

:

2
50 1) 2 5
15 (30.0%), 가
16 (32.0%), 19 (38.0%)
1
Excel 97 SAS 6.12
Kappa
Kappa
(12, 13).
95%

Table 2

Kappa 0.44

Table 3

(Table 1).

Kappa 0.42

가

(circumscribed margin)

3 (

5

0.53

,

(spiculate margin)

Table 1. Contents of the Study Questionnaire

Variables	Items
1. Parenchymal pattern	1) Fatty breast 2) Diffuse scattered fibroglandular breast 3) Heterogeneous fibroglandular tissue which may lower the sensitivity of mammography 4) Extremely dense fibroglandular tissue which may lower the sensitivity of mammography
2. Mass	1) Location 2) Size 3) Number 4) Shape 5) Margin 6) Density
3. Calcification	1) Location 2) Size 3) Number 4) Type 5) Distribution
4. Other Findings	1) Tubular density/ Solitary dilated duct 2) Intramammary lymph node 3) Asymmetric breast tissue 4) Asymmetric density 5) Focal asymmetric density 6) Architectural distortion 7) Skin thickening 8) Cooper 's ligament thickening
5. Conclusion	1) Final category 1: Negative finding (normal) 2) Final category 2: Benign finding 3) Final category 3: Probably benign finding ADV. F/U 6 months 4) Final category 4: Suspicious of malignancy ADV. Tissue confirm needed 5) Final category 5: Highly suggestive of malignancy 6) Final category 0: Assessment incomplete ADV. Further study

0.43 Kappa
(microlobulated) (obscured, indistinct)

Kappa 0.51
가 가 Kappa
0.65
0.59 0.54 Kappa
Kappa
Table 4
0.66
가 가 0.81 가
Kappa 0.52
3cm Kappa 0.77
가 1 cm
0.57 0.43 Kappa
1 - 3 cm 가

Table 2. Kappa Values for Interobserver Agreement for Parenchymal Pattern of Breast on Mammogram

Parenchymal pattern	Kappa	95% CI
1. Fatty breast	0.63	0.54 - 0.72
2. Diffuse scattered fibroglandular breast	0.33	0.24 - 0.42
3. Heterogeneous fibroglandular tissue which may lower the sensitivity of mammography	0.27	0.18 - 0.36
4. Extremely dense fibroglandular tissue which may lower the sensitivity of mammography	0.66	0.57 - 0.75
Mean Kappa value	0.44	0.39 - 0.49

Table 3. Kappa Values for Interobserver Agreement for Breast Mass on Mammogram (1)

Finding	Kappa	95% CI
Mass margin		
1. No mass	0.53	0.44 - 0.62
2. Circumscribed	0.53	0.45 - 0.62
3. Microlobulated	- 0.01	- 0.10 - 0.08
4. Obscured	0.10	- 0.01 - 0.19
5. Indistinct(ill-defined)	0.21	0.12 - 0.29
6. Spiculated	0.43	0.35 - 0.52
Mean Kappa value	0.42	0.34 - 0.44
Mass density		
1. No mass	0.65	0.56 - 0.74
2. Hyperdense	0.54	0.45 - 0.63
3. Isodense	0.26	0.17 - 0.34
4. Hypodense	- 0.00	- 0.09 - 0.08
5. Fat-containing(radiolucent) compared to breast parenchyma	0.59	0.50 - 0.68
Mean Kappa value	0.51	0.45 - 0.57

Table 5

Kappa 0.66
Kappa 0.43
(seg -
mental)
Kappa 0.66
가
Kappa 0.44
Table 6

Table 4. Kappa Values for Interobserver Agreement for Mammographic findings of Breast Mass (2)

Mammographic Finding of Mass	Kappa	95% CI
Mass location		
1. No mass	0.68	0.59 - 0.76
2. Right	0.66	0.58 - 0.75
3. Left	0.59	0.50 - 0.67
4. Both	0.81	0.73 - 0.89
Mean Kappa value	0.66	0.60 - 0.72
Mass size		
1. No mass	0.57	0.46 - 0.66
2. < 1cm	0.43	0.34 - 0.52
3. > 1 - 2 cm	0.26	0.17 - 0.34
4. 2 - 3 cm	0.23	0.14 - 0.32
5. ≥ 3 cm	0.77	0.69 - 0.86
Mean Kappa value	0.52	0.46 - 0.58

Table 5. Kappa Values for Interobserver Agreement for Mammographic Calcifications in Breast

Mammographic Finding of Calcification	Kappa	95% CI
Calcification type		
1. Non calcification	0.71	0.62 - 0.80
2. Typically Benign	0.67	0.59 - 0.76
3. Intermediate cancer	0.17	0.08 - 0.25
4. Higher probability malignancy	0.82	0.74 - 0.91
Mean Kappa value	0.66	0.60 - 0.72
Calcification distribution		
1. No calcification	0.66	0.57 - 0.74
2. Linear	0.27	0.18 - 0.35
3. Grouped	0.18	0.10 - 0.27
4. Segmental	0.61	0.52 - 0.70
5. Regional	0.03	- 0.06 - 0.12
6. Diffuse scattered	0.26	0.17 - 0.34
Mean Kappa value	0.43	0.38 - 0.48

Table 6. Kappa Values for Interobserver Agreement for Final Conclusion of Mammogram

Conclusion	Kappa	95% CI
1. Normal	0.49	0.40 - 0.58
2. Benign	0.37	0.28 - 0.45
3. Cancer	0.45	0.39 - 0.57
Mean Kappa value	0.44	0.38 - 0.51

가 , Ciccone (9)

가

. Beam (15)

가

50 79

108

62 40%

45%

Beam (15)

가 , Ciccone (9)

45 7

가 2 2

12 , 24

9

가 2000

가

가 0.45 0.44

가 0.35 0.67 kappa 0.56

2001 1

가 (17).

가 (18).

가 , Skaane (14)

kappa 0.52 0.66 0.58

가 , Elmore (10)

kappa 0.47

(9, 10, 14)

Kappa

가

가 (8 - 10, 14)

가

Kappa

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Interobserver Variability in Interpretation of Mammogram¹

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Purpose: The purpose of this study was to evaluate the performance of radiologists for mammographic screening, and to analyze interobserver agreement in the interpretation of mammograms.

Materials and Methods: 50 women were selected as subjects from the patients who were screened with mammograms at two university hospitals. The images were analyzed by five radiologists working independently and without their having any knowledge of the final diagnosis. The interobserver variation was analyzed by using the kappa statistic.

Results: There were moderate agreements for the findings of the parenchymal pattern ($k = 0.44$; 95% CI 0.39 - 0.49), calcification type ($k = 0.66$; 95% CI 0.60 - 0.72) and calcification distribution ($k = 0.43$; 95% CI 0.38 - 0.48). The mean kappa values ranged from 0.66 to 0.42 for the mass findings. The mean kappa value for the final conclusion was 0.44 (95% CI 0.38 - 0.51). In general, moderate agreement was evident for all the categories that were evaluated.

Conclusion: The general agreement was moderate, but there was wide variability in some findings. To improve the accuracy and reduce variability among physicians in interpretation, proper training of radiologists and standardization of criteria are essential for breast screening.

Index words : Interobserver variability

Mammography

Kappa value

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