The Role of Abdominal Ultrasound and Chest Radiography in Management of Breast Cancer Patients in a Low Resource Country: A Case of Tanzania.

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Background: ***Breast cancer is among the commonest cancers affecting women in Tanzania. Most of them seek hospital treatment when the disease has reached an advanced stage. Hence widely available modalities like ultrasound (LUS) and chest radiograph (CXR) can be used to establish metastasis in newly diagnosed patients. The main objective of this study was to determine the role of abdominal ultrasound and chest radiography in detection of liver and lung metastasis in newly diagnosed breast cancer patients.***
Methods: ***This was a descriptive cross sectional study in which 103 new breast cancer patients attending Ocean Road Cancer Institute (ORCI) were recruited consecutively. All participants were investigated for liver and lung metastases using abdominal ultrasound and chest x-ray respectively. Standardized questionnaires were used to obtain socio-demographic and to document examination findings.***
Results: ***Participants were aged between 26 – 77 years, with a mean of 48±11.22. The prevalence of metastasis to the liver and lungs were 18.4% and 20.4% respectively. Majority of patients with breast cancer had locally advanced breast cancer disease that is either TNM stage three (59.2%) or four (32%) disease upon arrival to ORCI.***
Conclusion: ***This study has demonstrated a high detection rate of LUS and CXR for liver and lung metastasis in patients with locally advanced breast cancer.***

Introduction

Breast cancer is a disease with high prevalence in females worldwide, contributing to a substantial public health burden. Although breast cancer was once known to affect highly affluent communities, it has been realized that disadvantaged communities now are facing the heaviest disease burden. It is estimated that more than 1.3 million cases of breast cancer are diagnosed each year. This disease accounts for 10.9% of all cancers and 22.8% of all cancers in women worldwide[1]. In USA one out of eight women will be diagnosed of breast cancer in her lifetime. Breast cancer is the leading cause of mortality and morbidity in Asia and Latin America[2].

Cancer of the breast is among the commonest cancer affecting women in Tanzania. It is estimated that approximately 1307 women with breast cancer register in different hospitals in Tanzania each year[3]. Majority of women who are diagnosed with breast cancer seek hospital treatment when the disease has reached an advanced stage, at which point metastasis to the lungs or liver are most likely[4].

Lack of knowledge about breast cancer among the general population and lack of regular systematic breast cancer screening program are some of the factors for late presentation at Ocean Road Cancer Institute (ORCI)[5]. A study done in 1996 at Muhimbili National Hospital (MNH) found that more than 90% of breast cancer patients had stage III or more disease, with high probability of a distant metastasis to the lungs or liver[4]. Liver metastasis is a primary clinically significant contributor to mortality associated with breast cancer, and present in about two-thirds of women with metastatic disease. At the

same time sixty to seventy percent of patients who die of breast cancer eventually have metastasis in their lungs[6].

In Tanzania, where resources are limited, widely available modalities like ultrasound (LUS) and chest radiograph (CXR) can be used to establish early overt metastasis in breast cancer patients.They are reliable, fast, cheap and easy modalities in detecting liver and lung metastasis and for predicting prognosis in breast cancer patients. However, in case of microscopic liver metastasis LUS maybe normal hence complementary examinations like, computed tomography (CT scan), Magnetic Resonance Imaging (MRI) and Positron emission tomography (PET) should be done where resources are available[7]. On the other hand, CXR is very beneficial since it can upgrade patient who had stage I or II to stage IV, and hence determine the appropriate treatment plan[8]. In situations where CXR interpretations maybe inconclusive advanced radiological investigations like Computed tomography (CT) scan may be needed.

The aim of this study was therefore to show that in a low resource country like Tanzania, LUS and CXR are very beneficial in staging, treatment planning, follow up and prognosis determination of breast cancer patients.

Patients and Methods

This was a six months hospital based descriptive cross sectional study carried out between June and Dec 2010 at Ocean Road Cancer Institute (ORCI) in Dar es Salam Tanzania. ORCI is the only specialized centre for cancer treatment in Tanzania, handling cancer patients from all over the country of 45million people. Its treatment modalities range from chemotherapy, radiotherapy by external beam, hormonal therapy and to a lesser extent immunotherapy. Patients are either referred for neo/adjuvant therapy or palliative options using the above and the cancer surgery is done by the referring hospitals. The centre receives about 4,000 new cancer cases every year, two thirds of whom are women. Breast cancer cases comprise 10%- 14% of all new cancer cases seen at the institute. The confirmation of diagnosis was done by the referring hospitals, including TNM staging for those that have undergone a mastectomy. All patients come to ORCI with results from pathology laboratories either with a Histopathology (HP) or histocytology (HC) number.

Male patients were excluded from this study along with those who did not have tissue reports confirming the diagnosis. A total of 103 patients were therefore recruited into this study. Each underwent an abdominal ultra sound and chest x-ray evaluation to check for evidence of metastasis. Structured questionnaire was used to collect information regarding patient's socio-demographic details, abdominal ultrasound and chest x-ray findings. Abdominal ultrasound was done using a PHILIPS HD 4000 system with broadband curve-linear transducers of 2MHz to 5MHz range (Best, Eindhovern, The Netherlands) which is in a routine use at the Radiology department. Metastasis was defined as any lesion in the liver which its echotexture was heterogeneous, hypoechoic, or isoechoic be it solitary or multiple with irregular margins and had a size of more than 1cm.

A high KV technique chest radiograph postero-anterior (PA) view was obtained by a Radiographer using PHILIPS HD 30 system (Best, Eindhoven, The Netherlands). All chest x-rays were reported by the Researcher then re-reported by a qualified Radiologist. Lung metastasis was defined as presence of solitary or multiple lung nodules with irregular margins, reticulo-nodulations, or presence of pleural effusion

The limitation to this study was that neither tissue confirmation was performed to confirm that the lesions seen were indeed metastasis from the breast nor a follow up to document on the response to therapy offered. Ethical clearance was sought from ethical clearance board (IRB) of the Muhimbili University of Health and Allied Sciences (MUHAS) which is also an ethical clearing body for ORCI.

Permission to conduct the study was sought from Ocean Road Cancer Institute to use the subjects for the Study. Data analysis was done using Statistical Packages for Social Science (SPSS) version 15.

Results

A total of 103 women with breast cancer were recruited into the study, aged between 26 – 77, with 64 (61.5%)of them being 45 years and with a mean of 48±11.22. Fifty (48.5%) of the patients had primary level of education. The majority (64%) of the patients were married. Fifty six (53.8%) had no formal source of income(Table 1). Overall, the majority of newly diagnosed patients had locally advanced breast cancer with either TNM stage three 61(59.2%) or four 33(32.0%) disease, very few had stage II and none had stage I. There is a trend of decreasing in stage 3 with increasing age, while there is an increasing trend of stage 4 with increasing age (Figure 1). A total of 38.8% (40/103) of the breast cancer patients had LUS and Chest X-ray detectable metastasis. Those aged 45 years and above had the highest prevalence of metastasis at 44.3%, the least being in those between 25-34 years of age. Lung metastasis was most commonly observed at 20.4% (21/103) (Table 2).

Table 1. Demographic and baseline characteristics of study population (N=103)

Characteristics	Number	Percentage
Age in Years		
25-34	10	9.6%
35-44	29	27.9%
45 and above	64	61.5%
Mean age(SD), years	48±(11.22)	
Marital status		
Single	10	9.7%
Married	66	64.0%
Divorced	27	26.2%
Education level		
No formal education	25	24.3%
Primary education	50	48.5%
Post primary education	28	27.2%
Occupation		
Formal and informal occupation	47	46.2%
No occupation	56	53.8%

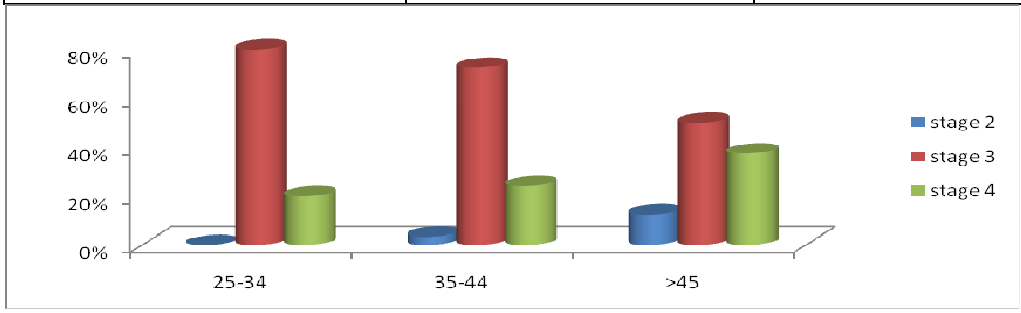

Figure 1.Distribution of Study Sample by Age and TNM Stage

Table 2. Prevalence of Liver and Lung Metastasis According to Age (n = 103)

Age (Yrs)	Liver	Lung	Total
25-34 (10)	2(20%)	1(10%)	30%
35-44 (24)	4(13.8%)	6(20.7%)	34.5%
>45 (61)	13 (21.3%)	14 (23%)	44.3%
Total (103)	**19(18.4%)**	**21(20.4%)**	**38.8%**

Discussion

Lung and liver metastasis contributes to morbidity and mortality in women with breast cancer disease making both clinical and radiological staging to be of paramount importance in patient management plan. The purpose of staging in resource constrained settings is to rule out overt metastasis, with resultant treatment and prognostic implications. In this study, the findings of breast cancer TNM stages do not differ with studies done in other parts of Africa whereby more than 90% had locally advanced breast cancer which was either stage III or IV disease at the time of diagnosis and none presented with a stage one disease[4]. These findings have remained the same in spite of more recent campaigns to create awareness of breast cancer among women conducted by Medical Women Association of Tanzania (MEWATA) in almost the whole country[5].

The reasons for these late presentations might be multifactorial but were beyond the scope of this study. More than half of the studied women had no any kind of work that generated income. This lack of economic independence has been shown to limit access to information and access to early care seeking behaviour. This is also aggravated by a lack of formal education which might lead to holding of traditional beliefs hence seeking other help outside the formal health care setting before finally presenting with an advanced disease[9]. But study by MEWATA had sited that a lack mammography at primary health care facilities, poverty, difficult referral system, myths and misconceptions were among the factors accounting for advanced disease at presentation[5].

In South Africa a similar study was done about TNM stage of newly diagnosed breast cancer patients and compared blacks and white patients. Findings were similar to what was seen in this study whereby stages III and IV of breast cancer were the most prevalent in black women (77.7%) compared to white women (30.7%). The reasons given were that for blacks having Locally Advanced Breast Cancer (LABC) at the time of diagnosis was interpreted as a reflection of conflicts, particularly in social relationships. Many patients with cancer believed that a special witchcraft caused their cancer; hence the first priority was to reverse the sorcery by seeking help from tradition healers before presenting to hospital[10].

Moreover locally advanced breast cancer is the most common form of presentation for breast cancer patients in countries of limited resources, and, along with stage IV disease, it represents up to about 80% of new patients at presentation in Arabic and African communities[11]. This means that our patients have poor prognosis in comparison to breast cancer patients in developed world who are usually picked up with an early breast cancer disease stage I/II. Furthermore death occurring due to breast cancer shows significant differences among stages: only 5% to 12% of Stage I/II patients die in the first 10 years after diagnosis, compared with over 60% of Stage III patients and over 90% of Stage IV patients[12]. In this study the detection rate of lung and liver metastasis in newly diagnosed breast cancer was 20.4% and 18.4% respectively. This is high compared to what was seen by other researchers elsewhere.

In Toronto Canada they found out that the prevalence of metastatic disease in locally advanced breast cancer (LABC) was 13.2%. This supports the continued need for full routine staging tests for patients with LABC as compared with those women with earlier stage disease. The Canadian study subjected all women who had LUS and CXR negative to more complex studies like computed tomography, magnetic resonance imaging (MRI) and/or positron emission tomography (PET), where an additional 2.8% metastasis was found[13]. In our setting, though CT scanning and MRI are available, they are largely expensive and will delay timely intervention hence was not considered. This implies that there was a possibility that we missed about 2.8% distant metastasis but still our breast cancer metastasis detection rate was still very high.

In the Netherlands in 2002, wherein 399 breast cancer women underwent LUS and CXR, the prevalence of liver and lung metastasis were 1.5% and 1% respectively[14]. This was similar to an Italian study finding, thus suggesting that these investigations are largely unnecessary in early breast cancer patients[15]. But the two studies only involved early breast cancer patients hence their conclusions might not have sound implications in this series where the detection rate has been demonstrated to be high.

The ability to accurately stage patients has many benefits. Firstly, clinicians will be better able to advise patients on their prognosis. Secondly, appropriate palliative measures can be introduced at an earlier opportunity. Finally, clinicians will be able to better individualize treatment to their patients. Conversely, in those who present with metastatic disease, a more balanced, quality-of-life oriented approach can be utilized. It is, however, considered beneficial for the accurate staging of disease to be known when decisions regarding adjuvant systemic therapy are made[13]. To aide this, our study has provided evidence that abdominal ultra sound and chest x-ray should be performed routinely on every patient presenting with LABC who are majority at the ORCI.

Conclusion

This study has demonstrated a high detection rate of LUS and CXR for liver and lung metastasis in patients with locally advanced breast cancer.

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