



ROBINSON'S CYTOLOGICAL GRADING ON FNAC OF BREAST CARCINOMA AND ITS CORRELATION WITH HISTOLOGICAL GRADING SYSTEM

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ABSTRACT

Objective: The study was designed to correlate cytological and histopathological grading in breast carcinoma on FNA and core biopsy respectively. FNAC is cheaper, less invasive and can sample different areas of the lesion compared with core needle biopsy. In present study we correlated Robinson cytological grading system with Elston-Ellis modified SBR method and find concordance between cytological grading system and histological grading system. **Study Design:** This is a two years retrospective study of breast carcinoma with cytology and histopathology evaluated at our Pathology Department, SSG Hospital and Medical college, Baroda from year of 2020 and 2021. A total of 46 cases of breast carcinoma diagnosed on FNAC and confirmed on histopathology were included in the study. Cases diagnosed on FNAC but not confirmed on histology were excluded. **Results:** Applying Robinson cytological grading system, 9 cases were graded as grade I, 22 cases as grade II and 15 cases as grade III and histologically by using Elston -Ellis modification of SBR grading system, 6 cases were graded as grade I, 23 cases grade II and 17 cases as grade III. The absolute concordance rate (sensitivity) of cytological grading system was 63.04% and specificity was 100%. **Conclusion:** Robinson cytological grading system for breast carcinoma is easy to apply, reproducible and well correlated with histological grading system. Cytological grading of breast carcinoma on FNAC is useful in patients with locally advanced disease, older patients, patients with accompanying chronic disease and patients who reject surgery.

KEYWORDS : Breast carcinoma, Cytology, core needle biopsy, Histopathology.

INTRODUCTION

Breast carcinoma is most common malignant tumour and leading cause of death in women. In India, breast cancer is most common malignancy followed by cervical cancer. Breast cancer has ranked number one cancer among Indian females with age adjusted rate as high as 25.8 per 100,000 women and mortality 12.7 per 100,000 women.(1)

Breast carcinoma prognosis depend upon tumour type, histological grading, hormone receptor status, cell proliferation markers, expression of different oncogenes and DNA ploidy.(2)

As compared to core biopsy, on FNAC breast lesions are easily accessible, cost effective, results obtained within a day and less invasive. In developed countries core needle biopsy is routinely used for breast lump diagnosis while in developing countries core needle biopsy is still not used and at most of the medical centres FNAC is the primary tool for diagnosis.(3)

The histological grading proposed by Elston and Ellis using Nottingham modification of Scarff, Bloom Richardson (SBR) for breast carcinoma grading system is useful, sensitive to guide for selecting neoadjuvant therapy and has good prognostic correlation.(4). In preference to subjective and descriptive cytology report, cytological grading should be included in the report. Grading mentioned in cytological report adds reproducibility of report. The National cancer institute, Bethesda sponsored a conference on the uniform approach to report breast fine needle aspiration biopsy and

recommended that tumour grading should be incorporated for prognostication.(5)

Cytological grading of breast carcinoma on FNAC is useful in patients with locally advanced disease, older patients, with accompanying chronic diseases and patients who reject surgery. (6) There is different grading system like Mouriquand's method, Black's nuclear grading system, Hunt et al scoring scheme, Robinson et al, Howell et al, Taniguchi et al and Khan et al. (3,7) In present study we correlated Robinson cytological grading system with Elston-Ellis modified SBR method to find concordance between cytological grading system and histological grading system.(8)

MATERIAL AND METHOD

This is a two years retrospective study of breast carcinoma with cytology and histopathology evaluated at our Pathology Department, SSG Hospital and Medical college, Baroda. Breast carcinoma diagnosed on FNAC and confirmed on histopathology were included in the study. Cases diagnosed on FNAC but not confirmed on histology were excluded.

FNAC was done after written consent of patient. Procedure was done by 10 ml syringe with 22-23-gauge needle using aseptic precautions. The smears were wet fixed and air dried. H&E and PAP stain were done on wet fixed smear and MGG stain was done on air dried fixed smear. Cytological features were graded by using Robinson's method by two independent observers.

Robinson's grading system included the architecture arrangement, cell size, cellular pleomorphism, nuclear features like nuclear margin, chromatin and nucleoli.

Table 1: Robinson's (1994) Cytological Grading System Of Breast Carcinoma

	Score 1	Score 2	Score 3
Dissociation	Cells mostly in clusters	Mixture of single and cell clusters	Cells mostly single
Cell size	1-2xRBC size	3-4x RBC size	≥ 5xRBC size
Cell Uniformity	Monomorphic	Mildly pleomorphic	Pleomorphic
Nucleoli	Indistinct	Noticeable	Prominent
Nuclear margin	Smooth	Folds	Buds or cleft
Chromatin	Vesicular	Granular	Clumped and cleared

Table 2: SBR Method Was Use For Histological Grading On H&E stained sections

Features	Score
Tubule formation(%)	
Majority of tumor(>75)	1
Moderate degree(10-75)	2
Little or none(<10)	3
Nuclear Pleomorphism	
Minimum variation in size and shape	1
Moderate variation in size and shape	2
Marked variation in size and shape	3
Mitotic counts(per 10-40xfields)	
0-5	1
6-10	2
> 11	3
Final grading system-Grade I -3 to 5, Grade II -6 to 7, Grade III-8 to 9	

The statistical analysis was done with the SPSS software. In this study, concordance rate of each grading both in cytology and histopathology has been calculated. At the end absolute concordance rate of all the gradings has been calculated. The agreement between the methods was assessed by the use of Kappa statistics. Multiple linear regression was done to assess the significant of different cytological parameters to predict final cytological grade. P value of 0.05 or less was considered for statistical significance.

Observation

In present study total no of 46 cases of breast carcinoma were included. The patient age ranges from 23 to 67 years with maximum no of patients in 51 to 60 years age group.

Table 3: Concordance Rate Of Cytological Grading And Histological Grading

Robinson's Cytological Grading		Histological Grade			Concordance
		Grade I	II	III	
I	9(19.5%)	5	4	0	55.5%
II	22(47.8%)	1	14	7	63.6%
III	15(32.6%)	0	5	10	66.7%
Total	46	6	23	17	63.04%

Table 4: Comparison Of Cytological And Histological Grading By Using Kappa Coefficient

Grade	Robinsons Cytological Grading	Histological grade	Kappa value (95% CI) for agreement	Standard error	Strength of agreement
I	9	6	0.61 (0.296-0.914)	0.158	Substantial

II	22	23	0.26 (0.018-0.540)	0.142	Fair
III	15	17	0.43 (0.154-0.698)	0.139	Moderate

Table 5: Multiple Linear Regression Analysis Of Cytological Features

Robinson's cytological grading system (Independent variables)	Unstandardized Regression Coefficients	t - value	Significance (p value)	
Cell dissociation, x ₁	0.310 (b ₁)	3.235	0.002	Significant
Cell size, x ₂	0.402 (b ₂)	3.437	0.001	Significant
Cell Uniformity, x ₃	0.287 (b ₃)	2.546	0.015	Significant
Nucleoli, x ₄	0.363 (b ₄)	4.904	0.000	Significant
Nuclear margin, x ₅	0.329 (b ₅)	2.902	0.006	Significant
Chromatin, x ₆	0.369 (b ₆)	3.409	0.002	Significant

Constant α = -2.483; t-value = -6.705; P = 0.000

Regression equation: grade, $y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6$

Applying Robinson cytological grading system, 9 cases were graded as grade I, 22 cases as grade II and 15 cases as grade III. These cases were graded histologically by using Elson -Ellis modification of SBR grading system. Histologically, 6 cases were graded as grade I, 23 cases grade II and 17 cases as grade III. (Table 3)

The highest rate of concordance was observed in grade II and grade III i.e., 63.6% and 66.7% respectively; while grade I tumour showed 55.5% concordance rate. The absolute concordance rate (sensitivity) of cytological grading system was 63.04% and specificity was 100%. The higher-grade tumour i.e., grade II and grade III showed good concordance.

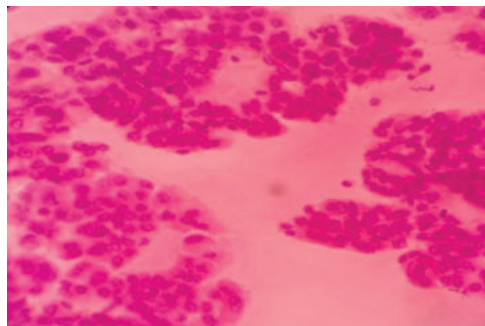


Figure 1: Cytological Grade 1. The Cells Are Cohesive With Enlarged Mild Nuclei, Smooth nuclear Margin And Inconspicuous Nucleoli.

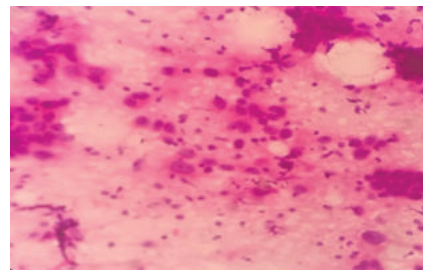


Figure 2: Cytological grade 2. The cells are in loose clusters

with dispersed cells having nuclei that are three to four times the erythrocytes, with smooth margins and single prominent nucleoli.

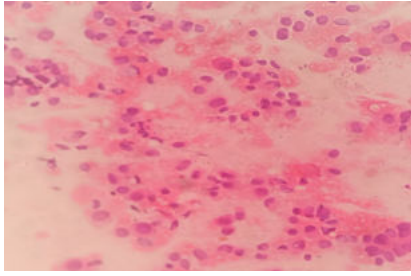


Figure 3: Cytological Grade 3. Cells Are Singles With Coarsely Granular Chromatin, Irregular Nuclear Margins.

DISCUSSION

In women, breast carcinoma is one of the most common malignancies in the world and is second most common cancer in India. FNAC is rapid, reliable and safe diagnostic procedure in neoplastic and non-neoplastic lesions. FNAC is one of the components of the triple test in the diagnosis of palpable breast lump in developing countries. Combination of clinical examination, mammography and FNAC in parallel lead to improved diagnosis. If all three investigations are in agreement, diagnostic accuracy is over 99%. (7,9)

The main objectives in breast malignancy are; to establish correct diagnosis, early detection of cancer, staging of cancer and predict prognosis. A cytological assessment of prognostic marker is important, and it is useful in patient with inoperable tumour and in high-risk surgical patient. (10,11,12)

There are many cytological grading systems have been proposed by various authors. We applied Robinson grading system for cytological grading. Robinson grading system is found to be better because of its more simplicity, specificity, easy reproducibility and more objective set of criteria (13,14,15).

In the present study, out of total 46 cases, 9(19.5%), 22(47.8%) and 15(32.6%) cases were as grade I, II and III respectively. Majority of cases were in CG grade II which is comparable to other studies. (11,16)

The concordance of CG with histological grade showed 55.5% in grade I, 63.6% in grade II, 66.7% in grade III. The absolute concordance of CG with histological grade is 63.04% which correlates with other studies. Robinson et al found 56.9% concordance, Chalise et al found 65.9% while Sood et al, Chhabra et al, Meena et al and Sinha et al found 68.97%, 65.0%, 59.1%, 69.5% respectively.

Table 6: Correlation Of Concordance Rate With Different Studies

Different type of study	Concordance rate %
Robinson et al(7)	56.9
Chalise et al (17)	65.9
Sood N et al(12)	68.97
Chhabra et al (18)	65.0
Meena et al (19)	59.1
Sinha (20)	69.5
Present study	63.04

We have applied kappa statistical analysis to find out strength of agreement between cytological and histologic grades. As shown in table Kappa values for grade I, II and III tumours were 0.61, 0.26 and 0.43 respectively. There was substantial agreement for grade I tumours, fair agreement for grade II tumours and moderate agreement for grade III tumours between cytological and histological grading systems.

For Robinson cytological grading system multiple regression analysis used to assess the significance of each cytological features. In our study cell dissociation, cell size, nucleoli and chromatin were most influential features for cytological grading. Das et al(21) found cell dissociation, nuclear margin, nucleoli and cell uniformity, Lingegowda et al(22) found cell dissociation, nucleoli and nuclear margin were most influential cytological features for cytological grading. Tubule formation, nuclear pleomorphism and mitotic figures are the most important factors for histological grading system while cell dissociation, cell size, cell uniformity, nuclear margin, chromatin pattern and nucleoli are included in Robinson cytological grading system. Cell dissociation, cell size and nuclear characteristics are important features of malignancy on cytology smears. Mitotic figure was not included in RCG system which is important for histological grading system and tubule formation is difficult to appreciate on cytological smear. Other factors for discordance between cytological and histological grading were tumour necrosis, severe inflammation and fixation artifact.

CONCLUSION

Robinson cytological grading system for breast carcinoma is easy to apply, reproducible and well correlated with histological grading system. This grading system should routinely be included in cytology report of breast carcinoma. Cytological grading of breast carcinoma on FNAC is useful in patients with locally advanced disease, older patients, patients with accompanying chronic diseases and patients who reject surgery. Cytological grading will also help to choose appropriate neoadjuvant chemotherapy and prevents unnecessary over treatment of low-grade carcinoma.

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