# Cytological Grading of Breast Carcinoma on FNAC & Correlation with Histological Grading on Excised Specimen

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## Abstract

*Background:* With the advent of fine needle aspiration cytology (FNAC), the approach to diagnosis and management of breast lesions has been revolutionized. Assigning a tumor grade to breast cancer provides important prognostic information and guides optimal therapy. *Aim:* The aim of this study was to grade breast carcinoma on aspirates by Robinson Grading System (RGS) and histological grading was done according to Nottingham modification of Scarff–Bloom–Richardson method. *Materials and Methods:* Over a period of 2.5 years, 109 cases diagnosed as malignant on FNAC of clinically palpable lesions, were included & non-epithelial tumours are excluded. A total of 47 cases were followed-up by histopathologic examination. *Results:* Robinson's cytological grading correlated well with Bloom Richardson's histopathological grading. In the present study, by application of Chi-square test, p value was <0.00001 which is statically significant. This indicates that cytological and histopathological grade are well correlated. *Conclusion:* Cytologic grade could be used to predict histologic grade as significant relationship exists between grades assigned to cytologic and histologic specimens. Evaluation of cytology grade using FNAC permits determination of the aggressiveness of breast carcinoma.

**Keywords:** Breast Carcinoma; Cytologic Grading; Histologic Grading.

## Introduction

A palpable breast lesion is a common presentation to surgical OPD. It is important not only to diagnose benign lesions as benign or malignant, but also to assay the prognosis of both. To assay the prognosis, grading of breast malignancies is very important. FNAC is an important diagnostic tool which is cheaper, less traumatic, requires no local anaesthesia, can generate rapid diagnosis [1-3]. The purpose of present study is to find utility of grading breast carcinoma on FNAC as per the criteria proposed by Robinson and colleagues in 1994 and compare it with the histological grading based on method proposed by Nottingham's modification of Bloom and Richardson system by Elston and Ellis.

## Materials and Methods

This is a study undertaken in our institute, from 01-01-2014 to 30-06-2016. FNA was performed on palpable breast lesions using a 10 ml disposable syringe & 22-23 gauge needles. No local anaesthesia was given during the procedure. Papanicolaou (Pap), Giemsa and Hematoxilin & Eosin (H & E) stained FNA smears and H & E stained tissue sections (obtained from mastectomy specimens) were evaluated for cytological and histological grading respectively. 109 cases diagnosed as malignant on FNAC of clinically palpable lesions, amongst which 47 which had subsequent histopathology were included in our study. Non-epithelial tumours are excluded.

The cases were graded cytologically using Robinson's criteria and histological grading was performed using Scarff Bloom Richardson's criteria. In the Robinson's grading system for breast carcinoma, six different cytological parameters namely cell dissociation, cell size, cell uniformity, nucleolus, nuclear margin and nuclear chromatin were used to grade the tumours. A score of 1-3 was

given to each of these parameters and the tumours were graded by adding up the scores. Cancers that scored in the range of 6-11 were graded I, scores of 12-14 were graded as II and grade III was given for a score ranging from 15-18. Histological grading was performed on formalin-fixed paraffin-embedded sections from mastectomy specimens using Nottingham's modification of Bloom and Richardson histological grading. Criteria such as tubule formation, nuclear pleomorphism and mitotic count was evaluated.

## Results

The diagnosis of malignancy was offered in 109 cases on FNAC. Nottingham modification of Bloom Richardson grading can be applied to ductal carcinoma, special types of ductal carcinoma & lobular carcinoma. The cytological and histological grading was performed on Ductal carcinoma NOS (47 cases).

On cytological grading 14 cases (29.78%) were Grade I, 20 cases (42.55%) were Grade II and 13 cases (27.65%) were grade III. Robinson cytological grade correlated with Nottingham modification of Bloom Richardson grade revealed 12 cases out of 14 cases to be grade I, 2 case to be grade II. Among 20 cases of grade II in cytology 16 cases were grade II, 3 cases were grade I and 1 case was grade III in histopathological grade and 13 cases of grade III in cytology 2 case were grade II, 11 cases grade III.

In the present study, by application of Chi-square test, p value was <0.00001 which is statically significant. This indicates that cytological and histopathological grade are well correlated.

**Table 1:** Robinson Grading System [3]

| | Score | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Cell dissociation | Mostly in clusters | Mixture of single cells and cells in clusters | Mostly single cell |
| Cell size | 1–2 x RBC size | 3–4 x RBC size | >5 x RBC size |
| Cell uniformity | Monomorphic | Mildly pleomorphic | Pleomorphic |
| Nucleoli | Indistinct | Noticeable | Prominent or pleomorphic |
| Nuclear margin | Smooth | Folds | Buds/clefts |
| Chromatin | Vesicular | Granular | Clumped and cleared |

Grade I: Score 06–11. Grade II: Score 12–14. Grade III: Score 15–18.

**Table 2:** Modified-Bloom-Richardson Grading System [4]

| Feature | Score |
|---|---|
| **Tubule formation** | |
| Majority of tumor: >75% | 1 |
| Moderate degree: 10–75% | 2 |
| Little or none: <10% | 3 |
| **Nuclear pleomorphism** | |
| Small, uniform cells | 1 |
| Moderate increase in size/variation | 2 |
| Marked variation | 3 |
| **Mitotic counts—per 10 HPF (40x fields)** | |
| 0–5 | 1 |
| 6–10 | 2 |
| >11 | 3 |

Scores: Grade I (well differentiated): 3–5. Grade II (moderately differentiated): 6–7. Grade III (poorly differentiated): 8–9.

**Table 3:** Comparison of cytological and histopathological grades of carcinoma

| Cytological grade | Total cases | Histopathological grade | | |
|---|---|---|---|---|
| | | Grade I | Grade II | Grade III |
| I | 14 | 12 | 2 | 0 |
| II | 20 | 3 | 16 | 1 |
| III | 13 | 0 | 2 | 11 |
| Total | 47 | 15 | 20 | 12 |

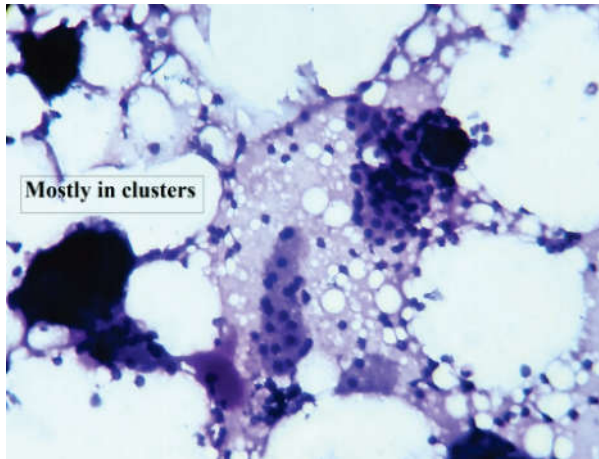Chi-square value-54.764, Degree of freedom- 4, p value <0.00001

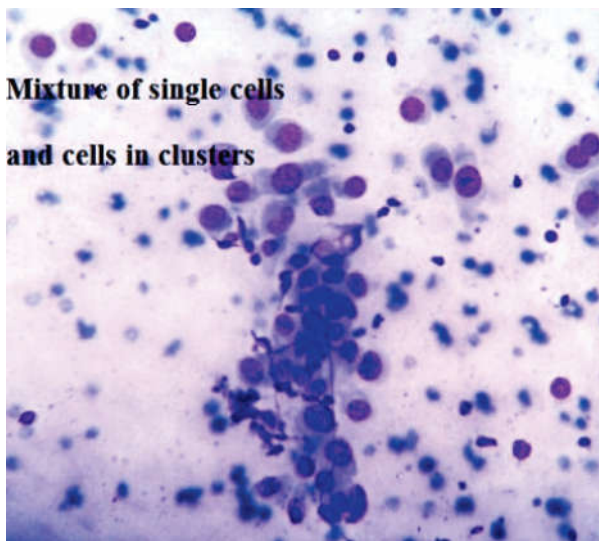**Fig. 1:** Cytological grade I (MGG 10x)



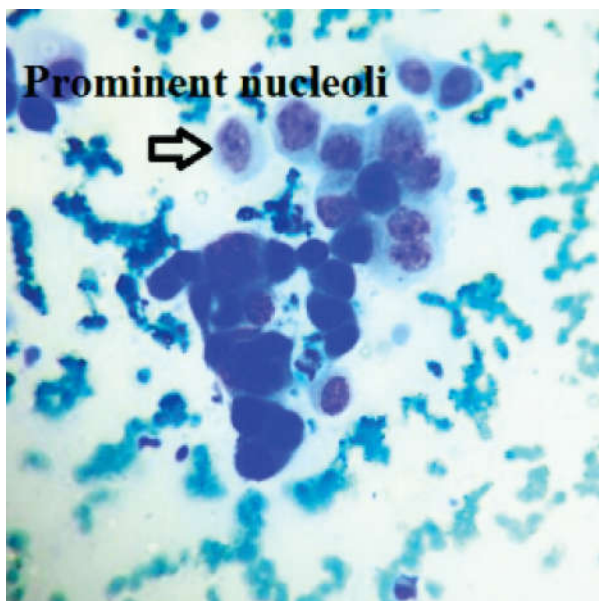**Fig. 2:** Cytological grade II (MGG 40x)



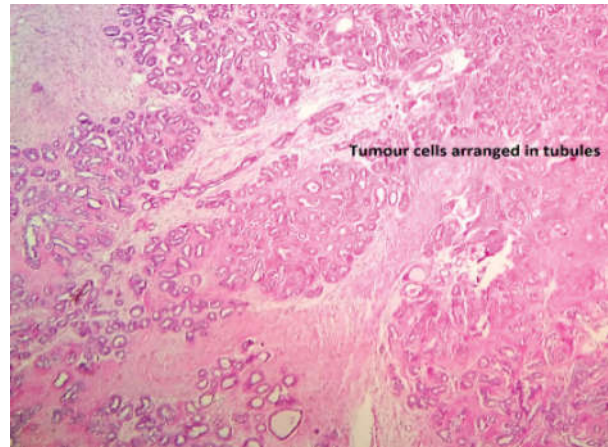**Fig. 3:** Cytological grade III (MGG 40x)



**Fig. 4:** Histological grade I (H & E 10x)
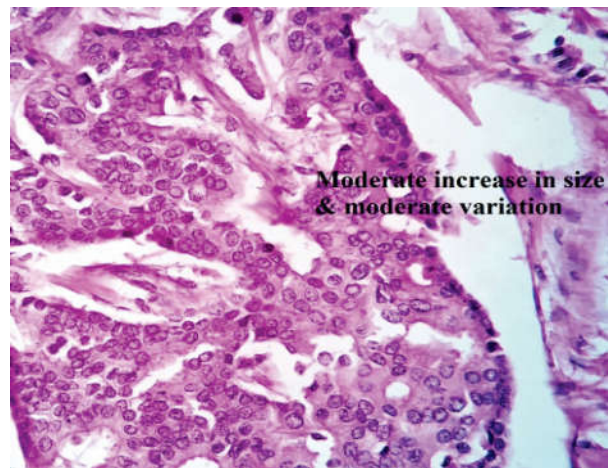

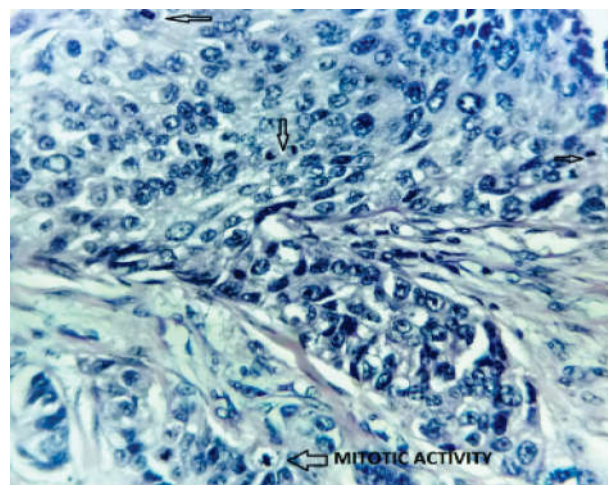
**Fig. 5:** Histological grade II (H & E 40x)



**Fig. 6:** Histological grade II (H & E 40x)

### Discussion

FNAC is one of the routinely used diagnostic procedures in patients presenting with breast lump. Cytological grading of breast carcinoma is feasible and reproducible. Its application can provide

important information on tumour type, grade, and size before surgery so that most appropriate medical regime can be selected [5]. Nuclear grading on cytological specimens has been shown to correlate well with that of histological sections unlike other parameters like tubule formation and mitotic count. Cytological grading on aspirates of breast carcinomas is useful tool for assessing prognosis. Correct diagnosis of benign and malignant breast lesions is important for further treatment protocols and also to guide the surgeons to plan the type of operation and level of lymph node resection beforehand. Robinson's cytological grade corresponded well with the established histological grades (Elston's modified Bloom Richardson method). In our study, we have attempted grading of carcinoma breast on FNAC as per the criteria proposed by Robinson and colleagues in 1994. As proposed by Robinson IA et al., we used six criteria to facilitate grading. These were cell dissociation, cell size, cell uniformity, character of nucleoli, nuclear margin and chromatin pattern. Each criterion was given one to three score. Sum of total score of all criteria was calculated. 109 cases were diagnosed as breast carcinoma by FNAC. Among 109 only 47 cases were available for histopathological comparison. After observing morphology of these six criteria, sum of the scores of each criterion contributed to cytological grade of breast carcinoma. On the basis of cytological grading, 20 cases were moderately differentiated followed by 14 cases of well differentiated and 13 cases were poorly differentiated.

Histopathological grading was done using Elston and Ellis Nottingham modification of Bloom and Richardson method. Three histological features viz. tubule formation, nuclear pleomorphism and mitotic count were evaluated. Each of which were given 1 to 3 score. Total score was given after adding score of all 3 criteria and the tumours were graded as Grade I, II and III viz. well, moderately and poorly differentiated carcinoma respectively. On the basis of histological features, 20 cases were moderately differentiated, 15 cases were well differentiated and 12 cases were poorly differentiated.

Cytology grading was correlated with histological grading. Robinson IA et al reported equal importance to all these mentioned criteria. In the present study, cytology grading showed an absolute correlation with the histological grade in 82.97 % (n=47) cases. The lack of correlation between cytological and histological grading in 17.03 % of our cases may be the presence of varying degrees of atypia within the same tumor and interobserver subjectivity when assigning a cytological nuclear grade [7].

The rapid diagnosis made by FNAC relieves the anxiety of patient and helps the clinician to plan the treatment [6]. Robinson's grading system of breast carcinoma is simple, quick and correlates well with histological grading and typing. Histological grade has been shown to be a valuable prognostic parameter in patients with breast cancer [7]. Robinson's method of cytological grading in fine needle aspiration smears of breast carcinoma is simpler, objective and easily reproducible, hence being preferable for routine use [8].

Along with cytological diagnosis, cytological grading provides important prognostic information. Evaluation of cytology grade using FNAC permits determination of the aggressiveness of breast carcinoma. It is a useful parameter to take into consideration when selecting neoadjuvant therapy for breast carcinoma.

## References

1. Lindholn K. Breast. In: Orell SR, Sterrett GF, Whitaker D, editors. Fine Needle Aspiration Cytology. (4thedition). NewDelhi: Churchill Livingstone, 2005.p.165-225.

2. Silverberg SG, Masood S. The Breast. In: Silverberg SG, Delellis RA, Frable WJ, editors. Principles and Practice of Surgical Pathology and Cytopathology. Vol 1 (3rdedition). Singapore: Churchill Livingstone, 1997.p.575-673.

3. Feoli F, Paesmans M, Eeckhout PV. Fine Needle Aspiration Cytology of Breast, Impact of Experience on Accuracy, using Standard Cytologic Criteria. ActaCytol 2008; 52:145-151.

4. Robinson IA, McKee G, Nicholson A, D'Arcy J, Jackson PA, Cook MG, et al. Prognostic value of cytological grading of fine-needle aspirates from breast carcinomas. Lancet 1994; 343:947-9.

5. Elton CW, Ellis IO. Pathological prognostic factors in breast cancer. I. The value of histological grade in breast cancer: Experience from a large study with long-term follow-up. Histopathology 1991; 19:403-10.

6. Sinha SK, Sinha N, Bandyopadhyay R, Mondal SK. Robinson's cytological grading on aspirates of breast carcinoma: Correlation with Bloom Richardson's histological grading. J Cytol 2009; 26:140-3.

7. Das S, Kalyani, Kumar H. Breast carcinoma aspirates: A study on cytological grading. Int J Basic Appl Med Sc 2012; 2:189-95.

8. Mehra K, Vanita K, Rajvinder K, Gupta N. Cyto-histopathological correlation in palpable breast lesions. Int J Res Med Sci 2016; 4:1943-1949.