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Original Article

General Surgery Section

Triple Assessment for the Diagnosis of Carcinoma Breast in a Tertiary Care Hospital of Tripura: A Cross-sectional Study

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ABSTRACT

Introduction: A combination of invasive and non invasive procedures, clinical examination, radiological imaging {mammography/ ultrasonography/Magnetic Resonance Imaging (MRI)} and Fine Needle Aspiration Cytology (FNAC) called the triple assessment test is being increasingly used in place of the more invasive core needle biopsy and histopathology.

Aim: To evaluate accuracy of triple assessment in the preoperative diagnosis of patients with breast carcinoma and to determine sensitivity and specificity with regards to histopathology in the diagnosis of the disease.

Materials and Methods: A cross-sectional study was conducted among 61 women of more than 25 years of age having palpable breast lump, attending the surgery Outpatient Department (OPD) and breast clinic of a tertiary care hospital from January 2017 to February 2019. Data on socio-demographic status, menstrual and obstetric information, clinical examination performed, mammography, FNAC, high resolution sonography breast and histopathology were recorded into predesigned and pretested proforma and analysed using Statistical Package for Social Sciences (SPSS) version 25.0.

Results: Out of total 61 patients participated in the present study, most patients were of 41-50 years of age, with a mean age of 44.23±7.4 years. Majority of patients were married, non vegetarian and without any past history of alcohol consumption. Sensitivity and specificity of triple assessment was 98.3% and 100%, respectively. The positive predictive value of triple assessment was 100% while the negative predictive value was 66.7%. All values were significantly better than both clinical breast examination and FNAC in detecting malignancies.

Conclusion: The triple test was also found to be accurate in diagnosing breast carcinoma in this geographical region. A patient with a negative triple test report can be safely followed-up without the need for biopsy.

Keywords: Carcinoma breast, Sensitivity, Specificity, Triple assessment

INTRODUCTION

Breast cancer is the most common cancer in women worldwide, with nearly 1.7 million new cases diagnosed every year and second most common cancer overall representing about 12% of all new cancer cases and 25% of all cancers in women [1,2]. It is also the most common cause of cancer mortality among women in developing countries and second most common in developed countries. Signs of breast cancer varies, and may include change in the breast shape, dimpling of the skin, fluid coming from the nipple or a red scaly patch of the skin. In those with distant spread of the disease, there may be bone pain, swollen lymph nodes, shortness of breath and yellow skin [3]. However, the most common way the disease presents itself is with the presence of a growing lump in the breast that is felt by the woman [1].

An estimated 1,45,000 new breast cancer patients are diagnosed annually in India and about 76,000 women are expected to die from the disease every year [2,4,5]. It has been suggested that the primary reason for such a high mortality among breast cancer patients in the country is the fact that the early diagnosis of the disease is still very low. Most of the breast cancer patients have no access to screening procedures, and in cases where screening is availed, adequate follow-up of the patients do not occur. This leads to most of the breast cancer cases progressing to a more advanced form of the disease which is associated with much poorer prognosis and outcomes [1]. In Tripura, breast cancer is the one of the most common forms of cancer among females, second only to uterine cancer [6].

Although the diagnosis of breast cancer can be suggested by clinical examination, it largely depends on the degree of clinical suspicion of the disease. Presence of a lump or space occupying lesion in the breast raise suspicion of being benign or malignant. Differential diagnosis of breast lesion includes traumatic fat necrosis, acute and chronic breast abscess, fibroadenosis, breast cysts etc. In those with distant spread of the disease, there may be bone pain, swollen lymph nodes, shortness of breath and yellow skin [7,8]. Furthermore, patients who are overtly cautious and fearful of cancers can feel a lump in their breasts even when none exists. Histopathological examination of tissue from a suspected lesion remains the gold standard for the diagnosis of breast cancer. However, since the procedure is invasive, other modalities have since been developed to screen for and diagnose the disease [7].

A combination of invasive and non invasive procedures, i.e. clinical examination, radiological imaging {mammography/ ultrasonography/ Magnetic Resonance Imaging (MRI)} and fine needle aspiration cytology called the triple assessment test have been used with a fairly high accuracy to diagnose palpable breast lumps. Studies have been done comparing triple assessment with histopathology in the diagnosis of breast cancer. However, a thorough literature search of the existing literature revealed that there were very few studies that have been done to explore this scenario in India [4,8]. As the availability, accessibility and utilisation of cancer screening services are still low in the country, this study aims to fill in the gaps that exist in the existing knowledge regarding the accuracy of triple assessment in the Indian setting, especially in Tripura.

The aim of this study was to evaluate accuracy of triple assessment in the preoperative diagnosis of patients with breast carcinoma and to determine sensitivity and specificity with regards to histopathology in the diagnosis of the disease.

MATERIALS AND METHODS

A cross-sectional study was conducted from January 2017 to February 2019 in the Department of General Surgery of a tertiary care

teaching institute in Agartala, Tripura, India. The study was conducted among the patients attending the surgery OPD and breast clinic of the hospital. Ethical permission was obtained from the Institutional Ethics Committee of Agartala Government Medical College (F.4(5-192)/AGMC/Academic/IEC Meeting/2015/090). Written informed consent was obtained from each participant before conducting the study as well as before performing any clinical procedures on them. Confidentiality and anonymity of the participants was ensured.

Inclusion criteria: All patients aged more than 25 years, having palpable breast lump and presented to the Department during the study time period were included.

Exclusion criteria: Patients unwilling/incapable of giving informed consent, pregnant patients or those currently suffering from other medical illnesses like fever, acute cholecystitis, Chronic Obstructive Pulmonary Disease (COPD), cardiovascular diseases, pancreatitis etc., or those patients who remain absent on follow-up, presenting with frank malignant mass with skin infiltration and patients with atypia on Histopathological Examination (HPE) or inconclusive reports were excluded in the study.

Sample size calculation and sampling technique: The sample size was calculated based on the specificity of 90% as reported by Kharkwal S and Sameer AM [4] utilising the formula:

$n=[Z_{1-(\alpha/2)}\times\sqrt{\{2\pi0\times(1-\pi0)\}}+Z_{1-\beta}\sqrt{\{\pi1(1-\pi1)+\pi2(1-\pi2)\}}]2/(\pi2-\pi1)^2$

where, $\pi0=(\pi1+\pi2)/2$

here

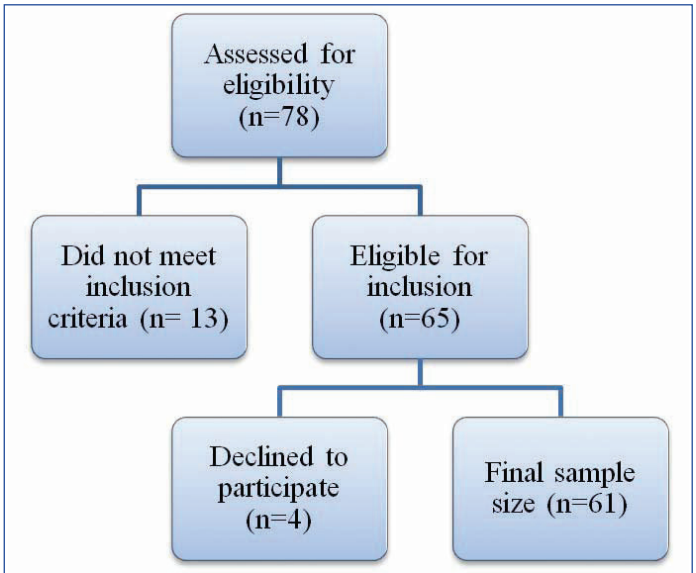
$\pi1$=specificity of the new test=90%

$\pi2$=specificity of the reference test=100%

α=significance level=10%

1-β=power=80%

The minimum calculated sample size was 57. A complete enumeration of the patients attending the general surgery OPD during the study period was done as a sampling technique. A total of 65 eligible patients were found, of whom, four were excluded as per the exclusion criteria, leaving the final sample size obtained by this method to be 61 [Table/Fig-1].



[Table/Fig-1]: Flowchart showing the recruitment of patients for the present study.

Procedure

The data collection was done using a researcher administered questionnaire [Annexure-1]. After obtaining written informed consent, the participants provided information regarding their socio-demographic status, menstrual and obstetric information, and clinical information. After obtaining data pertaining to the questionnaire, following clinical examinations were performed.

Mammography: A lateral oblique and a craniocaudal view of each breast was taken and examined. Criteria such as irregular borders, micro-calcifications, speculated density, loss of architecture and skin retractions were considered as characteristic of a malignant lump, while well-circumscribed mass with regular borders were considered a benign disorder.

High resolution Ultrasonography (USG): Ultrasonography of breast was performed with the patient placed in a supine or oblique position with ipsilateral arm above the head, with the breast being scanned in either a transverse or sagittal or radial planes. Characteristics observed on USG which suggested the lesion to be malignant included sonographic spiculations, microlobulations, thick hyperechoic halo, and the lesion being deeper than wide. A well-circumscribed lesion which was wider than deep, with gently curving smooth lobulations were considered to be benign.

Fine Needle Aspiration Cytology (FNAC): FNAC of the breast lumps was done with 22-gauge needle, mounted on a 20 mL syringe. Prepared slides were sent for staining and histopathological diagnosis to the pathology laboratory of the study institution.

Triple assessment: A combination of these three tests, that is clinical examination, radiological imaging (mammography/ultrasonography) and FNAC, called the triple assessment test is being used increasingly as a non operative tool for breast cancer diagnosis instead of the more disfiguring core needle biopsy.

Grades of alcohol intake was defined as 'never' if someone had never taken alcohol in his lifetime, 'occasional' as consuming less than one alcoholic drink per day and 'moderate' as having more than 1 to 2 alcoholic drinks per day. Any clinical examination performed (mammography, FNAC, high resolution sonography breast and histopathology) were done with proper informed consent and the patients were explained about the procedure fully before undergoing it. In all of the clinical examinations done, it was ensured that the patient had a female attendant.

STATISTICAL ANALYSIS

After collecting all data, data entry was done in a spreadsheet. For the statistical analysis, Statistical Package for the Social Sciences (SPSS) version 25.0 was used. Descriptive statistics, such as frequency, percentage, mean, median, and standard deviation were used. In this study, the result was divided into two groups: benign, and malignant. Sensitivity and specificity were calculated for clinical breast examination, FNAC, USG and triple assessment against the gold standard (histopathology).

RESULTS

It was seen that most patients were of 41-50 years of age, with a mean age of 44.2±7.4 years. Over 45 (73.8%) patients were married and 10 (16.4%) patients were unmarried. Only six participants were divorcees. The mean Systolic Blood Pressure (SBP) of the patients was 111±5.6 mmHg and the mean Diastolic Blood Pressure (DBP) was 91.3±4.6 mmHg. Only one participant had a positive family history of breast cancer [Table/Fig-2]. The mean age of menarche among the participants was 13±0.8 years, with the minimum being 12 years and the maximum being 14 years. The average number of children of the participants was 1.5±0.7, with a mean breastfeeding duration of 8.3±5.4 months [Table/Fig-3].

Histopathology of the tissue from the breast lumps, the gold standard for the diagnosis of breast cancer showed that 59 patients (96.7%) had malignant masses, while only two (3.3%) participants had non malignant masses. Analysis of sensitivity and specificity showed that the sensitivity of the triple assessment test in detecting breast cancer in women was 98.3% as compared to the gold standard (histopathology). The specificity of triple assessment was found to be 100%, with a 66.7% negative predictive value [Table/Fig-4].

Variables	Subcategories	Frequency (n)	Percent (%)
Age groups (years)	31-40	17	27.9
	41-50	31	50.8
	51-60	13	21.3
Marital status	Married	45	73.8
	Divorced	6	9.8
	Unmarried	10	16.4
Diet	Non vegetarian	45	73.8
	Vegetarian	16	26.2
Alcohol intake	Moderate (≥2 standard drinks/day)	3	4.9
	Occasional (<2 standard drinks/day)	5	8.2
	Never	53	86.9
Use of smokeless tobacco	No	35	57.4
	Yes	26	42.6
Use of Oral Contraceptive Pills (OCP)	No	52	85.2
	Yes	9	14.8
Family history of breast cancer	No	60	98.4
	Yes	1	1.6

[Table/Fig-2]: Distribution of participants according to socio-demographic characters (n=61).

Variables	Number of patients	Mean	SD	Minimum	Maximum
Age (years)	61	44.2	7.4	31	59
Age at menarche (years)	61	13	0.8	12	14
Age at marriage (years)	51	23.8	3.2	18	28
Duration of breast feeding (months)	31	8.3	5.4	1	24
Number of children	36	1.5	0.7	0	3

[Table/Fig-3]: Gynaecological and obstetric characters of the participants (n=61).

Variable	Results	Histopathological Examination (HPE) (N=61)		Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
		Malignant	Benign				
Clinical Breast Examination (CBE)	Malignant	52	1	88.1	50	98.1	12.5
	Benign	7	1				
Fine Needle Aspiration Cytology (FNAC)	Malignant	56	0	94.9	100	100	40
	Benign	3	2				
Ultrasonography (USG)	Malignant	57	0	96.7	100	100	50
	Benign	2	2				
Triple assessment	Malignant	58	0	98.3	100	100	66.7
	Benign	1	2				

[Table/Fig-4]: Sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of CBE, USG, FNAC and triple assessment in comparison to gold standard (histopathological examination).

DISCUSSION

The current study found that 17 (27.9%) patients had 31-40 years of age, 31 (50.8%) patients had 41-50 years of age and 13 (21.3%) were in 51-60 years of age. The mean age of patients was 44.2±7.4 years. This finding was supported by previous research where the incidence of malignancy was found to be higher in populations of 40-49 years old [9-11]. Kharkwal S and Sameer AM reported that the women over 40 years of age but under 50 accounted for almost 35% of breast lump cases [4]. This preponderance of malignancy occurrence in comparatively younger population is characteristic to the subcontinent, as reported by Khokhar A [12]. Similar findings were also observed by Saxena S et al., in their study of 569 breast cancer patients in Delhi [13].

Thus, the sensitivity of the clinical breast examination was found to be 88.1%, specificity of 50%, positive predictive value to be 98.1% and the negative predictive value to be 12.5%. These findings are similar to those reported by Yang WT et al., where the sensitivity, specificity and positive predictive value of clinical breast examination was found to be 88%, 92%, and 67%, respectively [14]. Malignant lesions were detected better by USG as compared to clinical breast examination [15]. The sensitivity of the ultrasound modalities was found to be 96.7%, with the positive predictive value and the specificity both being at 100% and the negative predictive value at 50%. USG modalities detected five more lumps as being malignant as compared to clinical breast exam, all of which were confirmed by histopathology. Similar sensitivity and specificity for USG modalities have been reported by Pande AR et al., in their study [15]. The current study reported FNAC as a poorer diagnostic modality than USG, with a sensitivity of 94.9% and the negative predictive value of 40%. This is, however, in contrast to the findings elsewhere. Jan M et al., reported a sensitivity of 100% for FNAC with a negative predictive value of 100% [8]. Similarly, Martelli G et al., [16] and Steinberg JL [17] reported FNAC to be a better diagnostic modality as compared to USG for breast cancer diagnosis.

When triple assessment was compared with histopathology for the diagnosis of breast cancer, it was seen that the sensitivity was 98.3%, negative predictive value was 66.7% and both the specificity and positive predictive value were 100%. Jan M et al., in their study conducted among patients in Kashmir reported a sensitivity and specificity of 100% and 99.3% respectively [8]. Martelli G et al., also reported similar values, with positive predictive value of 100% and sensitivity of the modality at 95% [16]. According to Steinberg JL et al., the triple test was better than other modalities, with sensitivity of 95.5% and specificity of 100% [17].

Limitation(s)

The current study had several limitations. Firstly, the sample size was small, and the study was conducted in a single tertiary care hospital. This predisposed the study to selection biases.

CONCLUSION(S)

The study found that triple assessment is a very useful diagnostic tool to evaluate patients with breast lumps and detect patients with breast cancers. The triple test is valid and reliable, with a high degree of accuracy for the diagnosis of breast lumps. The triple test was also found to be as accurate in diagnosing breast carcinoma in this geographical region as have been reported elsewhere. Of all the three components of the triple test, USG modalities were found to be the most accurate. Therefore, it can be said that a patient with a concordant benign triple test report can be safely followed-up without the need for biopsy.

REFERENCES

[1] Shah PP, Shaikh S, Panchbhai S, Vakhariya B. Clinical study of breast lump-triple assessment does help in diagnosing it better. International Surgery Journal. 2018;5(4):1246-50.
[2] Ghoncheh M, Pournamdar Z, Salehiniya H. Incidence and mortality and epidemiology of breast cancer in the world. Asian Pacific Journal of Cancer Prevention. 2016;17(S3):43-46.
[3] Koo MM, von Wagner C, Abel GA, McPhail S, Rubin GP, Lyratzopoulos G. Typical and atypical presenting symptoms of breast cancer and their associations with diagnostic intervals: Evidence from a national audit of cancer diagnosis. Cancer epidemiology. 2017;48:140-46. Doi: 10.1016/j.canep.2017.04.010. Epub 2017 May 23.
[4] Kharkwal S, Sameer AM. Triple test in carcinoma breast. J Clin Diagn Res. 2014;8(10):NC09.
[5] Manoharan N, Nair O, Shukla NK, Rath GK. Descriptive epidemiology of female breast cancer in Delhi, India. Asian Pac J Cancer Prev. 2017;18(4):1015.
[6] Sarkar S, Datta D, Debbarma S, Majumdar G, Mandal SS. Patterns of Cancer Incidence and Mortality in North-Eastern India: The First Report from the Population Based Cancer Registry of Tripura. Asian Pac J Cancer Prev. 2020;21(9):2493-99.
[7] Lebron-Zapata L, Jochelson MS. Overview of breast cancer screening and diagnosis. PET Clinics. 2018;13(3):301-23.
[8] Jan M, Mattoo JA, Salroo NA, Ahangar S. Triple assessment in the diagnosis of breast cancer in Kashmir. Indian Journal of Surgery. 2010;72(2):97-103.
[9] Karim MO, Khan KA, Khan AJ, Javed A, Fazid S, Aslam MI. Triple Assessment of Breast Lump: Should We Perform Core Biopsy for Every Patient?. Cureus. 2020;12(3):e7479. Doi: 10.7759/cureus.7479.
[10] National Institute of Health. National Institute on Alcohol Abuse and Alcoholism. Alcohol Alert. https://www.niaaa.nih.gov/.
[11] National Institute on Alcohol Abuse and Alcoholism No 16 PH 315 April 1992. Available at: https://pubs.niaaa.nih.gov/publications/aa16.htm. Last accessed December 2021.
[12] Khokhar A. Breast cancer in India: Where do we stand and where do we go? Asian Pac J Cancer Prev. 2012;13(10):4861-66.
[13] Saxena S, Rekhi B, Bansal A, Bagga A, Murthy NS. Clinico-morphological patterns of breast cancer including family history in a New Delhi hospital, India-A cross-sectional study. World Journal of Surgical Oncology. 2005;3(1):01-08.
[14] Yang WT, Mok CO, King W, Tang A, Metreweli C. Role of high frequency ultrasonography in the evaluation of palpable breast masses in Chinese women: Alternative to mammography?. Journal of Ultrasound in Medicine. 1996;15(9):637-44.
[15] Pande AR, Lohani B, Sayami P, Pradhan S. Predictive value of ultrasonography in the diagnosis of palpable breast lump. Kathmandu Univ Med J (KUMJ). 2003;1(2):78-84.
[16] Martelli G, Pilotti S, de Yoldi GC, Viganotti G, Fariselli G, Lepera P, et al. Diagnostic efficacy of physical examination, mammography, fine needle aspiration cytology (triple-test) in solid breast lumps: An analysis of 1708 consecutive cases. Tumori Journal. 1990;76(5):476-79.
[17] Steinberg JL. Combined fine-needle aspiration, physical examination and mammography in the diagnosis of palpable breast masses: Their relation to outcome for women with primary breast cancer (vol 39, pg 302, 1996). Canadian Journal of Surgery. 1997;40(1):9-9.

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[ANNEXURE-1]

DATA RECORDING PERFORMA

1. CR Nos:-

2. Age: 3. Sex: 4. Religion:

5. Address:

6. Educational status:

7. Marital status: Married/Unmarried/Widow/Widower/Divorced

8. B.P: …… mmHg.

9. Weight: …… kg.

10. Do you use smokeless tobacco? A) Yes B) No

11. Do you take alcohol? A) Occasional B) Moderate C) Heavy D) Quitter

12. Your diet is: A) Vegetarian B) Non vegetarian

13. Age at menstruation (completed years): …… years

14. Age at Marriage (completed years): ……..years

15. No of children: ……

16. Duration of breast feeding (in months): ……

17. Use of OCP and duration (in years):……

18. Family history:……

19. Breast clinical presentation:……

20. Report of Mammography:……

USG:……

MRI: ……

21. Report of FNAC:……

22. Report of Histopathology: ……

Data collected by ……

Date ……