ORIGINAL ARTICLE

Diagnostic accuracy of clinical breast examination for breast cancer in patients with palpable breast lump in a middle income country

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ABSTRACT
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Background: Breast cancer assessment using breast self-examination (BSE), clinical breast examination (CBE) and mammography are secondary measures that aid in early detection of breast cancer and better management.

Objective: The aim of this study is to evaluate the sensitivity, specificity, false positive and false negative rates of clinical breast examination for palpable breast masses at Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State, Nigeria.

Methodology: This is a one-year prospective study from February 2009 to January 2010. All the consecutive patients with palpable breast lesions presenting at the general surgery out-patient clinics were recruited and evaluated clinically. Biopsy was performed on all the patients (open or core needle) and histology reports obtained. Data collected were recorded in a proforma and subsequently analyzed.

Results: The age range of the patients was 16-73years (mean=36.9 $\pm$SD 14.5). Out of the 110 patients, 109 were females and one was male, giving a male to female ratio of 1:109. Clinical breast examination achieved true positive value of 47(42.7%); true negative value 52(47.3%); false positive and false negative values 6(5.5%) and 5(4.5%), respectively. It also achieved the following diagnostic validities: sensitivity of 90.4%; specificity 89.7%; false positive rate 11.3%; false negative rate 8.8%; positive predictive value 88.7%; negative predictive value 91.2% and overall diagnostic accuracy of 90%.

Conclusion: Clinical breast examination in trained hands is a useful tool for assessing breast cancer especially in resource poor countries where mammography is still largely unavailable. We recommend this examination to all women from the age of 20years especially in people with positive family history of breast cancer.

Keywords: Biopsy, false-negatives, false-positives, family history, mammography

INTRODUCTION
Breast cancer is the most common malignancy affecting women in many parts of the world with an estimated 1.38million new cancer cases diagnosed in 2008 (23% of all cancers).[1] It is now the most common cancer both in developed and developing regions with around 690,000 new cases estimated in each

region (*population ratio 1:4*).[1] Breast cancer is the most frequent cause of cancer death in women in both developing (269,000 deaths, 12.7% of total) and developed regions, where the estimated 189,000 deaths is slightly above the estimated number of deaths from lung cancer (188,000 deaths).[1] In Nigeria, breast cancer is the most common cancer seen among women.[2,3,4,5] Breast cancer presents a decade earlier in Nigerian women and indeed other black women with worse biological behaviour and poor prognosis.[6,7,8,9,10,11]

Clinical breast examination (CBE) seeks to detect breast abnormalities or evaluate patient reports of symptoms to find palpable breast cancers at an early stage of progression. Treatment options for early-stage cancers are generally more numerous, include less toxic alternatives and are more effective than options for late-stage cancers, and in actual fact, in these modern times, breast cancer management emphasizes prevention more than treatment.

Breast cancer screening using: Breast self-examination (BSE), clinical breast examination (CBE) and mammography are secondary preventive measures that aid in early detection of breast cancer and better management. Mammography is currently accepted as a better modality for screening for breast cancer and is the gold standard in developed countries, followed by clinical breast examination.[12,13] For average-risk asymptomatic women in their 20s and 30s, it is recommended that CBE be part of a periodic health examination, preferably at least every three years.[13,14]

The examination should include BSE instruction for the purpose of gaining familiarity with breast composition. Public awareness needs to be created and information should be provided about the benefits and limitations of CBE and BSE, and it should be emphasized that breast cancer risk is very low for women in their 20s and gradually increases with age. The importance of prompt reporting of any new symptoms to

a health professional also should be emphasized.

Asymptomatic women aged 40years and above should continue to receive CBE as part of a periodic health examination, preferably annually.[13,14] Beginning at the age of 40years, discussion during CBE should include information about screening with mammography. For average-risk women aged 40years and below early detection of palpable tumours identified by CBE can lead to early therapy and better outcome. After age 40years, when mammography is recommended, CBE is regarded as an adjunct to mammography.[13,14,15,16,17,18] The sensitivity of breast cancer assessment is improved when CBE is combined with mammography.[17,18,19,20,21,22]

Though mammography is the preferred modality for early detection of breast cancer, there are still some drawbacks to its effective use in low resource centres and developing countries. For instance, mammography machines are not yet widely available especially in the rural settings, and also, there is still insufficient skilled manpower for interpretation of results. On the other hand, CBE could be done by a trained physician or nurse, however it is highly dependent on the nature of presentation of the patient and the experience of the examiner.

In a study by Wishart, *et al*, comparing the performance and accuracy of CBE on 16,585 symptomatic women among clinicians, there was marked variation in sensitivity between clinicians (range 44.6–65.9%).[23] The Breast Health Global Initiative (BHGI) Early Detection Panel 2007 Guidelines recommended CBE as the first tool for assessing breast cancer for basic and limited-level resources in low- and middle-income countries.[24] A number of studies done in Nigeria also recommended the use of CBE as a tool for assessing breast diseases.[25,26,27,28,29] Neither CBE nor mammography alone is capable of accurately distinguishing benign from malignant lesions. Hence, several

studies have advocated the use of 'Triple Test' which consists of clinical breast examination, radiologic examination and cytopathology.[30,31,32,33]

No trials comparing screening by CBE alone to not screening have been reported.[34] No study has directly tested the efficacy of CBE in decreasing breast cancer mortality.[35] A number of studies have been done in some tertiary health institutions in Nigeria evaluating the diagnostic accuracy of CBE for palpable breast masses.[36,37,38] The aim of this study is to evaluate the sensitivity, specificity, false positive and false negative rates of CBE for palpable breast masses at the Nnamdi Azikiwe University Teaching Hospital, Nnewi.

METHODOLOGY

This is a one-year prospective study from February 2009 to January 2010. All the consecutive patients with palpable breast lesions presenting at the general surgery out-patient clinics of the Nnamdi Azikiwe University Teaching Hospital, Nnewi were recruited. Approval was sought and obtained from the Ethical Committee of the Nnamdi Azikiwe University Teaching Hospital, Nnewi before the commencement of the study. Informed, written consent was obtained from all the patients and thereafter, each patient was fully evaluated clinically (history and physical examination). The clinical evaluation was done by the lead author. Biopsy was performed on all the patients (open or core needle) and histology report obtained. Data collected were recorded in the proforma used for the study and were subsequently analyzed using SPSS *version 17.0.*

Location of Study: The Nnamdi Azikiwe University Teaching Hospital, Nnewi is a Federal Government owned tertiary institution located in Nnewi, Anambra State, South-East Nigeria. Nnewi is a cosmopolitan city with heavy commercial and industrial activities. The institution is a referral centre and covers the whole of Anambra State, parts of Delta, Imo and Enugu States.

RESULTS

A total of 180 patients were recruited but only 110 came back with histology reports and were the ones used for the analytical part of the study. Patients with obvious clinical evidence of loco-regional or distant metastasis were excluded from the study. A total of 110 patients met the inclusion criteria of having both CBE and histology reports. The age of the patients studied ranged from 16-73 years (mean=36.9 ±SD 14.5).

Table 1. CBE impression compared to histology report

		Histology Report		
		Malignant	Benign	**Total**
CBE Impression				
	Malignant	47	06	53
	Benign	05	52	57
Total		52	58	110

Table 2. Diagnostic validities of clinical breast examination

Diagnostic Validity	Calculation	Value (%)
Sensitivity	47/47+5	90.4
Specificity	52/52+6	89.7
False Positive Rate	6/6+47	11.3
False Negative Rate	5/5+52	8.8
Positive Predictive Value	47/47+6	88.7
Negative Predictive Value	52/52+5	91.2
Overall Diagnostic Accuracy	47+52/ 47+6+5+52	90.0

Out of the 110 patients studied; 109 of them were females while only one patient was a male, giving an overall male:female ratio of

1:109. Clinically, 53 patients were diagnosed as having malignant disease but histopathology confirmed 47 of them to be malignant and 6 as benign. On the other hand, 57 patients were clinically diagnosed as benign but histopathology confirmed that 52 of them were benign while 5 were actually malignant (Table 1). This gives a true positive value of 47 (42.7%); true negative value of 52 (47.3%); false positive and false negative values of 6 (5.5%) and 5 (4.5%), respectively.

Table 3. Comparison of diagnostic validities of current study with other similar studies

	Current Study	UdoeYop	Gukas	Panchalingam
Sensitivity %	90.4	80.0	80.8	98.1
Specificity %	89.7	80.7	75.4	93.4
FPR %	11.3	24.5	29.6	6.8
FNR %	8.8	5.7	15.5	1.7
PPV %	88.7	75.5	70.3	93.1
NPV %	91.2	94.3	84.5	98.3
ODA %	90.0	85.3	77.7	95.7
No. of Patients	110	102	112	116

Key
FPR = False Positive Rate
FNR = False Negative Rate
PPV = Positive Predictive Value
NPV = Negative Predictive Value
ODA = Overall Diagnostic Accuracy

DISCUSSION

Clinical breast examination is still an important tool for making diagnosis of breast lesions. It is non-invasive and well tolerated by patients, with a high acceptability. In this study, clinical diagnosis achieved very high sensitivity and specificity of 90.4% and 89.7%, respectively. The sensitivity of 90.4% in this study is much higher than the upper limit of overall range of sensitivity, 17.2-58.3% proposed by Smith, *et al*, in their study and 40-69% by Humphrey, *et al*.[13, 34] Barton, *et al*, estimated CBE sensitivity at 54.0%.[39] Bobo, *et al*, found out that among women receiving their first National Breast and Cervical Cancer Early Detection Program-funded CBE, 67.5% had their cancer detected by CBE.[20] Among women receiving their second or third CBE, the values were 59.3 and 48.8%, respectively.

In the work by Fenton, *et al*, evaluating CBE accuracy among asymptomatic females a reported sensitivity of 21.6% was noted.[40] The higher value seen in our current study was most likely because it was done on symptomatic patients, since in similar studies done for palpable breast masses, the sensitivity correlated with that of the present study (Table 3). In this study, CBE achieved a specificity of 89.7% which is comparable to the range 88-99% quoted by Humphrey, *et al*.[34] This value also correlates with 94% estimated by Barton, *et al*, in their study.[39] Specificity in current study compares with values quoted by UdoeYop, Gukas and Panchalingam (Table 3).[37,38,39]

Clinical breast examination in this study achieved a false-positive rate (FPR) of 11.3%. One community study showed that within 10years of biennial screening, 13.4% of women had false-positive results on CBE at least once; risk for such results was higher among women younger than 50years of age.[41] UdoeYop and Gukas recorded very high FPR in their studies, 24.5% and 29.6% respectively.[36,37] This is particularly worrisome because it shows that clinical diagnosis alone has high probability of making false diagnosis of cancer resulting in unnecessary mastectomies with attendant patients' adversity and consequent medico-legal implications.

The confusion of clinical signs may result from late presentation, ulceration, super-imposed infection and presence of palpable lymph nodes especially in inflammatory conditions. False negative rate in this study

was 8.8%. With the high false negative rate, a lot of malignancies could be missed until they probably become very advanced when treatment outcome is dismal with unimaginable high cost of management.

The above finding shows that clinical diagnosis alone cannot be relied on to make accurate diagnosis thus emphasizing the need for a tissue diagnosis as a confirmatory tool. Clinical diagnosis has a significant amount of subjectivity and depends a lot on the experience of the clinician. This further supports the views of advocates of 'Triple Test' method which is composed of clinical examination, radiological examination and cytopathology in making diagnosis of breast lesions.[30,31,32,33]

CONCLUSION

Clinical breast examination remains an important tool for making diagnosis of breast diseases especially breast cancer. In trained hands, CBE can be used for assessing the breast for cancer especially in resource-poor countries where mammography is still largely unavailable. We recommend CBE for all women starting from the age of 20years especially in people with positive family history of breast cancer. The examination should include BSE instruction for the purpose of gaining familiarity with breast composition.

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