วารสารวิชาการสาธารณสุข
ปีที่ 28 ฉบับที่ 5 กันยายน - ตุลาคม 2562

Journal of Health Science
Vol. 28 No. 5, September - October 2019

นิพนธ์ต้นฉบับ ***Original article***

Accuracy of Mammography and Breast Ultrasound at Chaoprayayommarat Hospital: a Retrospective Analysis

Panida Issaraporn, M.D., Thai Board of Radiology
Division of Radiology, Chaoprayayommarat Hospital, Suphan Buri Province, Thailand

Date received: 30 Oct 2018
Date revised: 21 Mar 2019
Date accepted: 28 Mar 2019

Abstract The purpose of this retrospective descriptive study was to evaluate the accuracy of the mammography and breast ultrasound according to the BI-RADS classification at Chaoprayayommarat hospital. It was conducted in 823 mammograms of a consecutive, unselected collective of symptomatic and asymptomatic women who came to Chaoprayayommarat hospital during January 2015, to June 2015. The BI-RADS was use for mammographic reporting and interpretations. Final assessment category ranging from 1 to 5 according to the following: category 1, "negative"; category 2, "benign finding"; category 3, "probably benign finding"; category 4, "suspicious abnormality"; and category 5, "highly suggestive of malignancy". BI-RADS 1, 2 and 3 were considered negative and BI-RADS 4 and 5 were considered positive. Accuracy was determined by histopathologic findings or unchanged at least 24 months follow-up mammography. Total accuracy, sensitivity, specificity, negative predictive value (NPV) and positive predictive value (PPV) were also calculated. Of 523 patients, breast mass (62.91%) was the most common clinical presentations, followed by check-up (27.72%), mastalgia (6.31%), axillary mass (1.91%) and nipple discharge (1.15%), respectively, with mean age of 50.38 years. Based on the BI-RADS for mammography, BI-RADS category 2 and 3 (51.24%) representing benign and probably benign breast lesions were the most prevalent in this study. There were 345 negative studies (65.97%) and 178 positive studies (34.03%). Biopsies were performed in 208 of 523 patients (39.77%). Of these lesions, 94 were malignant and 114 were benign. There was 96.81% sensitivity, 79.72% specificity, 51.12% positive predictive value, and 99.13% negative predictive value. The total accuracy was 82.79%. In conclusion, breast evaluation by mammography, utilizing the BI-RADS classification, played an important role in the diagnostic assessment and screening of breast cancer. Benign breast lesion was more common than malignant lesion. The results of this study suggested that the combined mammography and ultrasound was very sensitive, but not as specific, with total accuracy of 82.79%, indicating benefit for evaluation of breast lesions and screening the female population to lower the misdiagnosis rate and reduce mortality of breast cancer. Further studies are needed to achieve improvement of diagnostic accuracy and cost-effectiveness of screening mammography in Thailand.

***Keywords*: mammography, BI-RADS, breast cancer, breast ultrasound, accuracy**

Introduction

Breast cancers are the leading causes of morbidity and mortality among women worldwide[1] especially in developing countries including Thailand. In 2018, there was an estimated 268,670 new cases of breast cancer in the United States and estimated 41,400 deaths from this cancer[1]. In Thailand, the incidence of breast cancer becomes increasingly higher over the decade. There were 4,099 deaths from breast cancer in 2016[2]. According to a report by the National Cancer Institute, breast cancer was the most common cancer among Thai women followed by cervical cancer and colorectal cancer[3,4].

Mammography and ultrasound are the main methods for detecting early breast cancer, in order that curative treatment can be planned. Screening with mammography has been shown to reduce mortality from breast cancer[5]. Schoor GV et al. found an increasingly strong reduction in breast cancer mortality over time because of mammographic screening across the period 1975-2008, resulting in a 65.00% breast cancer mortality reduction in 1992-2008 compared with a 28.00% reduction in 1975-1991[6]. Screening mammogram can detect suspicious lesions such as asymmetry, neodensity, architectural distortion and microcalcifications, before it is palpable by clinical breast examination[7]. An accurate evaluation is important to maximize cancer detection and to minimize unnecessary surgical procedures[8].

Breast Imaging Reporting and Data System (BI-RADS) developed by the American College of Radiology (ACR) provides standardize mammographic reports of breast lesions and also helpful in predicting benign or malignant potential. The latest edition of ACR BI-RADS was announced in 2013[9].

Chaoprayayommarat Hospital has been performing mammography since 2001 using the Breast Imaging Reporting and Data System (BI-RADS) classification. The accuracy of the mammographic reports according to the BI-RADS categories in Chaoprayayommarat Hospital has not been evaluated. The purpose of the present study was to evaluate the accuracy of the mammography and breast ultrasound according to the BI-RADS classification.

Materials and methods

Study population:

The retrospective descriptive study of 823 mammograms of a consecutive, unselected collective of symptomatic and asymptomatic women who came to Chaoprayayommarat hospital during January 2015, to June 2015 was performed. Data was collected from the medical records, request forms, histopathologic records, mammograms and ultrasound examinations. All patients had at least 24 months of imaging follow-up. The demographic data collection of the patients included age and presenting symptoms.

The inclusion criteria were:

1. All patients, at any age, who came to Chaoprayayommarat Hospital for either screening or diagnostic mammography to exclude possible breast cancer from January 2015, to June 2015.
2. Images were derived from the mammographic equipment (Hologic Lorad M-IV Analog Mammography) and an ultrasound machine (Toshiba's Aplio 500 ultrasound system).

The exclusion criteria were

1. Patients who had no histological specimens to prove either the benign or malignant nature of

the lesion.

2. Patients who were lost to follow-up mammography before 24 months.
3. Patients who had no available medical records.

Imaging protocols:

Mammograms were performed using the mammographic equipment (Hologic Lorad M-IV Analog Mammography). Two standard examinations on each breast were obtained using craniocaudal (CC) and mediolateral oblique (MLO) views by well-trained technologists. Additional spot compression and magnification views were used for better visualization of the suspicious area and evaluation of micro-calcifications.

All breast ultrasound examinations were performed by the interpreting radiologists including real-time bilateral whole-breast scan, using an ultrasound machine (Toshiba's Aplio 500 ultrasound system) with 7-12-MHz probes.

Data analysis:

The reports were classified into one category according to BI-RADS by experienced radiologists in Chaoprayayommarat Hospital. Final assessment category ranging from 1 to 5 according to the following: category 1, "negative"; category 2, "benign finding"; category 3, "probably benign finding"; category 4, "suspicious abnormality"; and category 5, "highly suggestive of malignancy"

The positive or negative studies for malignancy were defined according to the following criteria:

1. Negative studies: if final assessment categories were BI-RADS 1, 2 and 3.
2. Positive studies: if final assessment categories were BI-RADS 4 and 5.

The accuracy of the radiologist's report was determined by histopathologic findings or unchanged at least 24 months follow-up mammography.

Total accuracy, sensitivity, specificity, negative predictive value (NPV) and positive predictive value (PPV) were calculated. A software package (SPSS statistical software version 18) was used for statistical calculations.

Results

Of 823 consecutive mammograms, there were 523 patients who fulfilled the inclusion criteria (145 cases of screening mammography and 378 cases of diagnostic mammography); mean age, 50.38 ± 8.99 [SD] and range, 27-79 years. The clinical presentations of the 523 patients were summarized in Table 1.

Based on the clinical presentations, the distribution was such that breast mass predominated (329 cases, 62.91%). The other clinical presentations included mastalgia (33 cases, 6.31%), nipple discharge (6 cases, 1.15%), axillary mass (10 cases, 1.91%) and check-up (145 cases, 27.72%).

Based on the BI-RADS for mammography, the patients were classified as follows: 77 (14.72%) category 1, 167 (31.93%) category 2, 101 (19.31%)

Table 1 The clinical presentations of the 523 patients who fulfilled the inclusion criteria

Clinical presentations	Frequency (n)	Percent
Breast mass	329	62.91
Mastalgia	33	6.31
Nipple discharge	6	1.15
Axillary mass	10	1.91
Asymptomatic (check-up)	145	27.72
Total	523	100

category 3, 102 (19.51%) category 4 and 76 (14.53%) category 5 (Table 2). BI-RADS 1, 2 and 3 were regarded as negative studies and BI-RADS 4 and 5 were regarded as positive studies for malignancy. Therefore, there were 345 negative studies (65.97%) and 178 positive studies (34.03%).

The mammographic findings were positive in 178 cases (34.03%), which breast mass (n = 169, 94.94%) was the most frequent clinical presentation, followed by axillary mass (n = 5, 2.81%), check-up (n = 2, 1.13%), mastalgia (n = 1, 0.56%), and nipple discharge (n = 1, 0.56%), respectively.

Biopsies were performed in 1 of 77 patients (1.30%) who were categorized as BI-RADS 1 and revealed benign lesion. The other 76 patients showed an unchanged follow-up mammogram in a period of 24 months.

Biopsies were performed in 23 of 167 patients (13.77%) who were categorized as BI-RADS 2 and revealed fibrocystic change (n = 17) (Figure 1), carcinoma (n = 1) and other benign lesions (n = 5). The remaining 144 patients showed an unchanged follow-up mammogram in a period of 24 months.

Biopsies were performed in 19 of 101 patients (18.81%) who were categorized as BI-RADS 3 and revealed fibrocystic change (n = 7), fibroadenoma (n = 3), intraductal papilloma (n = 1), sclerosing adenosis (n = 1), abscess (n = 1), carcinoma (n = 2) (Figure 2) and other benign lesions (n = 4). The remaining 82 patients showed an unchanged follow up mammogram within 24 months.

Table 2 The mammographic findings according to BI-RADS

BIRADS	No. of patients	Percent
BI-RADS 1	77	14.72
BI-RADS 2	167	31.93
BI-RADS 3	101	19.31
BI-RADS 4	102	19.51
BI-RADS 5	76	14.53
Total	523	100

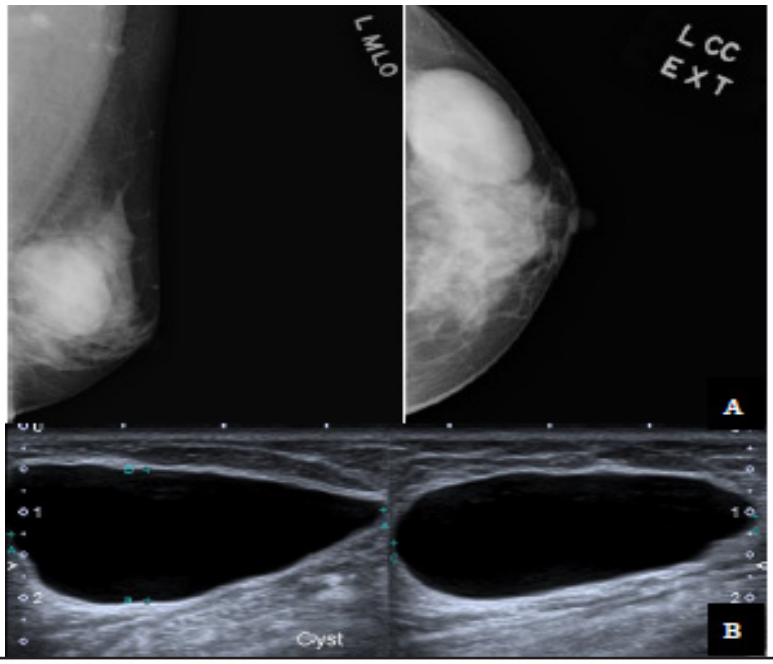
Biopsies were performed in 89 of 102 patients (87.25%) who were categorized as BI-RADS 4 and revealed fibrocystic change (n = 17), fibroadenoma (n = 23) (Figure 3), abscess (n = 4), carcinoma (n = 21), intraductal papilloma (n = 2), sclerosing adenosis (n = 1), lymphadenitis (n = 2), phyllodes tumor (n = 5) and other benign lesions (n = 14). The remaining 13 patients showed an unchanged follow up mammogram within 24 months.

Biopsies were performed in all 76 patients who were categorized as BI-RADS 5 and revealed carcinoma (n= 70) (Figure 4), fibroadenoma (n = 1), fibrocystic change (n = 2), sclerosing adenosis (n = 1) and phyllodes tumor (n = 2).

Mammographic findings were further classified as true-positive (TP), false-positive (FP), true-negative (TN) or false-negative (FN) (Table 3). True-positive (TP) is defined as a positive mammogram with cancer diagnosed within 24 months of follow-up. False-positive (FP) is defined as a positive mammogram with no cancer diagnosed within 24 months of follow-up. True-negative (TN) is defined as a negative mammogram with no cancer diagnosed within 24 months of follow-up. False-negative (FN) is defined as a negative mammogram with cancer diagnosed within 24 months of follow-up.

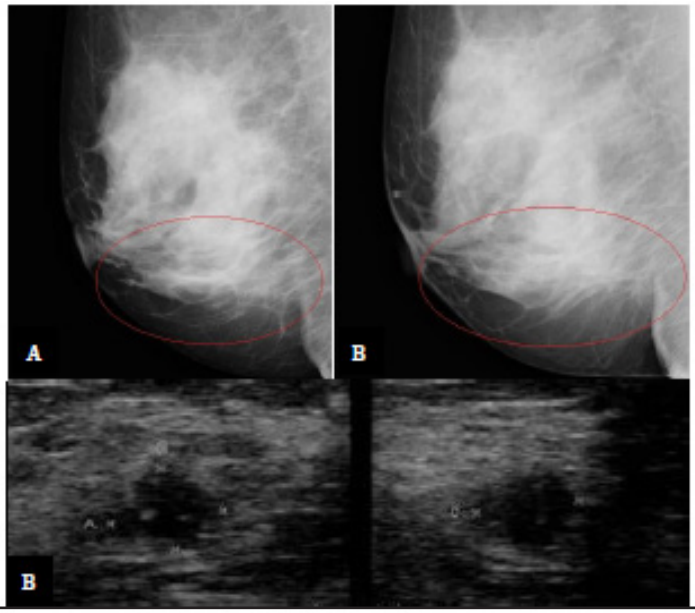
Subsequently, the sensitivity, the specificity as well as the positive and negative predictive values (PPV and NPV, respectively) were calculated, ac-

Figure 1 BI-RADS category 2 lesion



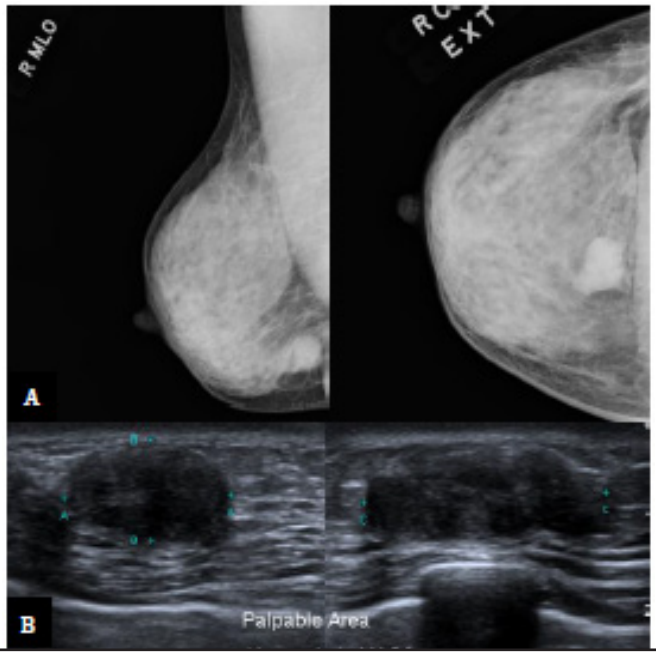
A 50-year-old female presented with left breast mass. (A) Mammogram of left breast showed an oval-shape mass with circumscribed border in upper outer quadrant. (B) Ultrasonography revealed a cystic lesion.

Figure 2 Malignant calcification previously misinterpreted as benign on screening mammography



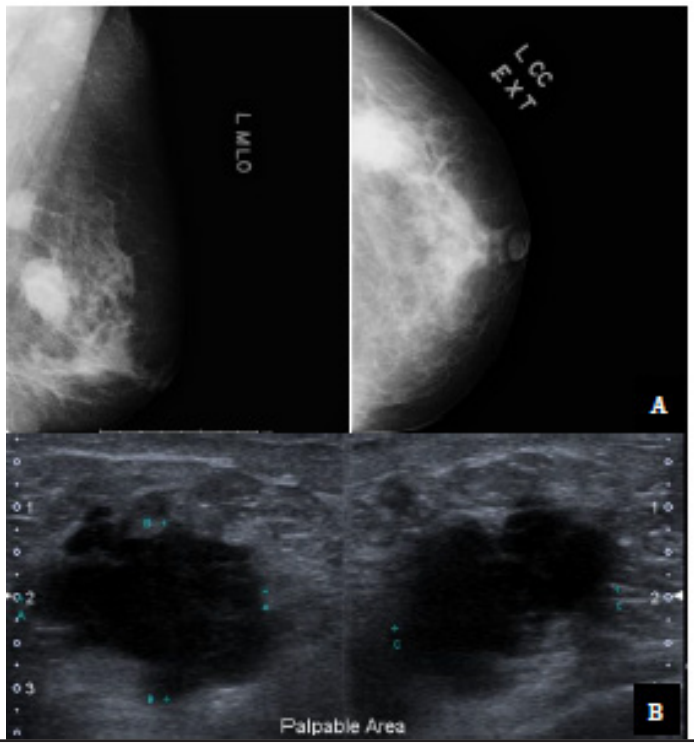
A 59-year-old asymptomatic female presented for screening mammography. (A) The initial mammographic image showed grouped, amorphous, and punctate calcifications, which were considered probably benign and were categorized as BI-RADS category 3. Ultrasonography showed no significant mass (not shown). (B) A subsequent mammographic image acquired after 12 months showed an increase in the extent of fine pleomorphic calcifications with segmental distribution, which were re-categorized as BI-RADS category 5. Ultrasonography revealed a hypoechoic lesion with irregular margin. Biopsy revealed invasive ductal carcinoma.

Figure 3 BI-RADS category 4 lesion



A 34-year-old female presented with right breast mass. (A) Mammogram of right breast shows an oval-shape mass with circumscribed border in lower inner quadrant. (B) Ultrasonography reveals a hypoechoic lesion with circumscribed margin. Biopsy revealed fibroadenoma.

Figure 4 BI-RADS category 5 lesion



A 56-year-old female presented with left breast mass. (A) Mammogram of left breast showed a spiculated mass in upper outer quadrant with an enlarged left axillary lymph node. (B) Ultrasonography revealed a hypoechoic lesion with irregular margin. Biopsy revealed invasive ductal carcinoma.

Table 3 False positive, true positive, false negative and true negative results based on the histopathologic diagnosis and follow-up mammography

Mammography and ultrasound results	Histopathologic diagnosis					
	Positive cancer		Negative cancer		Total	
	n	%	n	%	n	%
Positive studies	91	51.12 TP	87	48.88 FP	178	100.00
Negative studies	3	0.87 FN	342	99.13 TN	345	100.00
Total	94	17.97	429	82.03	523	100.00

Remark: TP: true-positive, FP: false-positive, FN: false-negative, TN: true-negative.

cording to the equations in table 4.

There was 96.81% sensitivity, 79.72% specificity, 51.12% positive predictive value, and 99.13% negative predictive value. The total accuracy was 82.79%.

Discussion

In the course of a 6-month period, 823 women presented to Chaoprayayommarat Hospital for either screening or diagnostic mammography. Breast mass was the most frequent clinical presentation for those who presented with symptoms, followed by axillary mass, mastalgia and nipple discharge. Early diagnosis of breast lesions is important. This can be helpful in accurate management of the patients and also helps to prevent patient's anxiety. The accuracy of the mammography and breast ultrasound according to the BI-RADS classification in Chaoprayayommarat Hospital has not been evaluated. Therefore, this study sought to evaluate the accuracy of mam-

Table 4 Sensitivity, specificity, PPV, NPV and accuracy results based on the histopathologic diagnosis and follow-up mammography (n=523)

Parameters	Equations	n	
Sensitivity	TP/ number of cancer cases (TP + FN)	91/91+3	96.81%
Specificity	TN/ number of non-cancer cases (TN + FP)	342/342+87	79.72%
PPV	TP/ number of positive mammographic examinations (TP + FP)	91/91+87	51.12%
NPV	TN/ number of negative mammographic examinations (TN + FN)	342/342+3	99.13%
Accuracy	(TP + TN) /All patients	91+342/523	82.79%
Positive likelihood ratio	$\frac{TP/(TP + FN)}{FP/(TN + FP)}$	$\frac{91/(91+3)}{87/(342+87)}$	4.77
Negative likelihood ratio	$\frac{FN/(TP + FN)}{TN/(TN + FP)}$	$\frac{3/(91+3)}{342/(342+87)}$	0.04

Remark: TP: true-positive, FP: false-positive, FN: false-negative, TN: true-negative, PPV: positive predictive value, NPV: positive predictive value

mography and ultrasound in those women both in patients with cancer and in patients who do not have cancer.

The current study found that the mammography was very sensitive (96.81% sensitivity), but not as specific (79.72% specificity), with 51.12% positive predictive value, 99.13% negative predictive value and 82.79% total accuracy.

The sensitivity of mammography in this group was high (96.81%); therefore, it is a reliable tool for evaluation of breast lesions and screening the female population to lower the misdiagnosis rate and reduce mortality of breast cancer. Nevertheless, this study included both screening and diagnostic cases who mostly presented with breast mass that may have resulted in high positive studies and high sensitivity in these groups. Shetty MK et al. reported sensitivity of 100.00% and specificity of 80.10% in 411 patients in whom combined mammographic and sonographic evaluation had been performed for palpable breast lumps[10]. Harini G et al. reported sensitivity of 97.80% in combined mammographic and sonographic modalities[11]. Their findings are comparable with the present findings of sensitivity of 96.80% and specificity of 79.72%. However, it was not very specific (79.72% specificity) compared with 100.00% specificity reported by Harini G et al.[11] and 98.60% reported by Gewefel H et al.[12].

The false-positive result is one of the harms of mammography screening[13]. Increased false-positive mammogram leads to increased additional medical cost and a patient's anxiety about breast cancer. This also leads to a higher rate of recommendations for biopsy and a higher rate of biopsies for benign lesions. As a result, risk-benefit analysis for mass screening of breast cancer using mammography should be considered carefully before the national mammography program is introduced[14].

Approximately 72.28% of patients presented with significant symptoms, which were predominantly breast mass, mastalgia, nipple discharge and axillary mass; therefore, the high sensitivity in this group was probably due to more cautious radiological practice. If radiologists face with patients with symptomatic problems at the time they read the mammogram, attention is paid to subtle features of malignancy in order to prevent lesions being missed. Therefore, the increased rate of patients with significant symptoms probably explains the high sensitivity in this group, which has also resulted in low specificity and decrease the positive predictive value of mammography.

Possible explanation for this low positive predictive value might be that this study included both BI-RADS 4 and 5 in the same positive studies for malignancy. The current study revealed that 66.67% of BI-RADS 4 had benign results which are comparable to results obtained by Raza S et al. was 75.20%[15] and Mustafa AA was 68.30%[16]. However, the high negative predictive value was achieved regardless of whether the patients were experiencing significant symptoms or not.

The negative predictive value in this study was high (99.13%), which is comparable to results obtained by Soo MS et al. was 99.80% in the setting of palpable lesions[17]; therefore, these combined mammography and sonography can be reassuring to the clinician if follow-up is planned when the physical examination is not highly suspicious. However, if there is a high degree of clinical suspicion, biopsy should be performed[17].

The total accuracy was 82.79%, which was lower than previous reports of Harini G et al. [11] and Gewefel H et al. (98.10%)[12]. The accuracy of breast imaging studies may be affected by technical aspects, characteristics of the population under study, patient's age, breast density,

radiologist's experience, and the variability in the interpretation by the radiologist utilizing BI-RADS[18-19]. The accuracy of mammography is high for population-based breast cancer screening in women, although the sensitivity is lower in women with dense breast[20]. It is particularly important to apply adequate compression in women who have high breast density to enable the separation of possibly superimposed densities.

Another explanation for this less accuracy might be that all mammographic images in the present study were derived from analog mammography equipment. Digital mammography was significantly better and more accurate than analog mammography at detecting breast cancer in young women, premenopausal and perimenopausal women, and women with dense breasts[21]. Analog mammography should be replaced by digital mammography, which provides good quality images using reduced radiation doses and can detect breast carcinoma in its earlier stages, resulting in a good prognosis and improved patient survival[22].

To achieve improvement of diagnostic accuracy, further studies are needed to clarify the relationships between fellowship training in breast imaging, radiologist's years of experience, reader volume, and interpretive performance[23]. Radiologists with fellowship training in breast imaging were significantly associated with greater sensitivity in cancer diagnosis and higher overall accuracy compared with those of radiologists without specialized training[24]. All mammograms obtained in Chaoprayayommarat Hospital are interpreted by general radiologists who have no fellowship training in breast imaging. Therefore, the emphasis on the performance of general radiologists is important.

In the present study, not all malignancies were BI-RADS category 4 or 5 according to both mammography and ultrasound. Three patients with BI-RADS categories 2 and 3 came to Chaoprayayommarat Hospital due to palpable mass lesions were found to have cancer. Although, the BI-RADS categories 2 and 3 means that the mammograms is negative or probably benign appearance, there is still approximately 2 percent chance of cancer. The BI-RADS category 3 - probably benign finding was given with the management decision of a short-interval follow-up, usually at 6 months. However, many of these lesions are instead recommended for biopsy[25]. Referring physician or patient concern may exist if these lesions change at follow-up and there could be a substantial risk of malignancy; therefore, ultimately biopsy is performed. Twenty-three patients with BI-RADS category 2 and 19 patients with BI-RADS category 3 underwent biopsy despite negative imaging findings because of palpable mass lesions and a high degree of clinical suspicion.

The most common histopathologic diagnoses of benign lesions biopsied in this study were fibrocystic changes (43 cases, 20.67%) and fibroadenoma (27 cases, 12.98%), which were similar to previous reports[26] (fibrocystic disease in 22 (41.50%) cases and fibroadenoma in 16 (30.18%) cases). The most common histopathologic diagnoses of malignant lesions in this study were invasive ductal carcinoma. Therefore, this study demonstrated that benign breast lesion was more common than malignant lesion. BI-RADS category 2 and 3 (n = 268, 51.24%) were the most prevalent in this study.

The other 91 cancer patients within BI-RADS category 4 and 5 came to Chaoprayayommarat Hospital with palpable masses in 89 cases, nipple discharge in 1 case and for screening for breast cancer in 1 case,

which reflects that mammography is an important imaging modality for evaluating breast lesions and could detect 1 cancer case out of 145 screening patients in this study.

However, a majority of women in Thailand cannot access screening mammography because of its limited availability and the relatively high cost despite its significance in breast cancer management. Although, the sensitivity, specificity and accuracy of both mammography and ultrasound were acceptable, these were not the only factors in making both modalities practical and beneficial for nationwide mass cancer screening[27]. Other factors need to be considered such as financial cost, population selection, screening interval, breast density, experience of trained radiologists, and mammography equipment. Therefore, the cost-effectiveness of screening mammography in Thailand should be further evaluated as a way of reducing mortality from breast cancer.

Conclusions

In conclusion, breast evaluation by mammography, utilizing the BI-RADS classification, plays an important role in the diagnostic assessment and screening of breast cancer. Benign breast lesion was more common than malignant lesion. The results of this study suggested that the combined mammography and ultrasound was very sensitive, but not as specific, with total accuracy of 82.79%, indicating benefit for evaluation of breast lesions and screening the female population to lower the misdiagnosis rate and reduce mortality of breast cancer. Further studies are needed to achieve improvement of diagnostic accuracy and cost-effectiveness of screening mammography in Thailand.

Acknowledgements

The author would like to thank colleagues from division of radiology and medical record officers in Chaoprayayommarat hospital, Suphan Buri province for assistance on this research.

References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2018. CA Cancer J Clin 2018;68:7-30.
2. Bureau of Policy and Strategy, Ministry of Public Health. Public Health Statistic A.D. 2016. Nonthaburi: Ministry of Public Health; 2017.
3. Virani S, Bilheem S, Chansaard W, Chitapanarux I, Daoprasert K, Khuanchana S, et al. National and subnational population-based incidence of cancer in Thailand: Assessing cancers with the highest burdens. Cancers 2017;9:1-27.
4. Imsamran W, Chaiwerawattana A, Wiangnon S, Pongnikorn D, Suwanrungrung K, Sangrajrang S, et al. Cancer in Thailand. Vol. VIII, 2010-2012. Bangkok: National Cancer Institute; 2015.
5. Tabár L, Fagerberg CJ, Gad A, Baldetorp L, Holmberg LH, Gröntoft O, et al. Reduction in mortality from breast cancer after mass screening with mammography. Randomized trial from the Breast Cancer Screening Working Group of the Swedish National Board of Health and Welfare. Lancet 1985;325:829-32.
6. Schoor GV, Moss SM, Otten JDM, Donders R, Paap E, den Heeten GJ, et al. Increasingly strong reduction in breast cancer mortality due to screening. Br J Cancer 2011;104:910-4.
7. Guraya SY. Breast Cancer Screening: Implications and Clinical Perspectives. Journal of Taibah University Medical Sciences 2008;3:67-82.
8. N NB, Thomas S, Hiremath R, Alva SR. Comparison of diagnostic accuracy of BIRADS score with pathologic findings in breast lumps. Annals of Pathology and Laboratory Medicine 2017;4:A236-42.

9. D'Orsi CJ, Sickles EA, Mendelson EB, Morris EA. ACR BI-RADS® Atlas, Breast Imaging Reporting and Data System. 5th ed. Reston, Virginia: American College of Radiology; 2013.
10. Shetty MK, Shah YP, Sharman RS. Prospective evaluation of the value of combined mammographic and sonographic assessment in patients with palpable abnormalities of the breast. J Ultrasound Med 2003;22:263-8.
11. Harini G, Shrinuvasan S, Chidambaram R, Shetty S. Diagnostic efficacy of combined mammography and ultrasonography in evaluation of breast lesions with pathological correlation and BIRADS assessment. Indian Journal of Basic and Applied Medical Research 2016; 6:790-9.
12. Gewefel H, Salama DH. Accuracy of combined mammography and breast ultrasound versus breast ultrasound alone in young women below 40 years. J Am Sci 2012; 8(1s):157-64.
13. Pace LE, Keating NL. A systematic assessment of benefits and risks to guide breast cancer screening decisions. Jama 2014;311:1327-35.
14. Nguyen CP, Adang EMM. Cost-effectiveness of breast cancer screening using mammography in Vietnamese women. PLoS One 2018;13:e0194996.
15. Raza S, Chikarmane SA, Neilsen SS, Zorn LM, Birdwell RL. BI-RADS 3, 4, and 5 lesions: value of US in management follow-up and outcome. Radiology 2008; 248:773-81.
16. Mustafa AA. BI-RADS 4 and 5 breast lesions: correlation between sonographic findings and histopathological results following ultrasound-guided FNAC. Kufa Journal for Nursing Sciences 2014;4:188-195.
17. Soo MS, Rosen EL, Baker JA, Vo TT, Boyd BA. Negative predictive value of sonography with mammography in patients with palpable breast lesions. AJR Am J Roentgenol 2001; 177:1167-70.
18. Berg WA, Campassi C, Langenberg P, Sexton MJ. Breast Imaging Reporting and Data System: inter- and intraobserver variability in feature analysis and final assessment. AJR Am J Roentgenol 2000;174:1769-77.
19. Lazarus E, Mainiero MB, Schepps B, Koelliker SL, Livingston LS. BI-RADS lexicon for US and mammography: interobserver variability and positive predictive value. Radiology 2006;239:385-91.
20. Van Gils CH, Otten JD, Verbeek AL, Hendriks JH, Holland R. Effect of mammographic breast density on breast cancer screening performance: a study in Nijmegen, The Netherlands. J Epidemiol Community Health 1998; 52:267-71.
21. Pisano ED, Gatsonis C, Hendrick E, Yaffe M, Baum JK, Acharyya S, et al. for the Digital Mammographic Imaging Screening Trial (DMIST) Investigators Group. Diagnostic performance of digital versus film mammography for breast-cancer screening. N Engl J Med 2005; 353:1773-83.
22. Zeeshan M, Salam B, Khalid QSB, Alam S, Sayani R. Diagnostic accuracy of digital mammography in the detection of breast cancer. Cureus 2018;10:e2448.
23. Carney PA, Sickles EA, Monsees BS, Bassett LW, Brenner RJ, Feig S, et al. Identifying minimally acceptable interpretive performance criteria for screening mammography. Radiology 2010;255:354-61.
24. Elmore JG, Jackson SL, Abraham L, Miglioretti DL, Carney PA, Geller BM, et al. Variability in interpretive performance at screening mammography and radiologists' characteristics associated with accuracy. Radiology 2009; 253:641-51.
25. Pijnappel RM, Peeters PH, Hendriks JH, Mali WP. Reproducibility of mammographic classifications for non-palpable suspect lesions with microcalcifications. Br J Radiol 2004;77:312-4.
26. Prasad S, Houserkova D. A comparison of mammography and ultrasonography in the evaluation of breast masses. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2007;151:315-22.
27. Huang Y, Kang M, Li H, Li JY, Zhang JY, Liu LH, et al. Combined performance of physical examination, mammography, and ultrasonography for breast cancer screening among Chinese women: a follow-up study. Curr Oncol 2012;19:eS22-eS30.

บทคัดย่อ: ความถูกต้องแม่นยำของการตรวจแมมโมแกรมและอัลตร้าซาวด์เต้านมในโรงพยาบาลเจ้าพระยายมราช: การศึกษาแบบย้อนหลัง

พนิดา อิศราภรณ์ พ.บ., ว.ว. รังสีวิทยาทั่วไป
กลุ่มงานรังสีวิทยา โรงพยาบาลเจ้าพระยายมราช จังหวัดสุพรรณบุรี
วารสารวิชาการสาธารณสุข 2562;28:941-52.

การศึกษานี้เป็นการศึกษาย้อนหลังเชิงพรรณนา มีวัตถุประสงค์เพื่อศึกษาความถูกต้องแม่นยำของการตรวจแมมโมแกรมและอัลตร้าซาวด์เต้านมโดยรายงานผลการตรวจตามระบบไบแรดส์ในโรงพยาบาลเจ้าพระยายมราช เก็บรวบรวมข้อมูล ผู้ป่วยหญิงทั้งหมด 823 คน ทั้งที่มีอาการและไม่มีอาการ ที่ได้รับการตรวจแมมโมแกรมในโรงพยาบาลเจ้าพระยายมราช ตั้งแต่ เดือนมกราคม พ.ศ. 2558 ถึง เดือนมิถุนายน พ.ศ. 2558 โดยรายงานผลการตรวจตามระบบไบแรดส์ ดังนี้ ไบแรดส์ชนิดที่ 1 คือ ผลตรวจเป็นปกติ ไบแรดส์ชนิดที่ 2 คือ ความผิดปกติที่ไม่ใช่มะเร็ง ไบแรดส์ชนิดที่ 3 คือ ความผิดปกติที่น่าจะไม่เป็นมะเร็ง ไบแรดส์ชนิดที่ 4 คือ ความผิดปกติที่สงสัยว่าอาจเป็นมะเร็ง และไบแรดส์ชนิดที่ 5 คือ ความผิดปกติที่สงสัยอย่างยิ่งว่าอาจเป็นมะเร็ง ไบแรดส์ชนิดที่ 1 ถึง 3 ถือว่าผลการตรวจให้ผลลบ ไบแรดส์ชนิดที่ 4 และ 5 ถือว่าผลการตรวจให้ผลบวก หาความถูกต้องแม่นยำโดยผลการตรวจชิ้นเนื้อทางพยาธิวิทยาหรือการตรวจติดตามด้วยแมมโมแกรมต่อไปอย่างน้อย 24 เดือน วิเคราะห์ผลโดยทำการคำนวณค่าความถูกต้องแม่นยำ ความไว ความจำเพาะ ค่าพยากรณ์ผลบวก และ ค่าพยากรณ์ผลลบ ผลการศึกษาพบว่า ผู้ป่วยทั้งสิ้น 523 ราย ถูกรวบรวมเข้าในการศึกษา ลักษณะทางคลินิกที่พบมากที่สุดได้แก่ ก้อนที่เต้านม 329 ราย (ร้อยละ 62.91) รองลงมาคือ ตรวจคัดกรองมะเร็งเต้านม 145 ราย (ร้อยละ 27.72) เจ็บเต้านม 33 ราย (ร้อยละ 6.31) ก้อนที่รักแร้ 10 ราย (ร้อยละ 1.91) และ น้ำคัดหลั่งออกจากหัวนม 6 ราย (ร้อยละ 1.15) ตามลำดับ อายุเฉลี่ยของกลุ่มตัวอย่างคือ 50.38 ปี การแปลผลการตรวจตามระบบไบแรดส์ พบว่า ไบแรดส์ชนิดที่ 2 และ 3 (ร้อยละ 51.24) ซึ่งได้แก่ความผิดปกติที่ไม่ใช่มะเร็ง และความผิดปกติที่น่าจะไม่เป็นมะเร็ง พบมากที่สุดในการศึกษานี้ ผลการตรวจที่ให้ผลลบมีทั้งสิ้น 345 ราย (ร้อยละ 65.97) และผลการตรวจที่ให้ผลบวกมีทั้งสิ้น 178 ราย (ร้อยละ 34.03) ผู้ป่วยที่ได้รับการตรวจชิ้นเนื้อทางพยาธิวิทยาทั้งสิ้น 208 ราย (ร้อยละ 39.77) พบว่า 94 รายเป็นมะเร็ง ส่วนอีก 114 ราย ไม่ใช่มะเร็ง ความถูกต้องแม่นยำของการรายงานผลร้อยละ 82.79 ความไวร้อยละ 96.81 ความจำเพาะร้อยละ 79.72 ค่าพยากรณ์ผลบวกร้อยละ 51.12 และ ค่าพยากรณ์ผลลบร้อยละ 99.13 โดยสรุป การตรวจเต้านมด้วยแมมโมแกรมโดยรายงานผลการตรวจตามระบบไบแรดส์ มีบทบาทสำคัญในการวินิจฉัยและคัดกรองโรคมะเร็งเต้านม กลุ่มที่ไม่ได้เป็นมะเร็งพบบ่อยกว่ากลุ่มที่เป็นมะเร็ง การศึกษานี้บ่งชี้ว่าแมมโมแกรมร่วมกับอัลตร้าซาวด์เต้านมเป็นการตรวจที่มีความไวสูง แต่มีความจำเพาะต่ำกว่าการศึกษาอื่น โดยมีความถูกต้องแม่นยำของการรายงานผลร้อยละ 82.79 ซึ่งแสดงให้เห็นว่าแมมโมแกรมเป็นการตรวจที่มีประโยชน์มากในการคัดกรองผู้ป่วยหามะเร็งเต้านมในระยะเริ่มต้น เพื่อลดอัตราการเสียชีวิตจากมะเร็งเต้านม นอกจากนี้ ยังสนับสนุนการศึกษาและพัฒนาคุณภาพเพิ่มเติม เพื่อหาแนวทางที่จะช่วยให้การวินิจฉัยมีความถูกต้องแม่นยำมากยิ่งขึ้น และศึกษาความคุ้มค่าในการตรวจคัดกรองโรคมะเร็งเต้านมในประเทศไทย

***คำสำคัญ*: แมมโมแกรม, มะเร็งเต้านม, อัลตร้าซาวด์เต้านม, ความถูกต้องแม่นยำ**