

Comparison between cytological & histological grading of Breast cancer and its role in prognosis.

Dr. Amita Chavda^{1*}, Dr. Shilpa Gandhi², Dr. Bhoomika Dadhanania³, Dr. Trupti Purohit⁴,
Dr. Gauravi Dhruva⁵

¹Resident Doctor, ²Associate Professor, ^{3,4}Assistant Professor, ⁵Professor & Head, Department of Pathology, P. D. U. Government Medical College, Rajkot.

Abstract:

Aim: To find out utility of grading breast carcinoma on fine needle aspiration cytology (FNAC) as per the criteria proposed by Robinson and Colleagues and compare it with histological grading based on Nottingham's modification of Bloom and Richardson system, proposed by Elston and Ellis. **Methods:** Cytological smears of 24 cases of breast carcinoma diagnosed on fine needle aspiration cytology (FNAC), and later on confirmed on histopathology, were graded according to the Robinson grading system. The histological grade as per Nottingham's modification of Bloom and Richardson system, proposed by Elston and Ellis was also decided in all 24 cases. The cytological grade was compared with the histological grade to know the concordance rate. **Results:** Out of 24 cases 9 cases were cytologically grade I, while 15 were grade II. Overall concordance between Cytological grade and histological grade was 79.17%. **Conclusion:** Cytology grading proposed by Robinson and colleagues can be a useful parameter for preoperative prognostication in cases of carcinoma of breast and selected cases requiring neoadjuvant chemotherapy.

Key Words: - Breast carcinoma, Cytological grading, Fine needle aspiration, Histological grading.

Introduction:

Breast carcinoma is one of the most common malignant tumor and the leading cause of death in women with more than 1,000,000 cases occurring worldwide annually. The value of histological typing and grading of breast carcinoma is well established. Histological grading of breast carcinoma using Nottingham modification of Bloom-Richardson system described by Elston and Ellis is a widely accepted tumor grading system and has been found to have good prognostic correlation.^[1] As, neo-adjuvant chemotherapy is becoming increasingly popular as primary medical treatment for breast cancer, there will be a great benefit to the patient, if tumor can be graded on FNAC. Such grading would allow assessment of the tumor preoperatively, thereby guiding for selection of most suitable treatment, i.e. extent of surgery required and selection of cases for neo-adjuvant chemotherapy.^[2]



* Corresponding Author:

Dr Amita Chavda

E-mail: camita3030@gmail.com

Of the different cytological grading methods corresponding to Elston and Ellis's histological grading, method described by Robinson et al. was found to be

useful in grading breast carcinoma in fine needle aspirates.^[2] The purpose of the present study is to find utility of grading breast carcinoma on FNAC as per the criteria proposed by Robinson and colleagues and compare it with histological grading based on method proposed by Nottingham's modification of Bloom and Richardson system by Elston and Ellis.

Materials and Methods:

The present study comprised of breast carcinoma cases diagnosed on FNAC in the Department of Pathology, from January 2016 to January 2017, which were later on confirmed by histopathology.

Inclusion criteria:

24 cases of breast carcinoma diagnosed on FNAC and confirmed on histology were included in the study.

Exclusion criteria: Breast carcinoma diagnosed on FNAC but not confirmed on histology.

Method:

FNAC was done by using 10 ml syringe with 22-23 gauge needles using aseptic standard technique. Smears were wet fixed and air dried and stained with H & E and MGG stain respectively and followed by microscopy with binocular microscope having 0.45 mm diameter of 40x lens. Cytological features were evaluated and breast carcinomas were graded using Robinson's grading system. Six parameters viz. cell dissociation; cell size, cell uniformity, nucleoli, nuclear margin and chromatin pattern were carefully evaluated. For each criterion, score one to three was given. Scores of each criteria were added and based on this total score, breast cancers were graded viz. Grade I with score 6 to 11, Grade II with score 12-14 and Grade III with score 15-18.

Surgical specimens received for histopathological examination were fixed in 10% formalin. Sections were taken from tumor and paraffin processed. Three to five micrometer thick sections were cut and stained with Haematoxylin and Eosin stain [H&E]. Histological typing of tumors was done according to world health organization (WHO) 2003.^[3] Histological grading was done according to Elston's and Ellis's modification of Bloom-Richardson method, using three criteria tubule formation, nuclear pleomorphism and mitotic count. Cytological and histological grades were compared to find the concordance between the two grading systems.

Results:

The present study consisted of total 24 cases of carcinoma of breast cases diagnosed on FNAC and later on confirmed on histology. The age ranged from 40 to 55 years of included cases.

All 24 cases were graded on FNAC smears according to Robinson's grading system, using six parameters viz. cell dissociation, cell size, cell uniformity, nucleoli, nuclear margin and chromatin pattern [Table1-6].

Table1: Score of cell dissociation in 24 cases.

Score	Number of Cases	Percentage of Cases
1	05	20.83%
2	19	79.17%
3	00	0

Table 2: Score of cell size in 24 cases

Score	Number of Cases	Percentage of Cases
1	01	4.17 %
2	22	91.66%
3	01	4.17 %

Table 3: Score of cell uniformity in 24 cases

Score	Number of Cases	Percentage of Cases
1	03	12.5%
2	18	75%
3	03	12.5 %

Table 4: Score of nucleoli in 24 cases

Score	Number of Cases	Percentage of Cases
1	07	29.17 %
2	17	70.83%
3	0	0

Table 5: Score of nuclear margins in 24 cases

Score	Number of Cases	Percentage of Cases
1	03	12.5%
2	20	83.33 %
3	01	4.17 %

Table 6: Score of chromatin pattern in 24 cases

Score	Number of Cases	Percentage of Cases
1	0	0
2	24	100 %
3	0	0

On adding up individual score for each case, out of 24, maximum 14 (58.33%) cases were cytological grade II, 10 (41.67%) cases were cytological grade I, while none of the case was grade III [Table-7].

Table 7: Cytological grading in 24 cases

Total score	Grade	No of cases	Percentage of cases
6 – 11	I	10	41.67%
12- 14	II	14	58.33%
15 – 18	III	0	0

The surgical specimens (modified radical mastectomy) of all 24 cases were received and the tumors were subsequently graded on histology using Elton's modification of Bloom - Richardson grading system [Table8-10].

Table 8: Scores of tubule formation in 24 cases

Score	Tumor area showing tubule formation	No of cases	Percentage of cases
1	>75%	0	0
2	10 - 75%	11	45.83%
3	<10%	14	58.33%

Table 9: Scores of nuclear features in 24 cases

Score	Nuclear Pleomorphism	No of cases	Percentage of cases
1	Mild	0	0
2	Moderate with visible nucleoli	22	91.67%
3	Marked with prominent nucleoli	02	8.33%

Table 10: Scores of mitotic count in 24 cases

Score	Mitotic count per10 high power field	No of cases	Percentage of cases
1	0 – 5	24	100%
2	6 – 10	0	0
3	>11	0	0

By adding up individual score, the Nottingham score was decided and tumor was graded. Maximum 15 cases (62.5%) were grade II, 9 cases (37.5%) were grade I and none was grade III [Table 11].

Table 11: Histological grading in 24 cases

Total score	Grade	No of cases	Percentage of cases
3 – 5	I	11	45.83%
6 – 7	II	13	54.17%
8 -9	III	0	0

On comparing the cytological grading with histological grading, out of 10 cases graded as cytological grade I, 8 (80%) were grade I on histology also, while two were showing grade II. While in cytological grade II tumors, out of 14, 11 cases (78.7%) proved to be grade II only, while 3 cases were rather grade I on histology [Table 12].

Table 12: Comparison of cytological and histological grading in 24 cases

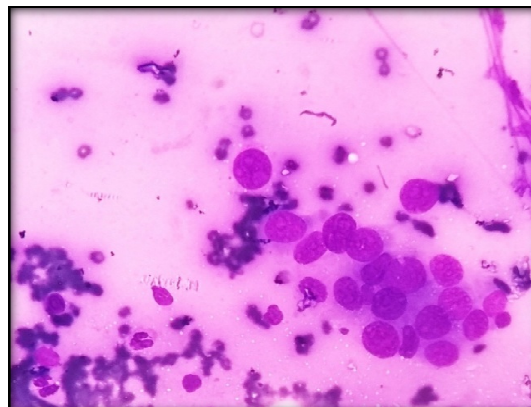
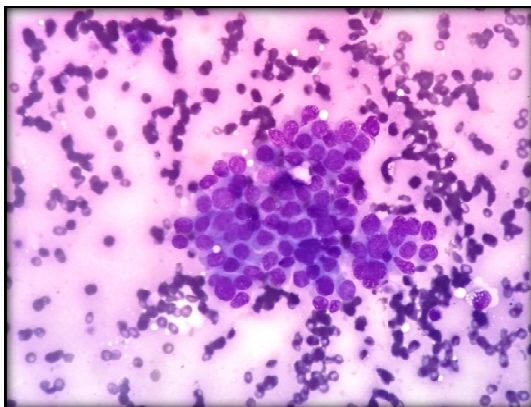
Cytological Grade	Histological Grade (no. of cases)			Total no. of cases
	I	II	III	
I	8	2	0	10
II	3	11	0	14
III	0	0	0	0
Total	11	13	0	24

Table 13: Concordance rates between cytological & histological grading

Grade	No of concordant cases between each Cytological & Histological grade	Total No of cases in cytological grade	Concordance Rate (%)
I	8	10	80%
II	11	14	78.57%
III	0	0	0
	Total : 19	Total : 24	Absolute concordance rate: 79.17%

The concordance rate between cytological grading and histological grading was 80% in grade I tumors, while it was 78.57% in grade II tumors. Overall it was 79.17% [Table -13].

Image 1: A/115/17-Cytological grade 1 tumour [MGG stain - 40X] **Image 2: A/295/17- Cytological grade 2 tumour [MGG stain - 40X]**



Discussion:

FNAC is a routinely used and highly sensitive investigation for rapid preoperative diagnosis of breast cancer, but prognostication of carcinoma of breast by grading on cytology is comparatively a newer concept. The ability to predict the accurate grade on cytology smears would add to the diagnostic value of FNAC, without any additional morbidity or expense to the patients. Assessment of biological aggressiveness by cytological grading without removing the tumor would be quite valuable. It will help to identify high grade tumors that are more likely to respond to neo-adjuvant chemotherapy and the low grade tumors, which may be better suited for surgery and tamoxifen treatment.^[4] Of various cytological grading methods described for breast cancer, the method proposed by Robinson et al. has been accepted widely.^[2] In present Study using this grading system, maximum 58.33% cases were found to be grade II, 41.67% of cases were grade I, while none was found to be grade III. The above findings were comparable with various studies like Chhabra et al.^[5], Das et al.^[6], Sinha et al.^[7], Das et al.^[8], Khan et al.^[9], Ravikumar & Rout et al.^[10] in which also grade II tumors were commonest, which is quite comparable with present study. Though other authors found some grade III tumors, they were least common. In present Study none of the tumor was grade III. This might have been due to small number of sample size.

Table 14: Comparison of Absolute concordance of histological and cytological grade in different study

Studies	Concordance rate (%)
Chhabra et al. ^[5]	65
Das et al. ^[6]	71.2
Sinha et al. ^[7]	69.5
Das et al. ^[8]	69
Khan et al. ^[9]	89.1
Ravikumar & Rout. ^[10]	77.5
Present Study	79.17

The main purpose of this study was to compare and find out the concordance rate between cytological and histological grading, which was obtained to be 79.17 %. This was

fairly comparable to that reported by other studies [Table14].

The lack of concordance between cytological and histological grading in 20.83% of our cases might have been due to presence of varying degree of atypia within the same tumor and inter-observer subjectivity.

Conclusion:

The present study shows that, it is possible to grade breast cancer on FNAC and that the cytological grade corresponds well with the histological grade. This cytological grade would provide relevant prognostic information regarding the aggressiveness of the tumor and would guide the surgeon regarding the judicious use of neo-adjuvant therapy and avoiding over treatment of low grade tumors.

References:

1. Elston CW, Ellis IO. Pathological prognostic factors in breast cancer. The value of histological grade in breast cancer – Experience from a large study with long term follows up. *Histopathology* 1991; 19(5): 403-410.
2. Robinson IA, McKee G, Nicholson A, D'Arcy J, Jacson PA, Cook MG, et al. Prognostic value of cytological grading of fine needle aspirates from breast carcinoma. *Lancet* 1994; 343:947-9.
3. Tavassoli F.A., Devilee P. (Eds): WHO classification of Tumors. Pathology & Genetics of Tumors of the Breast and Female Genital Organs. IARC Press: Lyon 2003.
4. Katz RL, A turning point in breast cancer cytology reporting: Moving from callowness to maturity. *Acta Cytol* 1994; 38-881-3.
5. Chhabra S, Singh PK, Agrawal A, Bhagolwali A, Singh SN, Cytological grading of breast carcinoma – A multivariate regression analysis. *J Cytol* 2005; 22:62-5.
6. Das AK, Kapila K, Dinda AK, Verma K, Comparative evaluation of grading of breast carcinoma in fine needle aspirates by two methods. *Indian J Med res* 2003; 118:247-50.
7. 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; 26-14-3.
8. Das S, Kalyani, Kumar H. Breast Carcinoma Aspirates: A study on cytological grading. *Int J basic Appl Med Sc* 2012; 2:189-95.
9. Khan N, Afroz N, Rana F, Khan MA. Role of cytological grading in prognostication of invasive breast carcinoma. *J Cytol* 2009; 26:65-8.
10. Ravikumar G, Rout P. Comparison of cytological versus histopathological grading of invasive ductal carcinoma of breast with correlation of lymph node status. *Middle east J Cancer* 2015; 6:91-6.