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ROBINSONS CYTOLOGICAL GRADING IN CARCINOMA BREAST AND ITS CORRELATION WITH HISTOPATHOLOGICAL GRADING

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ABSTRACT

Introduction: An easy and cost effective means of diagnosing breast swellings is fine needle aspiration cytology (FNAC) . Cytological grading of breast carcinoma can help in prognostication of patients. Robinsons cytological grading is an easily reproducible grading system with set objective criteria. In this study we aimed to analyze the concordance between Robinsons cytological grading system and Modified Bloom Richardson grading system on histopathology in cases of carcinoma breast.

Materials and Methods: 50 cases of carcinoma breast were included here. The study was conducted over a period of 15 months. Robinsons cytological grading was performed on the FNAC aspirates of the carcinomatous lumps. Following surgery, histopathological grading was performed and concordance between both grading systems was analyzed.

Results: We found high overall concordance of 80%. The concordance was highest for grade 2 tumors (86. 6 %) and least for grade 1 tumors (40%). The sensitivity and specificity of Robinsons

cytological grading was found to be 93.02% and 95.24% respectively. The inter observer agreement, measured by Cohen's kappa coefficient was 0.85.

Conclusions: Robinsons cytological grading shows good correlation with Modified Bloom Richardson grading system. It may be of great use in understanding patient prognosis and in taking appropriate treatment decisions.

Key Words: Robinsons Cytological Grading System, Fine Needle Aspiration Cytology, Modified Bloom Richardson Grading, Nottingham's Grading, Breast Carcinoma

INTRODUCTION

Breast cancer remains the commonest cancer in urban Indian population women and comes second in the rural female population, second to cervical carcinoma. Owing to lack of an orderly breast cancer screening programmed as well as limited dissemination of knowledge among our vast population, majority of breast cancers are diagnosed at advanced stages. [1]. Cytological methods of carcinoma diagnosis offers rapid and accurate results at a low cost which is of prime importance in early diagnosis and treatment. Fine needle aspiration cytology is an inexpensive and reliable tool in the evaluation of palpable breast lumps.[2]. The National Cancer Institute in 1990, recognized certain standard prognostic parameters such as tumour size, grade , nodal status, tumor type, and cellular proliferation for patients who undergo preoperative treatment modalities such as radiotherapy and chemotherapy., Cytodiagnosis of suspected cancerous lumps of the breast can be used to provide important prognostic information as well[3]. The grading of breast cancer on cytology can help in outcome prediction and selection of appropriate treatment modalities. [3]. The Robinson scoring system is the one of the most commonly used cytological grading systems for breast carcinoma. Six parameters, namely—cell dissociation, cell size, uniformity, nucleoli, nuclear margin, and chromatin, are given a score of 1–3. A total score in the range of 6–11 was graded as grade I, 12–14 as grade II, and 15–18 as grade-III. [4]

Elston's modified Bloom and Richardson method is the most widely accepted and established tumor grading system in breast carcinoma[5]. Histological grade , tumour size and nodal status helps to stratify patients for treatment modalities. [5]. The Robinson scoring system has an objective set of criteria, better concordance with histopathological grading system and easy reproducibility [6,7]. The objective of the present study was to assess breast carcinoma aspirates on cytology using the Robinsons Grading System and to compare the results with modified Bloom and Richardson grading system on histopathology of the tissue sections.

MATERIALS AND METHODS

The present study included 50 cases of histopathological confirmed cases of breast carcinoma, and was carried out over a period of 15 months (January 2023-March 2024). Institution ethics committee approval was obtained. FNAC was performed from palpable breast lesions suspected of carcinoma and stained using H & E stain.

Cytological grading using Robinsons grading system (Table 1) was performed on the slides. Following surgery, mastectomy specimens were received in the Pathology department and grossed accordingly. Paraffin embedded tissue sections were stained with haematoxylin and eosin stain (H &E) and graded according to Elston-Ellis modification of Bloom-Richardson grading system (Table 2)

Comparison between both of these grading systems was performed. Concordance rates between each of the grades and an overall concordance rate was calculated. Sensitivity, Specificity and Diagnostic accuracy was also calculated. Kappa coefficient was used to determine inter observer agreement.

Table 1: Robinson's cytological grading system [8]

Parameters	**Score 1**	**Score 2**	**Score 3**
Cell dissociation	Mostly in clusters	Single cells and clusters	Mostly in single cells
Nuclear size	1-2 times the size of RBC	3-4 times the size of RBC	>5 times the size of RBC
Cell uniformity	Monomorphic	Mildly pleomorphic	Pleomorphic
Nucleoli	Indistinct/small	Noticeable	Prominent
Nuclear margin	Smooth	Slightly irregular /folds/grooves	Buds and clefts
Chromatin pattern	Vesicular	Granular	Clumping and clearing

Total score was obtained by adding the individual scores ranging between 6 and 18, according to which grading was performed:

Grade 1: Score 6- 11; **Grade 2:** Score 12-14; **Grade 3:** Score 15-18

Table 2: **Modified Bloom Richardson Histolopathological grading [8]**

Parameters	**Score 1**	**Score 2**	**Score 3**
Tubule formation	>75%	10-75%	<10%

Nuclear pleomorphism	Small regular uniform cells	Moderate increase in size and variability	Marked variation
Mitotic count	0-9	10-19	>20

Each parameter is assigned a score of 1-3. Grading is done based on the total score obtained as follows: **Grade 1:** Score 3-5; **Grade 2:** Score 6-7; **Grade 3:** Score 8-9.

RESULTS

A total of 50 cases of carcinoma breast were included in the present study. The mean age of the patients was 52 years. All cases were of invasive ductal carcinoma, NOS. Cytological smears were retrieved and graded using Robinsons Grading System.

Bases on the total scores, cytological smears were graded into 3 groups. Majority of the cases were of grade 2 (33/50) followed by grade 3 (12/50) and grade 1 cases (05/50)

Histopathological grading was performed according to modified Blooms Richardson grading. Out of the 50 cases , majority of the cases were grade 2 (38/50), followed by grade 3 cases (10/50) and grade 1 cases (2/50).

With regards to the overall grading, a total of 40 cases out of 50 (80%) showed concordance with the histopathological grading system. 05 cases were reported as Robinsons grade 1, out of which 03 cases were upgraded to grade 2 in histopathology (concordance-40%). There were 33 cases of grade 2 carcinoma in cytology , but in histopathology 38 cases of grade 2 carcinoma was present (concordance-86.6%). 12 cases of grade 3 carcinoma breast cases were diagnosed on cytology. In histopathology 2 cases were downgraded to carcinoma grade 2 cases, therefore 10 cases of grade 3 were present on histopathology (concordance-83.33%). The sensitivity, specificity, positive and negative predictive values were 93.02%, 95.24%, 96.37% and 90.95%, respectively. The diagnostic accuracy of Robinsons cytological grading was 96.14%. Cohen's Kappa coefficient was analyzed to understand the inter observer agreement between Robinsons grading system and Modified Blooms Richardson grading system and was found to be 0.85.

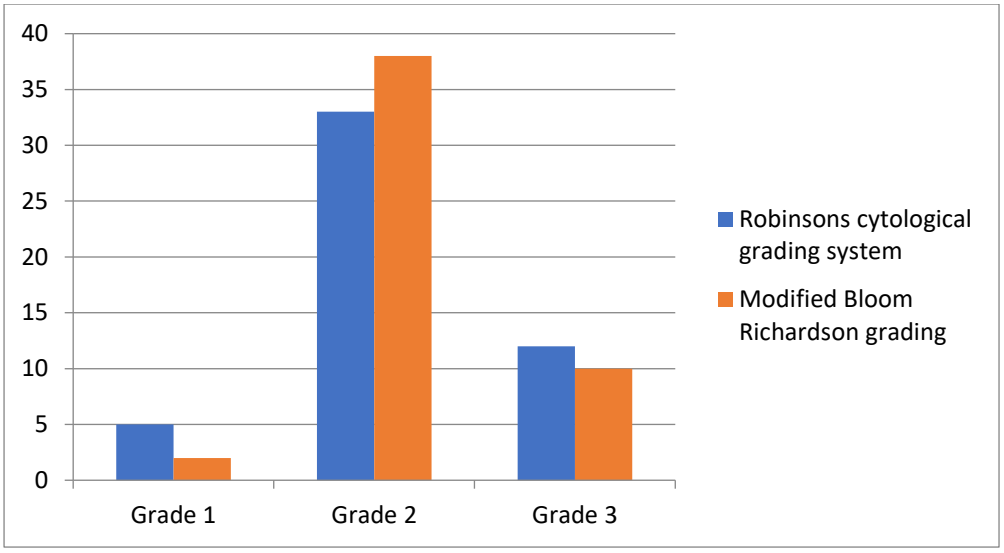

Figure 1: Frequency of carcinoma breast cases graded on cytology (Robinsons grading system) and histopathology (Modified Bloom Richardson grading system)

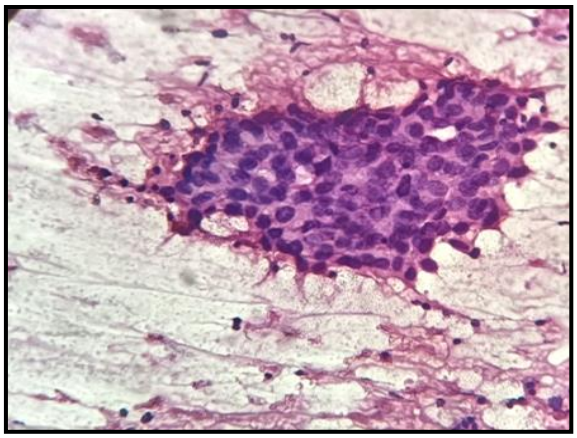

Figure 2: Mildly pleomorphic atypical cells in clusters with vesicular chromatin-Robinsons cytological grade 1 (H &E, 10x)

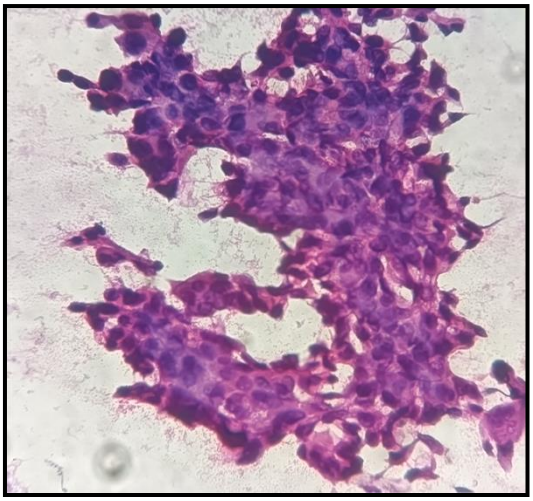

Figure 3: Moderately pleomorphic cells in clusters, with irregular nucleus and granular chromatin-Robinsons cytological grade 2 (H&E, 10x)

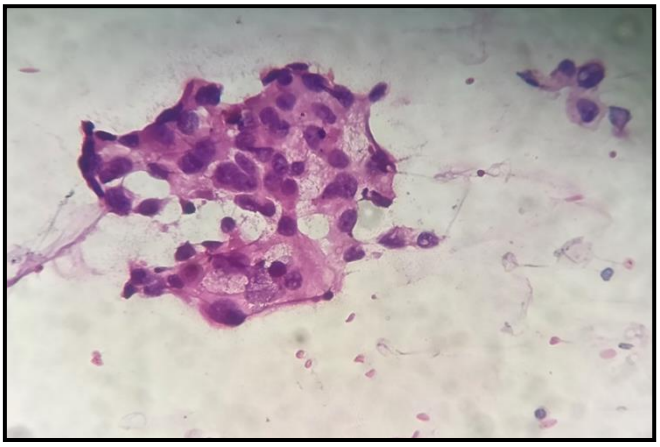

Figure 4: Markedly pleomorphic cells in discohesive clusters, singles , with irregular nucleus and prominent nucleoli-Robinsons cytological grade 3 (H &E, 10x)

DISCUSSION

The triple test approach encompassing clinical, radiological and pathological evaluation of palpable breast lumps is of prime importance in diagnosing the lesion. [9] Preoperative biopsy helps in tumour prognostication and decision making regarding treatment of the patient. There are numerous grading systems for breast carcinoma that can be applied on cytological smears and that have a good concordance with the modified Bloom Richardson grading system on histopathology of carcinoma breast. [9]

Due to the increased sensitivity and presence of set criteria with better reproducibility, Robinsons cytological grading system was considered superior to other cytological grading systems. [6,7, 10]. In the present study, absolute concordance was 80% and there was a predominance of grade 2 carcinoma cases. Similar findings were found in previous studies by Das et al. [11], Wani et al. [7], and Khan et al. [12]

Cangiarella and Simsir found that cytological features of cell uniformity, presence of cellular dissociation and nucleoli were the most influential factors in predicting the grade of tumours [13].

The degree of E cadherin expression directly correlates with cellular cohesion and several studies have reported a higher incidence of nodal metastasis in tumours displaying greater cell dissociation. [14].

James N et al found a significant association with regard to Robinsons grading system and modified Bloom Richardson grading system ($p<0.001$) They also reported highest concordance in grade 2 cases , with least concordance in grade 1 cases [8]. Our study showed similar findings, with 3 cases of grade 1 cases being upgraded to grade 2 on histopathological examination. [8]

Inter-observer subjectivity in assessing cytological features could be a reason for discordance. Also, difficulty in the identification of tubules and mitoses in cytological smears could contribute to discordance between cytological grading and its histopathological counterpart.[15]. Application of cytological grading in cases of carcinoma breast is imperative , as management of patients using preoperative neoadjuvant chemotherapy has become common [16]. Grade 3 tumours are more likely to be responsive to chemotherapy where as grade1/ grade 2 tumours may be amenable to treatment with tamoxifen. Therefore, cytological grading is of great prognostic importance [17]. Recently, the National Cancer Institute, USA, has recommended the incorporation of cytological grading of carcinoma breast to assist in the therapeutic management of patients. [18].

CONCLUSION

FNAC is a valuable tool, with minimum discomfort and ease of use in the case of palpable breast lumps. Robinsons grading system of carcinoma breast , has a high degree of sensitivity as well as concordance with histopathological grading system. Utilization of Robinsons cytological grading system gives a simple and relatively painless alternative in predicting tumour behavior and prognosis. This is also significant in the selection of the best treatment modality and guidance of neo adjuvant chemotherapy in carcinoma breast patients.

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None

CONFLICTS OF INTEREST

None

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