ACCURACY FOR DETECTION OF BREAST CANCER BY MAMMOGRAPHY AND ULTRASOUND AT UDONTHANI REGIONAL CANCER CENTER

N. MUNPOLSRI[1] MD, (diagnostic radiology)
S. WISET NANN[1] MSc(radiology)

Objective; To determine the accuracy for detection of breast cancer by mammography and ultrasonography compared with histopathology and unchanged follow up mammographic reports in 2 years.

Material and Method: Retrospective study of 1,756 mammographic reports with BIRADS classification into BIRADS 1 for negative study, BIRADS 2 for benign findings, BIRADS 3 for probably benign lesion, BIRADS 4 for suspicious malignancy and BIRADS 5 for highly suggestive of malignancy. All patients had confirmed diagnoses with tissue histopathology or unchanged mammographic reports within 2 years.

Results: The overall sensitivity was 88.00%, specificity 98.93% and accuracy 98.48% which is very high compatible with other studies.

Keywords: Mammography, Ultrasound, Breast cancer, histopathology.

Breast cancer is the second most common malignancy of women with an incidence of about 17.2 per 100,000 female population of Thailand.[1] Early detection of breast cancer can provide curative treatments with deceased morbidity and morbidity of the patients suffering from breast cancer. Now-a-day, these are multiple tools for early detection of breast cancer, but the most recommended one is mammography. Since 1996, Udonthani Regional cancer center is a unit of the Ministry of Public Health of Thailand provided for the people in the 9 provinces of the north Eastern part of Thailand in duding our neighboring country-Loas for early cancer detection, screening for massed in the breasts and also offering appropriate treatment. The provinces in the aforementioned included, Udonthani, KhonKaen, Kalasin, Nakonpranom, Mahasarakam, Loei, Sakonnakorn, Naongkai, Nongbualumphu, including Laos. Every years there are a large member of woman who had symptoms of abnormalities in the breast attending our center.

We would like to present to you our analysis of the result of 2,000 mammography, studied from the people having breast symptoms for mammography, aging from 16-81 yeast old since 2004 to 2006. The sensitivity, specificity and accuracy of mammography reports were analysed using BIRADS classification[2] in comparison with histopathology or unchanged followed up mammography in 2 years. The results of this study may help us to plan for further development in diagnostic procedures or treatment of breast cancer.

MATERIAL AND METHODS

From Jan 2004- Dec 2006, the collected data of 2,000 women caming to Udonthani Regional Cancer Center for mammography (screening and/or diagnostic mammography were analysed). About 1,756 patients (87.80 %) the diagnoses were proven by tissue diagnosis and the other group with unchanged of the mammographic results of a followed up after 2

[1] Devision of diagnostic radiology, Udonthani Regional Cancer Cener.
Correspondence to; Munpolsri N. Devision of Diagnostic Radiology, Udonthani Regional Cancer Center, Udonthani 41330. Thailand.

years interval. The accuracy of the diagnosis of the two groups were compared.

At least two standard positions of mammography were performed (CC: craniocaudal view and MLO; mediolateral oblique view) and additional position for more information if indicated. The mammographic machines are GE-Senograph DMR and 7.5 MHz linear probe ultrasound-GE logic 400.

The result of mammographic reports were classified into category of Breast Imaging Reporting and Data Systems of American College of Radiology (BIRADS)[2,3] by experience radiologists at Udonthani Regional Cancer Center. Negative study were classified as BIRADS I, benign findings were classified as BIRADS II, probably benign findings were classified as BIRADS III, suspicious lesion of malignancy were classifies as BIRADS IV and highly suggestive of malignancy were classified as BIRADS V. The BIRADS O (incomplete study) and BIRAD VI (known case of malignancy) were excluded from the study.

The statistical result such as sensitivity, specificity and accuracy of the study were determine by histopathology (fine needle aspiration, core needle biopsy or excision) or by unchanged mammographic report within 2 years.

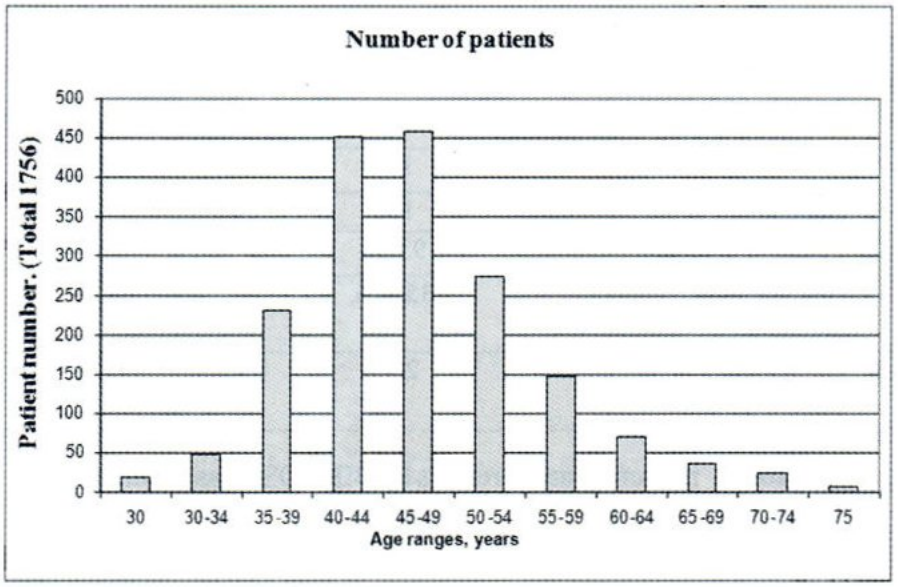
In the groups of BIRADS I , II were recommended for annual follow up mammography. Group of BIRADS III were recommended for short interval follow up and in group pf BIRADS IV and V were recommended for definite tissue diagnosis and proper management.

RESULTS

There were 1,756 mammographic reports to be studied with the ages range from 16-81 years old, average age about 46.328 years and high peak of age incidence range is between 40-49 years. (the lowest age is 16 years old came form Lao with bloody nipple discharge, diagnosed as BIRADS 4 and had proved to be intraductal papillaoma)

Age	Number of patients
<30	19
30-34	49
35-39	230
40-44	451
45-49	458
50-54	273
55-59	147
60-64	71
65-69	35
70-74	23
>74	7

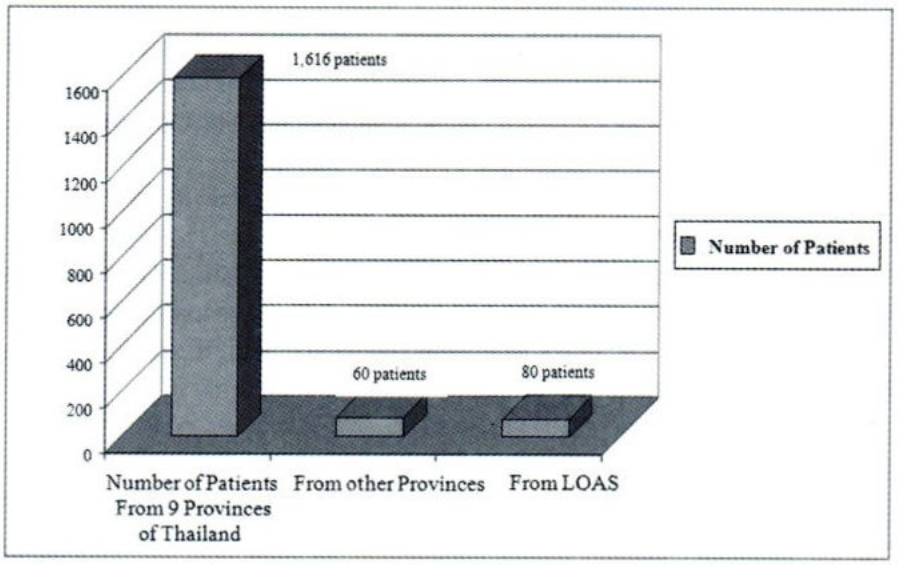
Table 1 Age distribution of the patients.



Graph 1 number of patients distribution by age groups.

Area (Provinces)	Number of patient	
	persons	%
Responsible area [9 provinces in Northeast of Thailand]	1,616	92.03
Out off responsible area	60	3.42
Laos	80	4.55

Table 2 percentage of patients in and out of responsilble area



About 92.03 % (1616 persons) of patients lived in the upper part of North-East of Thailand, in the responsible area of Udonthani Regional Cancer Center.

Mammographic reports	Histopathology or 2 years followed up mammography				Total
	Benign		Malignancy		
	number	%	number	%	number
BIRADS I Negative Studies	847	100	0	0	847
BIRADS II Benign	695	100	0	0	695
BIRADS III Probably Benign	121	93.08	9	6.92	130
BIRADS IV Suspicious of Malignancy	17	35.426	31	64.58	48
BIRADS V Highly Suggestive of Malignancy	1	2.78	35	97.22	36

Table 3 mammographic reports by BIRADS classification

In 847 patients of BIRADS I revealed 2.27 % were tissue proven as fibrocystic change(15), fibrosis (5), and unchanged mammographic report in 2 years for 97.63 % (827)

In 695 patients of BIRADS II revealed 5.47 % were tissue proven as fibrocystic change (15), fibroadenoma (18), fibroadenosis (3), inflammation (2) and 94.53% unchanged mammographic reports in 2 years (567)

In 130 patients of BIRADS III revealed 23.08 % (30) were tissue proven as malignancy (9), lipoma (1), fibrocystic change (11), fibroadenoma (8), benign phylloides tumor (1) and unchanged mammographic reports in 2 years 76.92 % (100)

In 48 patients of BIRADS IV revealed 64.58 % were tissue proven as malignancy (31), benign intraductal papilloma (2), fat necrosis (1), fibrocystic change (3), fibroadenoma (10), abscess (1)

In 36 patients of BIRADS V revealed 97.22 % (36) were tissue proven as malignancy (35) and lobulated contour fibroadenoma (1)

All data was statistically analysis. In group of BIRADS I, II, III regarded as negative for malignancy, where as BIRADS IV, V were regarded as positive for malignancy.

True Positive (TP) means the patients in BIRADS IV, V who were diagnosed as malignancy in mammography and proven to be malignancy by histopathology.

TP = 31+35=86

True Negative (TN) means the patients in BIRADS I, II, III were diagnosed as benign and confirmed to be benign or normal

TN = 847+695+121 =1,163

False negative (FN) means the patients who were diagnosed as non-malignancy in BIRADS I, II, III, but proven to be malignancy by histopathology

FN = 0+0+9 = 9

False Positive (FP) means the patients who were diagnosed as malignancy in BIRADS IV, V but proven to be benign condition by histopathology

FP = 17+1 =18

Negative Predictive Value (NPV)= TN/total negative malignancy on mammography Positive Predictive Value (PPV) = TP/ total positive malignancy on mammography

Mammographic reports	Positive Predictive Value (%)	Negative Predictive Value (%)
BIRADS I Negative Studies	-	100
BIRADS II Benign	-	100
BIRADS III Probably Benign	-	86.43
BIRADS IV Suspicious of Malignancy	64.58	
BIRADS V Highly Suggestive of Malignancy	97.22	

Table 4 PPV and NPV of each BIRADS classification

Mammographic reports	Positive Predictive Value (%)	Negative Predictive Value (%)
Benign (BIRADS I, II, III)	-	99.46
Malignancy (BIRADS IV, V)	78.57	-

Table 5 overall PPV and NPV

Sensitivity = TP/ (TP+TN) True Positive/ (True Positive+True Negative)
= 66/ (66+9)
= 88.00 %

Specificity = TN / (TN+FP) True Negative/ (True Negative+False Positive)
= 1,663/ (1,663+18)
= 98.93 %

Accuracy = (TN+TP)/ total number of study True Negative+True Positive/ total number of study
= (1,663+66) / 1,756
= 98.46 %

DISCUSSION

Mammography was recommended for the standard screening method of breast cancer (with addition sonographic examination depend on density of breast tissue[4,5] According to BIRADS classification it is easily helpful to make decision for further management of the patient after mammography having been taken. The groups of BIRADS I,II,III were defined as normal or negative for malignancy (benign condition) which in this study proved to be about 99.46 % for overall NPV in BIRADS I, II, III and 78.57 % for overall PPV for malignancy in BIRADS IV, V., high value.[6,7]

There was 87.80% of patients in this study had regular followed up of mammography and/or taken tissue for histopathology, means that the patients were alert and having awareness for detection of breast cancer.

The common benign disorders of breasts in this study are fibrocystic change and fibroadenoma, where as the malignant disorder is the infiltrative ductal carcinoma.

This study showed high sensitivity (88.00%),

specificity (98.93%) and accuracy (98.46%) similar to another studies,[8-11] so it is supported that the mammography is useful to be the screening tool for breast cancer which is not too expensive, but give high sensitivity, specificity and accuracy. However the sensitivity, specificity and accuracy are depends on multiple factors such as good technology of machines (mammography and ultrasound), well trained radiologic technicians, well trained and experience of radiologist.[12]

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