9% aware of HPV vaccination. Following the educational intervention, knowledge significantly improved to 97.2%, 98.3%, and 98.8% respectively, demonstrating substantial impact of the program.

Table 5: Impact of Health Education on Attitude regarding Cervical cancer among Anganwadi workers before and after intervention.

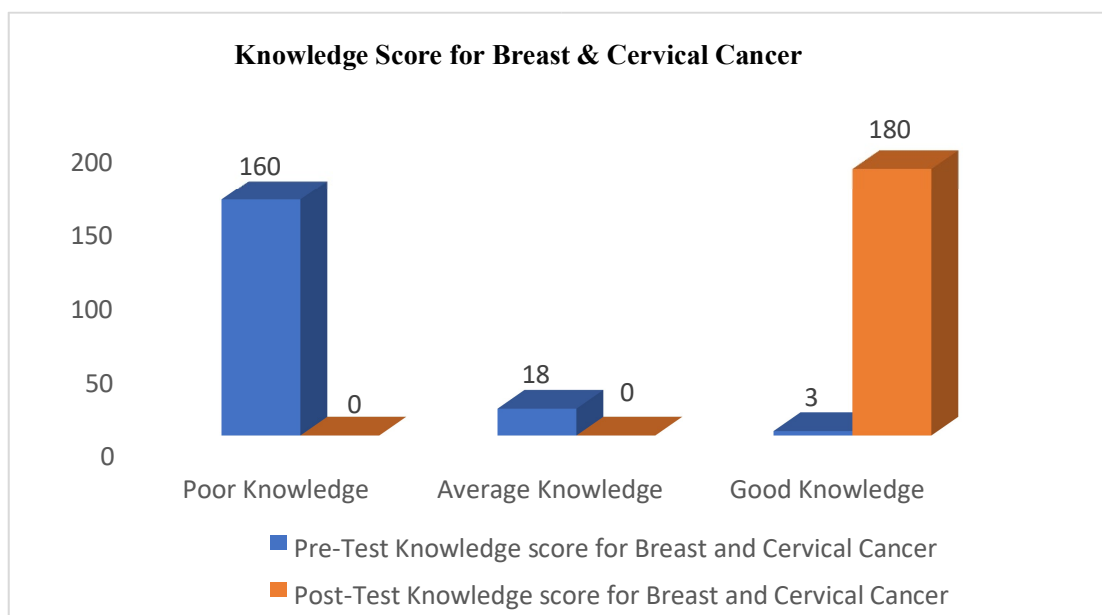
Attitude Questions on Cervical Cancer	Agree Strongly n in %		Agree % n in		Neither Disagree nor Agree n in %		Disagree in % n		Disagree Strongly in % n	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
Intermenstrual bleed is considered as normal.	13 (7.2)	2 (0)	130 (71.8)	1 (0)	40(22)	0 (0)	0 (0)	14(8.2)	0 (0)	168 (92.8)
Women should bear her first child by the age of 20 years	80 (44.2)	0 (0)	84 (46.4)	0 (0)	16 (8.8)	0 (0)	0 (0)	26 (14.4)	1 (0.6)	155 (85.6)
Women who engage in sexual activity with more than one partner increase their risk of cervical cancer.	43 (23.8)	107 (59.1)	81 (44.8)	70 (38.7)	10 (5.5)	0 (0)	22 (12.2)	0 (0)	25 (13.8)	4 (2.2)
A gynaecologist should check a woman's internal organs every three years.	45 (24.9)	156 (86.2)	30 (16.6)	25 (13.8)	53 (29.3)	0 (0)	31 (17.1)	0 (0)	22 (12.2)	0 (0)
If screening tests are made free, would you undergo screening	100 (55.2)	151 (83.4)	24 (13.3)	30 (16.6)	30 (16.6)	0 (0)	17 (9.4)	0 (0)	10 (5.5)	0 (0)
Health lifestyle can reduce the risk of cervical cancer	56 (30.9)	137 (75.7)	77 (42.5)	44 (24.3)	38 (21)	0 (0)	10 (5.5)	0 (0)	0 (0)	0 (0)
HPV vaccine reduces the risk of cervical cancer.	66 (36.5)	180 (100)	53 (29.3)	0 (0)	37 (20.4)	0 (0)	25 (13.8)	0 (0)	0 (0)	0 (0)

n = 180, p = <0.001

Pre- and Post-Test Attitude on Cervical Cancer among Anganwadi Workers: The Wilcoxon signed-rank test showed a significant improvement in participants' attitudes towards cervical cancer post-intervention. While 75.7% initially demonstrated poor attitudes, this reduced markedly after the intervention, with 86.7% showing improved attitudes, highlighting the effectiveness of the educational program.

Figures:

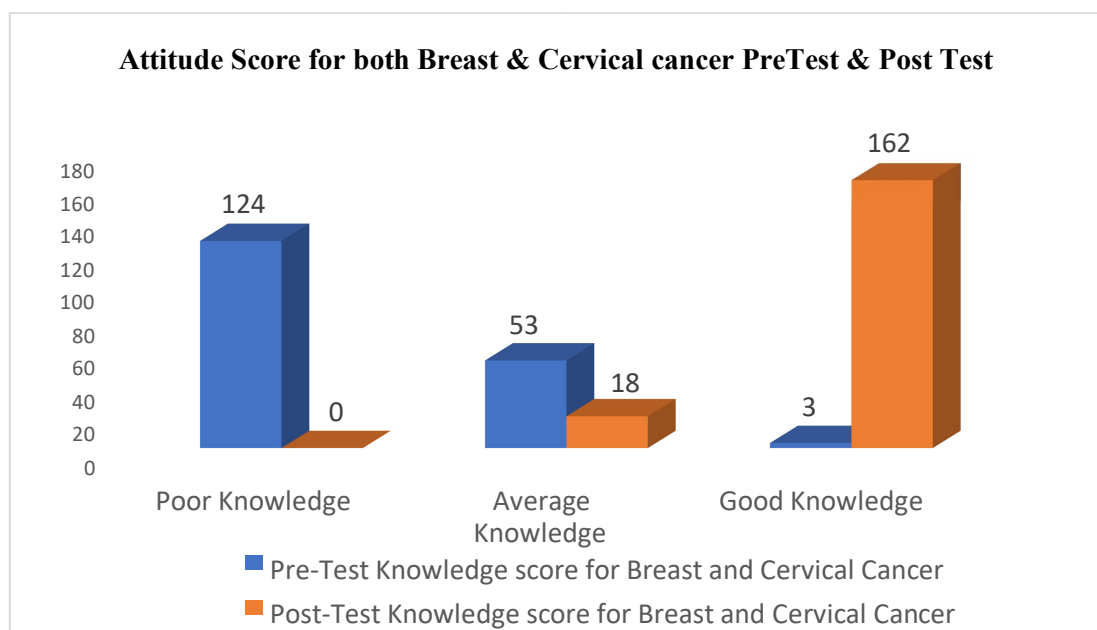
Figure 1: Impact of Health Education on Knowledge regarding Breast and Cervical cancer among Anganwadi workers (before and after intervention)



n = 180, p = <0.001

Figure 1 -Knowledge Scores for Breast and Cervical Cancer: The Wilcoxon signed-rank test revealed a significant improvement in overall knowledge of breast and cervical cancer. Pre-intervention, 88.3% of participants had poor knowledge, which improved markedly post-intervention, with 91.7% demonstrating good knowledge (p < 0.001), reflecting the effectiveness of the health education program.

Figure 2: Impact of Health Education on Attitude regarding Breast and Cervical cancer among Anganwadi workers (before and after intervention)



n = 180, p = <0.001

Figure 2 - Overall Attitude Scores for Breast and Cervical Cancer: Overall attitude towards breast and cervical cancer was poor among 69.1% of Anganwadi workers at baseline. Following the intervention, positive attitudes increased substantially to 89.5%, with a statistically significant improvement ($p < 0.001$).

DISCUSSION

The present study demonstrates that a structured health education intervention significantly improved both knowledge and attitudes of Anganwadi workers (AWWs) regarding breast and cervical cancer. At baseline, the majority of participants had poor knowledge, with 99.4% unaware of key aspects of breast cancer and 77.9% lacking adequate knowledge about cervical cancer. Post-intervention, knowledge improved dramatically, with all participants achieving good knowledge scores for both cancers. Similarly, positive attitudes increased from 31.1% at baseline to 89.5% after the intervention, reflecting the effectiveness of culturally tailored, interactive educational sessions. These findings underscore the potential of targeted community-based health education programs to empower frontline workers and indirectly improve cancer awareness in the broader community.

Comparison with Indian Studies:

Baseline knowledge and attitudes observed in this study are consistent with findings from other regions in India. In Tamil Nadu, only 27% of AWWs had adequate knowledge of cervical cancer before receiving training interventions²⁶. A Kerala-based study found that less than one-third of Accredited Social Health Activists (ASHAs) could correctly identify breast cancer signs and symptoms²⁷. Post-intervention results from our study, showing near-universal improvement, highlight the effectiveness of focused, locally adapted educational programs.

Similar gains have been reported in other Indian interventional studies. A quasi-experimental study in Andhra Pradesh demonstrated significant improvements in knowledge and attitude regarding cervical cancer following structured educational programs for community health workers²⁸. Likewise, a randomized controlled trial in Maharashtra showed that training health workers increased their ability to counsel women on breast self-examination and cervical screening²⁹. These findings reinforce the utility of health worker-oriented interventions across diverse Indian settings.

Comparison with International Evidence:

Global evidence also supports the effectiveness of similar interventions. In Nigeria, health education workshops among primary healthcare workers led to marked improvements in cervical cancer knowledge and awareness of HPV vaccination³⁰. Similarly, a study in Lesotho reported significant increases in nurses' understanding of breast cancer screening following structured training³¹. These international

parallels suggest that empowering frontline health workers is a universally effective strategy to address gaps in cancer awareness, regardless of the context.

Public Health Implications:

AWWs, as part of the ICDS framework, are trusted community health communicators. Training them in cancer awareness provides a multiplier effect, enabling dissemination of preventive messages at the grassroots level. This is especially important in rural areas, where access to formal screening services remains limited. By improving knowledge and attitudes, AWWs can facilitate early detection behaviors such as breast self-examination, clinical breast examination, Pap smear testing, and promotion of HPV vaccination.

Our findings align with the objectives of India's National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), which emphasizes community awareness as a cornerstone of cancer control³². Integrating structured cancer awareness modules into routine training for AWWs and ASHAs could strengthen NPCDCS implementation and contribute to improved cancer prevention and early detection at the community level.

Strengths and Limitations:

Key strengths of this study include its community-based design, inclusion of both urban and rural AWWs, and use of culturally appropriate tools, which enhanced acceptability and effectiveness. Limitations include purposive sampling, a short one-month follow-up, and lack of assessment of actual screening uptake. Future studies should incorporate longitudinal follow-up to evaluate sustained impact and behavioral outcomes.

CONCLUSION

This study demonstrates that a structured health education intervention significantly improved Anganwadi workers' knowledge and attitudes toward breast and cervical cancer. As frontline community health educators, empowering them with accurate information can enhance cancer awareness, promote early detection, and support prevention efforts at the grassroots level. Integrating such training into ICDS and NPCDCS programs may strengthen India's public health response to non-communicable diseases, improve screening participation, and contribute to better cancer outcomes.

Implications for Practice:

Training Anganwadi workers in breast and cervical cancer awareness offers a cost-effective, community-based approach to strengthen early detection and prevention. Leveraging their trusted role, they can educate women, dispel misconceptions, and promote screening uptake. Integrating such training into ICDS and NPCDCS can enhance community outreach, improve health-seeking behaviors, and advance India's cancer control goals.

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