

Correlation of Robinson's Cytological Grading of Breast Carcinoma with Bloom Richardson's Histological Grading – A Teaching Institutional Experience in Mandya, Karnataka

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ABSTRACT

BACKGROUND

Breast cancer is increasing in developing countries and the management options are wide; therefore, providing the surgeon with accurate prognostic information on which mode of therapy will be chosen becomes important. Fine needle aspiration cytology (FNAC) is a routinely used initial investigation of choice for rapid diagnosis of breast cancer. Apart from diagnosis of cancer, it also has the ability to predict the grade on smears which will add its diagnostic value without any additional morbidity or expense for the patients. Among various cytological grading systems, Robinson grading is most commonly used for breast carcinoma in fine needle aspirates. The purpose of this study is to evaluate the correlation between Robinson's cytological grading and Bloom Richardson's histological grading.

METHODS

This is a 3 - year retrospective analytical study. 40 cases of infiltrating duct carcinoma (IDC) of breast diagnosed on cytology were included in the study. Cytological grading was done using Robinson's grading and corresponding histopathology slides were taken, and histological grading using Bloom Richardson's system was done. Finally, correlation between cytological and histological grading was done using statistical package for social sciences (SPSS) software.

RESULTS

Age of the patients varied between 32 and 70 yrs. Cytologically, 32.5 % cases were grade I, 40 % were grade II and 27.5 % cases were grade III respectively. Histologically 22.5 %, 47.5 % and 30 % cases were grade I, grade II, and grade III, respectively. Concordance rate between grade I tumours in cytology and histology was 53.84 %, for grade II tumours it was 75 %, and for grade III tumours it was 63.63 %. The absolute concordance rate was 65 %.

CONCLUSIONS

Robinson's cytological grading (RCG) of breast carcinoma correlates well with Bloom - Richardson's histological grading system and could be a helpful parameter in selecting a neoadjuvant treatment for the breast cancer patients on fine needle aspiration cytology alone.

KEYWORDS

Breast Carcinoma, Robinson's Cytological Grading, Bloom Richardson's Histological Grading

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BACKGROUND

Breast cancer is emerging as the leading cause of cancer mortality in Indian women.¹ Tumour grade is one of the important prognostic factors, which helps in treatment decisions. The histological grade of breast cancer is very important in predicting the biologic behaviour of tumour.² Modified Bloom and Richardson method is a widely accepted histological tumour grading system and has been found to have good prognostic correlations.³

Fine needle aspiration cytology is a reliable method for the initial evaluation and diagnosis of carcinoma of breast. In addition to its low cost and rapidity of results, cytological grading also has the ability in providing the necessary prognostic/predictive information, particularly for those cases that may undergo neo-adjuvant therapy.³ Among various cytological grading systems, Robinson's cytological grading correlate well with modified Bloom and Richardson grading method because of better concordance rate than other cytological grading systems. Also, it has more objective set of criteria and easy reproducibility.^{4,5,6}

Objectives

- To study the correlation between the Robinson's cytological grading and Modified Bloom and Richardson grading.
- To check for the concordance rate between the two grading systems.

METHODS

This was a 3 - year retrospective analytical study between June 2017 and June 2019 in a tertiary care centre. Ethical committee clearance was obtained from institutional ethical committee. All the cases of infiltrating duct carcinoma (IDC) of breast diagnosed both on cytology and histology were included in the study. Recurrent cases and cases which were diagnosed either cytologically or histologically alone were excluded from the study. Case records were used for obtaining demographic data, radiologic and local examination findings.

For cytological study, May – Grunewald - Giemsa (MGG) and haematoxylin and eosin (H & E) stained smears were used. Robinson's system was used for cytological grading of tumours which included the six different cytological parameters, namely cell dissociation, cell size, cell uniformity, nucleolus, nuclear margin and nuclear chromatin. A score of 1 - 3 was given to each of these parameters, and the tumour was graded by adding up the scores. Cancers that were scored in the range of 6 - 11 were graded I, those that were scored in the range of 12 - 14 were graded II, and grade III was given for a score ranging from 15 to 18. Corresponding histopathology slides which were stained by haematoxylin and eosin (H & E) stain were graded using Bloom Richardson's system. Three parameters were taken into consideration: Degree of tubule formation, nuclear pleomorphism, and mitotic figures. Each parameter was given a score of either 1, 2 or 3. The overall score for

each case ranged from 3 to 9. Finally, the total score which ranged from 3 - 5 were graded as grade 1, 6 - 7 as grade 2 and 8 - 9 as grade 3 tumours.

The data was analysed by using SPSS software. The concordance rate in each grade and absolute concordance rate were studied. The coefficient of correlation was analysed by employing the Spearman rank correlation coefficient (r) to examine the degree of correlation between the cytological and histological grade.

RESULTS

We included 40 breast carcinoma cases in the present study. Age of the patients varied between 32 and 70 yrs. Breast lump was the commonest presentation. Tumour size ranges from 1.5 cm to 7 cm. Cytologically 13 (32.5 %) cases were grade I, 16 (40 %) were grade II and 11 (27.5 %) cases were grade III respectively. Histologically, 9 (22.5 %), 19 (47.5 %) and 12 (30 %) cases were grade I, grade II, and grade III respectively. Hence, both on cytology and histology grade II tumours were predominant. [Table: 1, Figure: 1]

Cytological Grade	Histological Grade			Total Number of Cases
	Grade 1	Grade 2	Grade 3	
Grade 1	07	04	02	13
Grade 2	01	12	03	16
Grade 3	01	03	07	11
Total number of cases	09	19	12	40

Table 1. Comparison of the Case Distribution between the Cytological and Histological Grades

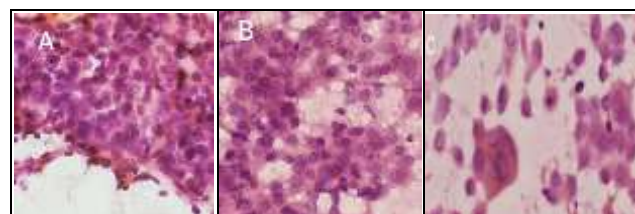


Figure 1. Cytological Grade 1 Tumour Showing Cluster of Cells with Mild Pleomorphism, Vesicular Chromatin, and Inconspicuous Nucleoli (Fig. 1a, H & E stain X 400), Grade 2 Tumour Showing Cells in Clusters and Scattered Singly, with Moderate Pleomorphism, Granular Chromatin. (Fig. 1b, H & E Stain X 400) and Grade 3 Tumour Showing Cells in Singles with High Pleomorphism, Granular Chromatin and Prominent Nucleoli (Fig. 1c, H & E Stain X 400)

Concordance rate between grade I tumours in cytology and histology was 53.84 % for grade II tumours, it was 75 %, and for grade III tumours it was 63.63 %. The absolute concordance rate was 65 %. [Table: 2]

Grade	Number of Concordant Cases between Each Cytological and Histological Grade	No. of Cases in Each Cytological Grade	Concordance Rate (%)	Spearman Rank Correlation Co-efficient (r)
I	07	13	53.83	(r): 0.5, P: < 0.001
II	12	16	75	
III	07	40	63.6	
Total	26	40	Absolute concordance rate 65	

Table 2. Comparison of the Concordance between the Cytological and Histological Grades

We found a statistically significant correlation between the cytological and histological grade with a Spearman rank correlation coefficient of "r" = 0.5 and P value of < 0.001.

DISCUSSION

Breast cancer is one of the most common causes of death in many developed countries in middle-aged women and is becoming frequent in developing countries too.¹

Fine needle aspiration cytology (FNAC) is a routinely used initial investigation of choice for rapid diagnosis of breast cancer. It is also a part of triple diagnosis. In addition to diagnosis of cancer, the ability to predict the grade on cytology smears would add to its diagnostic value without any additional morbidity or expense for the patients.⁷

The cytological grading helps in predicting the prognosis of tumour. The high grade tumours are more likely to respond to chemotherapy than low grade. Thus, it helps in preventing the unnecessary side effects of overtreatment to low grade tumours. Assessment of biological aggressiveness by cytological grading without removing the tumours would therefore be valuable.⁸

Again, simultaneous performance of cytological and histological grading helps in measuring accuracy of cytological grading. Histological concordance gives the cytopathologist a feedback and helps in increasing the efficiency of work.⁹

Of the various cytological grading methods described for breast cancer, the method proposed by Robinson et al. has been widely accepted because of its simplicity.¹⁰

In the present study, out of total 40 cases, cytologically 13 (32.5 %) cases were grade I, 16 (40 %) were grade II and 11 (27.5 %) cases were grade III respectively. Hence, majority of cases were in cytological grade II which is comparable with previous studies by Pal et al. Robinson et al. Pandit et al. and Das et al.^{7,10,11,12} In contrast a study by Kareem et al. showed predominance of grade I tumour.¹³

There was high concordance rate for grade II tumours (75 %) compared to grade I (53.84 %) and grade III tumours (63.63 %) similar to studies by Odujoko et al. Pal et al. and Phukan et al.^{2,7,9} In contrast studies by Sood et al. and Kareem et al. showed highest concordance rate of 100 % and 75 % respectively in grade I tumour.^{3,13}

In present study, the absolute concordance rate between the cytological and histological grade was 65 % (26 out of 40 cases) that was found to be fairly comparable to that reported by previous studies.^{1-4,7,9,13,14,15,16} [Table: 3].

Study	Number of Cases	Concordance Rates
Present study	40	65 %
Lingegowda et al. ¹⁴	50	64 %
Sood et al. ³	116	68.9 %
Sinha et al. ¹⁵	59	69.5 %
Phukan et al. ⁹	50	72 %
Odujoko et al. ²	30	73.3 %
Ravikumar et al. ¹⁶	98	77.5 %
Pal et al. ⁷	50	78 %
Rekha et al. ⁴	50	82 %
Pinki pandey et al. ¹	30	83.3 %
Kareem et al. ¹³	70	87.5 %

Table 3. Comparison of Concordance Rates of Various Studies

We found a statistically significant correlation between the cytological and histological grade with a "r" = 0.5 and P value of < 0.001.

Majority of discordance was observed in grade I tumour. Similar results were obtained by Pandit et al. and Das et al.^{11,12} In contrast study by Sood et al. found highest concordance (75 %) in grade I tumours.³

In our study 33.37 % cases showed the lack of correlation between cytological and histological grading. The possible reasons might be because of presence of varying degrees of atypia within the same tumour, inter observer subjectivity when assigning a cytological nuclear grade especially in identifying features such as nuclear margins, chromatin clumping, and granularity.^{8,17}

Another possible reason for discordance could be assessment of different parameters in cytological and histological grading. Cytological grading uses cell dissociation, cell size, cell uniformity, nucleolus, nuclear margin and nuclear chromatin as assessment parameters. Histological grading was based on the degree of tubule formation, mitosis and nuclear pleomorphism.

It is difficult to assess tubule formation and mitotic index on cytology. It might be one of the causes of discordance. In addition, on cytology, much importance was given to nuclear features like nuclear size, nucleoli, nuclear membrane and chromatin pattern in contrast to histological grade in which nuclear feature is only one component. This can also lead to cyto-histological disparity.^{18, 19, 20}

CONCLUSIONS

FNAC is a cost effective, simple and rapid method for diagnosis of breast cancer. In addition to its diagnostic efficacy, grading of carcinoma helps in prognostication without adding additional morbidity to patients. Robinson's grading system has better concordance rate compared to other grading systems. So, we can implement the grading in routine day to day practice which helps in selecting the patients for neoadjuvant therapy.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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