RESEARCH COMMUNICATION

Mammography and Ultrasonography Reports Compared with Tissue Diagnosis - An Evidence Based Study in Iran, 2010

Mohammad Esmaeil Akbari, Hamidreza Haghighatkhah, Mohammad Shafiee, Atieh Akbari, Mitra Bahmanpoor, Maryam Khayamzadeh*

Abstract

Background: Breast cancer is the most prevalent cancer and the fifth cause of cancer death in Iranian women. Early detection and treatment are important for appropriate management of this disease. Mammography and ultrasonography are used for screening and evaluation of symptomatic cases and the main diagnostic test for breast cancer is pathological. In this study we evaluated mammography and ultrasonography as diagnostic tools. Methods: In this cross-sectional study 384 mammography and ultrasonography reports for 255 women were assessed, divided into benign and malignant groups. Suspected cases were referred for pathology evaluation. The radiologic and pathologic reports were compared and also comparison was performed based on age groups (more and less than 50 years old), history of breastfeeding and gravidity. Statistical analysis was performed by SPSS. Results: The mean ages of malignant and benign cases were 49±11.6 and 43±11.2 years, respectively. Sensitivity and specificity for mammography were 73% and 45%, respectively. Sensitivity and specificity for ultrasonography were 69% and 49%, respectively. There were statistical differences between specificity of mammography in patients based on factors such as history of gravidity, breastfeeding and sensitivity in patients equal or more than 50 years old and less. Conclusion: Factors affecting different results in mammography and ultrasonography reports were classified into three groups, consisting of skill, experience and training of medical staff, and setting of instruments. It is recommended that health managers in developing countries pay attention the quality of setting and man power more than current status. Policy-makers and managers must establish guidelines regarding breast imaging in Iran.

Keywords: Breast neoplasms - mammography - ultrasonography - pathology - Iran

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Introduction

Breast cancer is the most prevalent cancer in women worldwide and also in iranian women (Akbari et al., 2007; Boyle et al., 2008). It is the 5th cause of cancer related death in females and estimated 8040 new cases and 1400 death according to breast cancer annually in Iran (CDC, 2007). Breast cancer consist of 23% of the whole malignancies in women and age standardized rate (ASR) in the latest report of Ministry of Health and Medical Education (MOHME) is 27.15/10^5 population (Akbari et al., 2007; CDC., 2007). Khadivi and his coworkers as many other researchers showed patients with breast cancer in Iran were 10 years younger than western countries (Khadivi et al., 2008; Attarian et al., 2011). Regarding younger age group and psychological and emotional burden in patients and their family, it's early detection and appropriate treatment are important. Ultrasonography and mammography can help physicians for suitable management of these patients (Brunicardi et al., 2010). Recommendation for breast imaging depends on different factors such as age of the patient, history of breastfeeding and parity, nature of breast symptoms and the presence of mass or other findings on physical examination (Ghebrehiwet et al., 2010). Mammography helps to manage malignancy by screening and detecting in early stage for successful treatment. Early screening by mammography is the selected approach for reducing mortality and morbidity (Nguyen et al., 2009; York et al., 2010). Screening with mammography is used in women without any symptoms. Diagnostic mammography is used in women with symptoms such as mass in breast or suspicious nipple discharge for estimating location of the tumor or lymph node involvement. Mammography can detect cancer one year before palpation the mass in 75% cases (Devolli-Disha et al., 2009). In some developed country, it is recommended in women with age group 40-50 years old every 1-2 years and after 50 years old annually (Elmore et al., 2005; Devolli-Disha et al., 2009). In many countries with screening mammography program, it is recommended in women with positive family history before 40 years old (Anderson et al., 2002). Unfortunately sometimes mammography may have some negative or positive false reports.

*Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran *For correspondence: khayamzadeh@yahoo.com*

Ultrasonograhy (US) is another important diagnostic tool for breast evaluation and recommended in symptomatic cases after breast examination, this is also useful for detecting asymptomatic patients with dense breasts and younger than 50 years old or nulliparous cases. In high risk cases, US helps to distinguish cystic by solid masses. (York et al., 2010; Prasad et al., 2007; Crystal et al., 2003)

In mammography, sensitivity and specificity in different studies were repoted 79.9%-89% and 64%-93% (Ciatto et al., 1994; Kacl et al., 1998; Malur et al., 2000).This difference is related to uncalibration in setting, incorrect technique or report the result, dense breast or subtle feature. Sensitivity and specificity of ultrasonography were ranged from 67%-96% and 93%-97% in different reports. (Ciatto et al., 1994; Malur et al., 2000)

The main and standard diagnostic test for breast cancer is pathology evaluation but it is invasive and many physicians prefer to use noninvasive techniques for diagnosing breast cancer, in the first step. We decided to evaluate the accuracy of the mammography and ultrasonography reports by comparing pathology diagnosis and appraise the effect of factors such as age, history of breast feeding and parity on these reports. Here we do not assess the efficacy of mammography and ultrasonography as the diagnostic tools in breast disease, which need to evaluate the standard setting of machine and man power.

Materials and Methods

It is a cross-sectional study evaluates women with breast complaints (symptoms) referred to cancer research center of Shahid Beheshti university of medical sciences in the period of 2005-2009.

The exclusion criteria were incomplete diagnostic reports, impossibility of pathology evaluation of the specimen, lack of follow up. Also cases younger than 30 years old were excluded. There were 384 mammographic or ultrasonography reports belong to 255 patients.

Questionnaires were filled by details such as family history, history of gravidity and parity and breast feeding for each patient as well as diet status and hormone consuming. A surgeon examined the breast and axillary area in sitting and supine position with arm elevation in sitting position. Symmetricity, nipple discharge, obvious masses, change in skin of the breast and nipple retraction were considered. In supine position and arm elevation, breast tissue and axillary areas were palpated for evaluating the texture and location of the mass and the result of examination were classified into normal, benign, suspected, and malignant cases. Mammography was performed in two medio -lateral and cranio-caudal views for these cases as an incidental selecting. Ultrasonography also was performed by a radiologist in supine position, his or her reports also were divided into normal, benign, suspected and malignant. The patients had ultrasonography or mammography reports or both of them. These reports were compared with clinical breast examination results and in suspected or malignant cases, they were referred for pathology evaluation with fine needle aspiration (FNA), core niddle biopsy, open biopsy directly or using ultrasonography or mammography guided biopsy. If there were inconsistency in clinical breast cancer (CBE) and radiologic reports and the CBE results were normal or benign, the patient were examined after 3-6 and 12 months, and imaging was performed after 12 months in necessary cases. Finally all of these 255 cases evaluated with tissue diagnosis and the other cases were excluded from study.

The results of ultrasonography and mammography were compared with the pathology results which were classified into benign and malignant. Cases which their radiology reports were consistent with malignant pathology diognosis consider as true positive. Patients with malignant pathology reports and benign radiologic results were assumed as false negative moreover cases with benign pathology and malignant reports were classified in false positive group.

Statistical analysis was performed by SPSS software version 17 using X^2, Fisher exact test and t - test. P-value less than 0.05 was considered as significant.

Results

There were 384 radiologic reports (220 mammography and 164 ultrasonography) belong to 255 breast cases. Pathologic evaluations revealed the presence of 170 malignant and 85 benign cases. The mean age of malignant patients were 49±11.6 (range: 25-79) years and in benign cases were 43±11.2 (range: 8-69) years with significant statistical differences between them ($p<0.001$) (patient equal or more than 30 years old were evaluated). In 220 mammography reports, there were 106 cases (48.18%) true positive, 42 cases (19.09%) false positive and 34 cases (15.45%) true negative and 38 cases (17.27%) of false negative. The sensivity and specificity of mammography reports were estimated as 73% and 45%, respectively.

Table 1. Sensitivity and Specificity for Mammography and Ultrasonography Estimated for Different Risk Factors

	Ultrasonography				Mammography			
	P-value	Specificity	P-value	Sensitivity	P-value	Specificity	P-value	Sensitivity
< 50years	0.6	53.00%	0.3	68.00%	0.1	48.00%	0.07	69.00%
> 50years		47.00%		78.00%		67.00%		82.00%
Gravidity+	0.4	48.10%	0.01	75.00%	0.01	49.20%	0.4	74.80%
Gravidity-		60.00%		47.40%		84.60%		68.00%
Breast feeding +	0.6	44.00%	0.001	78.00%	0.01	32.00%	0.9	73.00%
Breast feeding-		52.00%		48.00%		63.00%		74.00%

Table 2. Sensitivity and Specificity of Mammography and Ultrasonography in Different Studies

	Ultrasonography		Mammography	
	SPEC	SEN	SPEC	SEN
1. Our study	49.0	69.0	45.00	73.0
2. Mular	79.0	89.1	68.70	83.7
3. Houssami	-	80.5	-	77.6
4. Ciatto	97.7	67.7	93.50	79.9
5. Kacl	-	-	64.00	82.0
6. Berg	91.8	60.0	96.53	50.0
7. Devolli- Disha	88.5	72.6	73.90	52.1
8. Prasad	-	69.8	-	77.4

*SPEC=Specificity, SEN=Sensitivity.

In 164 ultrasonographic reports there were 66 (40.24%) cases of true positive, 35 (21.34%) cases false positive, 34 (20.73%) cases true negative and 29 (17.68%) cases of false negative. Sensitivity and specificity were estimated as 69% and 49% respectively.

There were not significant statistically differences between sensitivity and specificity among two types of radiologic reports (mammography & ultrasonograghy), but there were significantly difference in these indices with international reports (Table 1 & 2). Sensitivity and specificity for mammography and ultrasonography in different risk factors is shown in Table 1.

Discussion

This is an evidence-based study evaluates the current status of imaging reports for detecting breast cancer. In this study the sensitivity and specificity of mammography reports estimated 73% and 45% and in ultrasonography was 69% and 49%, respectively. As is shown in table 2, these indices varied in different studies (Ciatto et al., 1994; Kacl et al., 1998; Malur et al., 2000; Berg et al., 2008; Prasad et al., 2007; Devolli-Disha et al., 2009; Akbari et al., 2010).

Different factors affect the mammography reports as follows (Prasad et al., 2007): 1. Evaluation of dense breasts is difficult and often inadequate; 2. Mastitis in tuberculosis and abscess can mimic the cancer; 3. Overlap structures can limit visibility of the masses; 4. Fibrocystic mastitis can disappear the border of a mass, so it may look as a cancer; 5. Breast in young patients contains fibroglandular parenchyma; 6. The number of gravidity and duration of breast feeding; 7. Out of date or uncalibrated mammography setting; 8. Technical difficulties and man power incompetence. Using standard reporting system in mammography BI-RADS (Breast Imaging Reporting and Data System) presented by ACR (American College of Radiology) can help the clinicians to understand unique concept from the different radiologist mammographic reports.

Factors affect the ultrasonography reports are (Prasad et al., 2007): 1. Expertise of man power (human power dependent); 2. Small and iso-echoeic masses are usually undetectable; 3. Microcalcification may not reveal; 4. I t is difficult to distinguish masses in fatty breasts; 5. Multi –centric cancer may not be detected.

These factors can be classified into three groups: 1. Man power; 2. Patients; 3.Setting of instruments.

Detection of breast cancer in the early stages is the main aim of breast imaging and man power has important role in this detection.

Parity and breastfeeding may lead to differentiation the mammary cells and contribute to stratification of breast tissue particularly during the first full term pregnancy. Moreover parity and breastfeeding possibly reduce ovulatory cycle with estrogen secretion and increase prolactin production which might decrease women's cumulative exposure to estrogen as a proliferative hormone in breast tissue (Akbari et al., 2010).

Dense breasts also are another important factors decrease the sensitivity of mammography. It causes almost 4%-12% of false negative in mammography reports in the international studied.

Comparing different studies reveals higher sensitivity than our study (except two study) moreover specificity in our study is less than other entire studies in both mammography and ultrasonography reports. (Table 2)

In the study was done by Devolli, 59% of patients were less than 50 years old. In our study also 60% patients were less than 50 years old (Devolli-Disha et al., 2009).

In an another study, 87% of patients were under 50 years old, and sensitivity and specificity of mamography were estimated 77.4% and 69.8% respectively (Prasad et al, 2008). These indices are similar to our study but age of patients is different. Comparing these studies show, factors depend on man power and setting are much more important than factors related to patients which are not significantly effective. (Malur et al., 2001)

Health managers in developing countries such as Iran must pay attention to quality of setting and man power more than current status. Government must standardize the quality of machines (setting) and human power to improve screening and detection of the breast cancer. Also the medical staff should pay more attention for selecting the cases based on the age, gravidity, breastfeeding and so on.

In conclusion, in this study 36.36% of mammography reports were false negative and false positive which need urgent attention from the policy makers and managers to conduct guidelines and standards regarding breast imaging in the Islamic Republic of Iran.

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