MORPHOLOGICALSPECTRUMOFFNACBREASTINTERTIARY CARE HOSPITAL - A RETROSPECTIVEAND PROSPECTIVE OBSERVATIONAL STUDY

[1]Dr Dudaram Choudhary,Final year PG student
Dept of Pathology,DrS.N.Medical College,Jodhpur

[2]Dr Rajni Joshee,Senior Professor
Dept of Pathology,DrS.N.Medical College,Jodhpur

[3]**Dr Suman Choudhary,SR**
Dept of Ophthalmology,Maheshwara Medical College,Hyderabad

[4]Dr Omveer Singh Chouhan,Associate Professor
Dept of Pathology,DrS.N.Medical College,Jodhpur

[5]Dr Yogi Raj Joshi,Professorand Head
Dept of Pathology,DrS.N.Medical College,Jodhpur

Corresponding author–Dr Omveer Singh Chouhan,Associate Professor,Dept of Pathology, Dr S.N. Medical College ,Jodhpur
Place of study- Department of Pathology,Dr.S.N.Medicalcollege,Jodhpur

Abstract - Introduction : Fine needle aspiration cytology (FNAC) is first line investigation in diagnosing breast lesions , however histopathology is the gold standarad . FNAC is a significant component ofthe "Triple approach" forpre operativediagnosis of breast lumps, theothertwo being clinical assessment and radiological imaging. The diagnostic accuracy is close to 100% when all three modalities favour a benign or malignant diagnosis . The aim of the study is to find out the proportion of various breast lesions as diagnosed by Fine needle aspiration study AIM : Theprimary objective is to find out proportion of various breast lesions as diagnosed on FNAC breast . The secondary objective are age wise distribution of various breast disease and to evaluate site of distribution of various breast diseases Material and method : • A prospective and retrospective observationl study was conducted involving all the female patient of age group 15-75 years with palpablelump is breast. FNAC slidewereexamined and reported bytwo independent pathologist of atleastassistantprofessorrankandlesionswerecategorizedaccordingtoIACintofivecategoryas C1-C5.RESULT:•Totalof231caseswerestudied,outofthese148(64.07%)caseswere

benign , 52 (22.51 %) cases were found malignant , 8 (3.46 %) cases were suspicious for malignant , 2 (0.87 %) cases were atypical and insufficient sample were 20 (8.66 %) . Most commonbenignlesionwasfibroadenoma82(55.41%)cases,followedbyfibrocycticdisease23(15.54 %) cases . Mostly lesions were unilateral 224 (96.97 %) cases . Most common quadrant of lesion was upper outer 72 (31.17 %) cases . CONCLUSION • FNAC is a rapid , cheap and effectivemethodforprimarycategorizationofpalpablebreastlesions.Mostcommonbreastlesions are benign than malignant lesions . Fibroadenoma is most common benign brest lesion followed by fibrocystic disease and most common malignant lesion was IDC . Maximum no. of lesions in age group of 21-30 years

INTRODUCTION

Cancer of the breast ranks as the second most prevalent form of cancer among women. The rise in breast cancer cases is associated with delayed marriage, childbirth at an advanced age, shorter durations of breastfeeding,and nulliparity or low parity. From a clinical perspective, breast disorders manifest with palpable lumps in the breast or nipple discharge. The presence of a breast mass, whether benign or malignant, induces anxiety in the patient and her family members.[1]

Breast lumps represent a significant proportion of cases in surgical practice, necessitating the differentiation between benign and malignant lesions prior to initiating definitive treatment.[2] According to the International Academy of Cytology (IAC) classification, the various categories of breast lesions are classified as C1-C5 (insufficient, benign, atypical, suspicious of malignancy,andmalignantlesions).[3]Includedinthebenigncategory arefibrocysticdisease, granulomatousmastitis,lactationalmastitis,lobular/ductalhyperplasia,fat necrosis, and lipoma.[4] The malignant category encompasses breast carcinomas, with infiltrating ductal carcinoma of the breast being the most common malignant breast lesion. The primary manifestation of breast disease is often a palpable mass, although clinical examination alone may not definitively determine whether a suspicious lump is benign or malignant.[2] Breast carcinoma ranks among the most prevalent cancers in women and stands as one of the leading causes of death among women globally.[5]

Breast carcinoma stands as the most prevalent malignant tumor and the primary cause of cancer-related deaths in women, with over 1,000,000 cases reported worldwide annually.[6]

The diagnostic protocol for breast cancer involves the "Triple test," comprising clinical examination, mammography, and fine needle aspiration cytology (FNAC).[8] FNAC, a key element of the "triple test," serves as a valuable approachforassessingbreastlumps,distinguishingbetweenneoplasticand non-neoplasticlesionsofthebreasts.[9,10]

However,FNAC faces limitations in distinguishing between invasive and non- invasive cancer when malignant cells are detected.[22] Several factors impact the diagnostic accuracy of breast FNAC, including the skill, experience,preparation, and interpretation of smears. Experience plays a crucial role in enhancing accuracy, and optimal results are achieved when the cytopathologist reading the FNAC also reports histopathology.[23,24]

Complications of FNAC may include vasovagal reactions, local hematoma, and occasionally, mild discomfort for the patient.[25] It's important to note that a definitive diagnosis may not always be possible with FNAC alone, either due to inherent limitations of FNAC or the inability to obtain adequate material. In such cases, FNAC serves as a presumptive diagnosis. Importantly, FNAC is not a replacement for trucut biopsy, open biopsy, or core biopsy.[26]

AIM &OBJECTIVES

AIM:

- Tofindouttheproportionofvariouspalpablebreastlesionsasdiagnosed by Fine needle aspiration Cytology.

OBJECTIVES:

- **Primaryobjective**
  - Tofindoutproportionofvariouspalpablebreastlesionsasdiagnosed on FNAC breast.
- **Secondaryobjective**
  - Agewisedistributionofvariouspalpablebreastlesion.
  - Toevaluatesiteofdistributionofvariouspalpablebreastlesion.

MATERIALANDMETHODS

Study setting: Study was conducted at department of Pathology Dr. SN Medical College and associated hospital, Jodhpur.

StudyPeriod:ThestudywasconductedafterapprovalfromInstitutionalEthics Committee and was conducted between June2023 to July 2024 .

StudyDesign: ProspectiveandRetrospectiveobservational study

Study Population: All the female patient with palpable lump in breastcoming to central lab of hospital associated with Dr. S.N. Medical collegefor FNAC were included

InclusionCriteria:

- Femalesofagegroupof15to75yearwithpalpablebreastlesionfor FNAC were included

ExclusionCriteria:

1. Inadequatesample
2. Heavilybloodmixedmaterial
3. Onlynecroticmaterial

SamplingTechnique--Bidirectionaldatacollection

SampleSize: Exercise4

Singlesampleproportion $N = Z_{1-}$

$_{H}P (100-P)$

E^2

$(1.96)^2X18.5(100-18.5)$

$\frac{}{(5)^2}$ =231

P=Malignant=18.5%asperfindingofBabuAtAl E =

Absolute error(5%)

Randomization-Notapplicable
Blinding-Notapplicable

Procedure- Neoplastic lesions were further categorized into benign and non neoplastic pathology .

Reporting of FNAC was according of IAC into five category .

C1:Insufficientmaterial C2:

Benign

C3:Atypicalprobablybenign

C4:Suspicious,probablyinsituorinvasivecarcinoma C5: Malignant

Methodology of data collection and monitoring: Aftertaking permissionfrom HOD and Medical officer incharge labs , the slide were examined . FNAC were reported by two independent pathologist of at least Assistant professorrank . Previously reported cases were reviewed by another pathologist and reported as system proposed by IAC

Flowchartshowingplanofaction: Notapplicable

StandardandOperationalDefinitions: Notapplicable

Statistical Analysis: Data were analyzed by using statistical package for social science (SPSS) version 21 where as required.

Ethical consideration & Confidentiality: Breast FNAC were taken by female pathologists in presence of parents, relatives or female laboratory staff as far as possible. Otherwise a female attendant were there. Patient name or other identification will not be revealed. Report were handed over to the patient herself or her authorized relative only.

OBSERVATIONSANDRESULTS

Table1:DistributionaccordingtoAge

Agegroup	Number	%
11-20years	36	15.58
21-30years	61	26.41
31-40years	45	19.48
41-50years	38	16.45
51-60years	27	11.69
61-70years	18	7.79
>70years	6	2.60
Mean±SD	37.39±16.16	

Themeanageofcasesis37.39yearswithmajorityareinagegroup21-30years (26.41%) followed by 19.48% inage group 31-40years, 16.45% inage group

41-50years,11.69%inagegroup51-60years,7.79%inagegroup61-70years and 2.60% in age group >70 years.

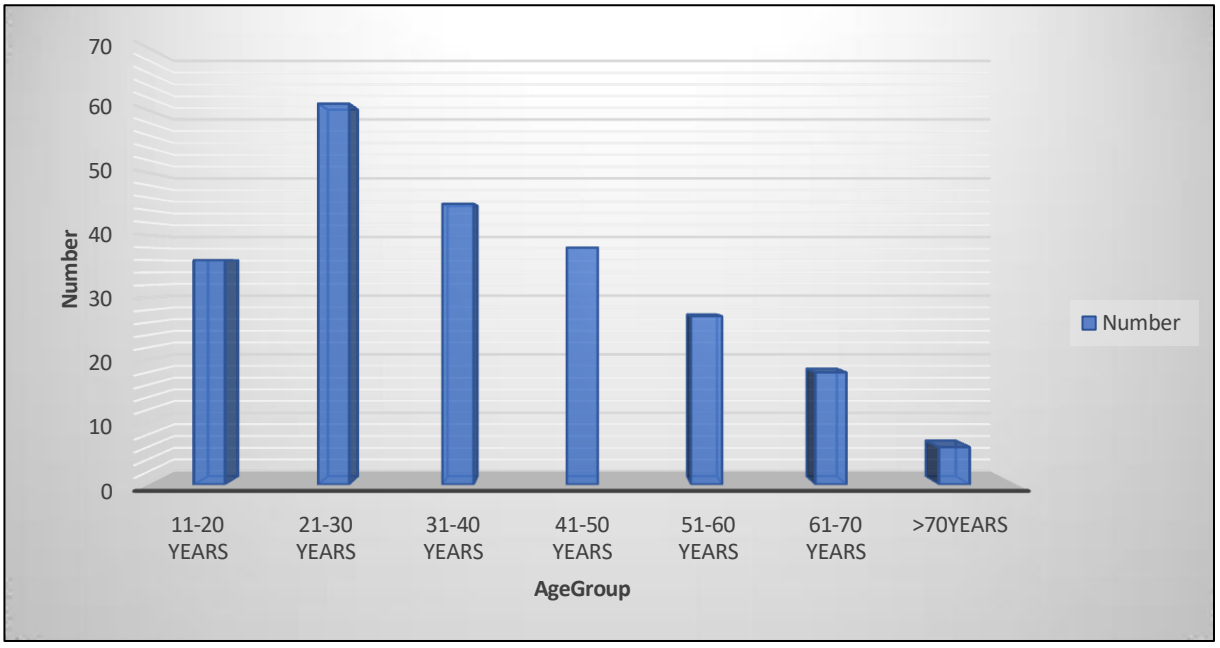


Table2:DistributionofBenignandmalignantaccordingtoage

Agegroup	Benign		Malignant		Other		Total
	Number	%	Number	%	Number	%	
11-20years	34	94.44	2	5.56	0	0.00	36
21-30years	48	78.69	5	8.20	8	13.11	61
31-40years	32	71.11	5	11.11	8	17.78	45
41-50years	17	44.74	15	39.47	6	15.79	38
51-60years	9	33.33	13	48.15	5	18.52	27
61-70years	6	33.33	10	55.56	2	11.11	18
>70years	2	33.33	3	50.00	1	16.67	6

Benign lesions are more common in age group 11-20 years (94.44%) followed by 21-30 years (78.69%) and 71.11% in age group31-40 years. Malignant lesions are more common in 61-70 years (55.56%) followed by 50% in age group >70 years and48.15%in age group 51-60 years.

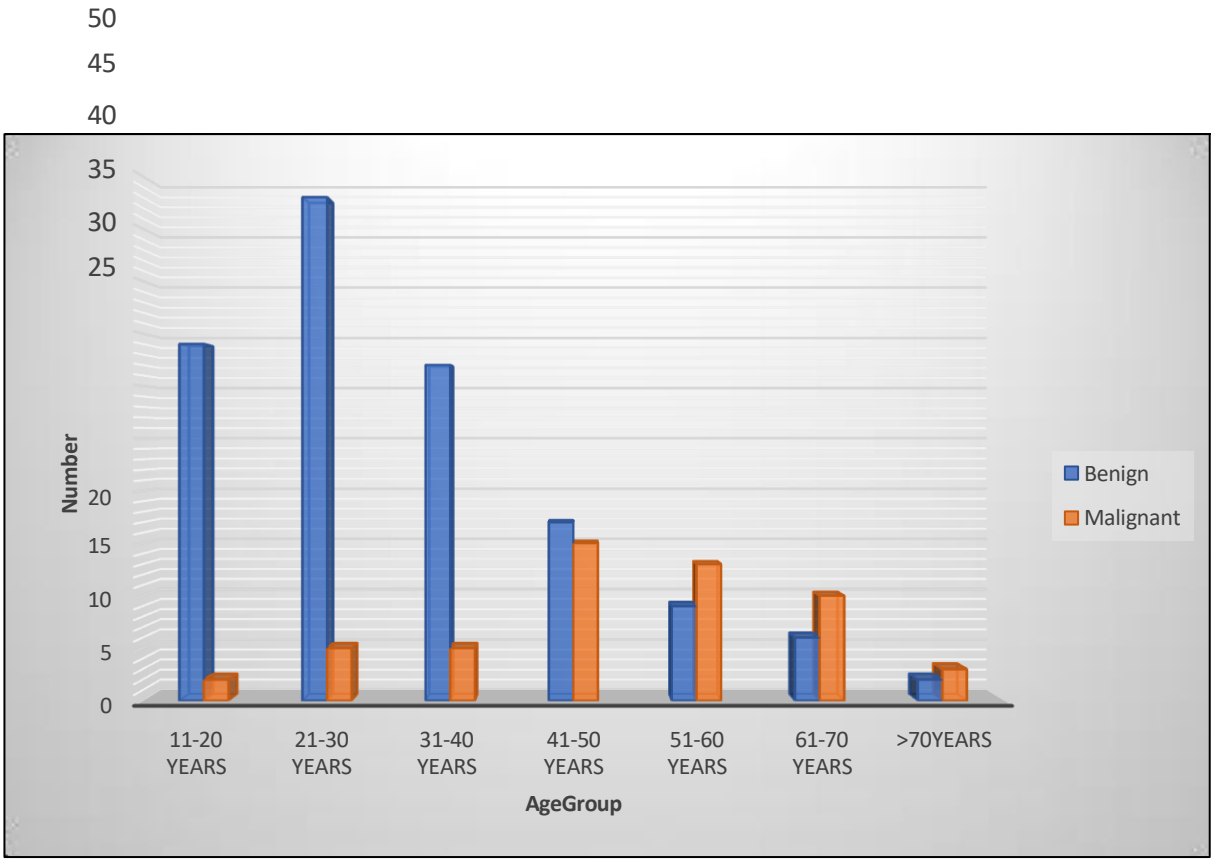


Table3:DistributionaccordingtoSizeofLesion

SizeofLesion	N	%
<1cm	7	3.03
1.1-<2cm	33	14.29
2.1-<3cm	103	44.59
3.1-<4cm	64	27.71
4.1-<5cm	9	3.90
>5cm	15	6.49

According to size of lesion, most common size in between 2.1 cm to less than 3 cm (44.59%) followed by 27.71% cases has size of lesion is between 3.1 cm to less than 4 cm, 14.29% lesions has size between 1.1 cm to less than 2 cm. only 10.39% lesion has size more than 4.1cm.

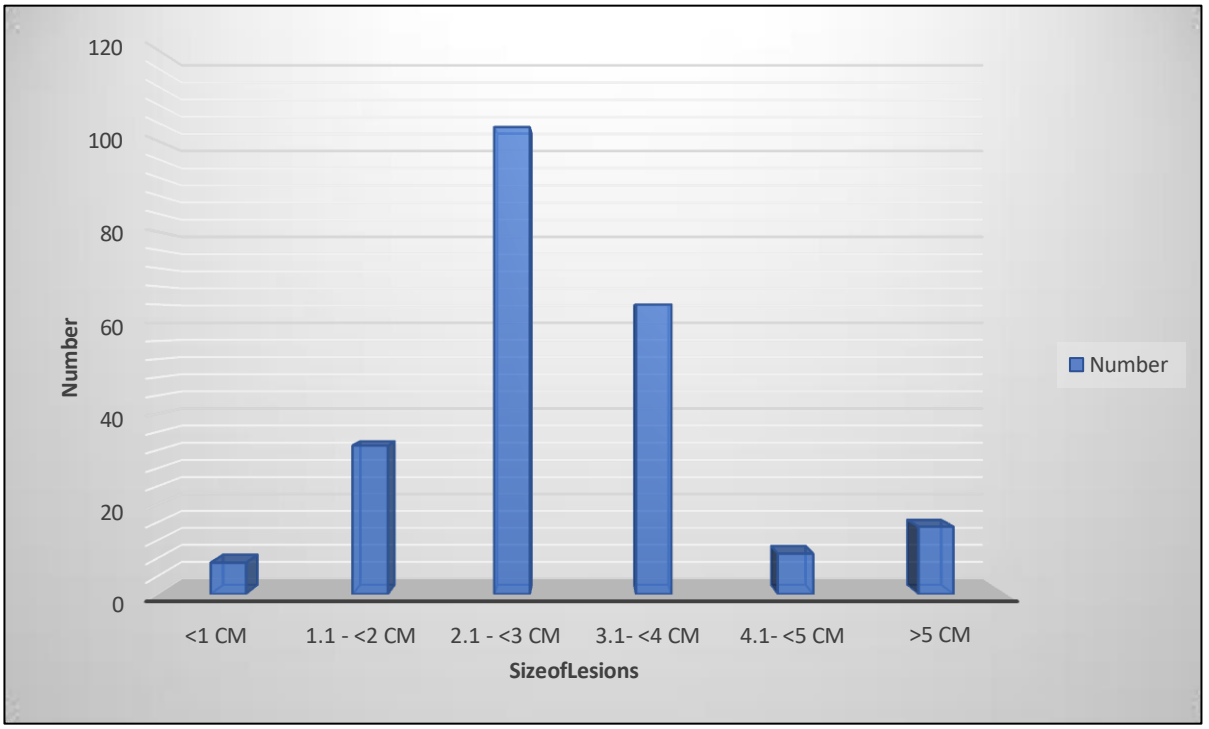


Table4:Distributionaccordingtolocationofbreastlesion

LocationofBreastLesion	N	%
Upper–outer	72	31.17
Lower–outer	28	12.12
Upper–Inner	39	16.88
Lower–Inner	18	7.79
NAC	24	10.39
AllQuadrant	9	3.90
Nipple	3	1.30
UpperOuterAndInnerQuadrant	11	4.76
Retroareolar	13	5.63
UpperOuterAndNAC	4	1.73
UpperAndLowerOuterQuadrant	3	1.30
LowerUpperAndLowerInner	3	1.30
UpperOuter,Left–NAC	1	0.43
Larger-NAC,Smaller-UpperInner	1	0.43
Left-Areola,Right-UpperIn	2	0.87

According to location of breast, most common location is upper outer quadrant (31.17%) followed by 16.88% has upper inner quadrant, 12.12% has lowerouter quadrant and 7.79% has lower inner quadrant.

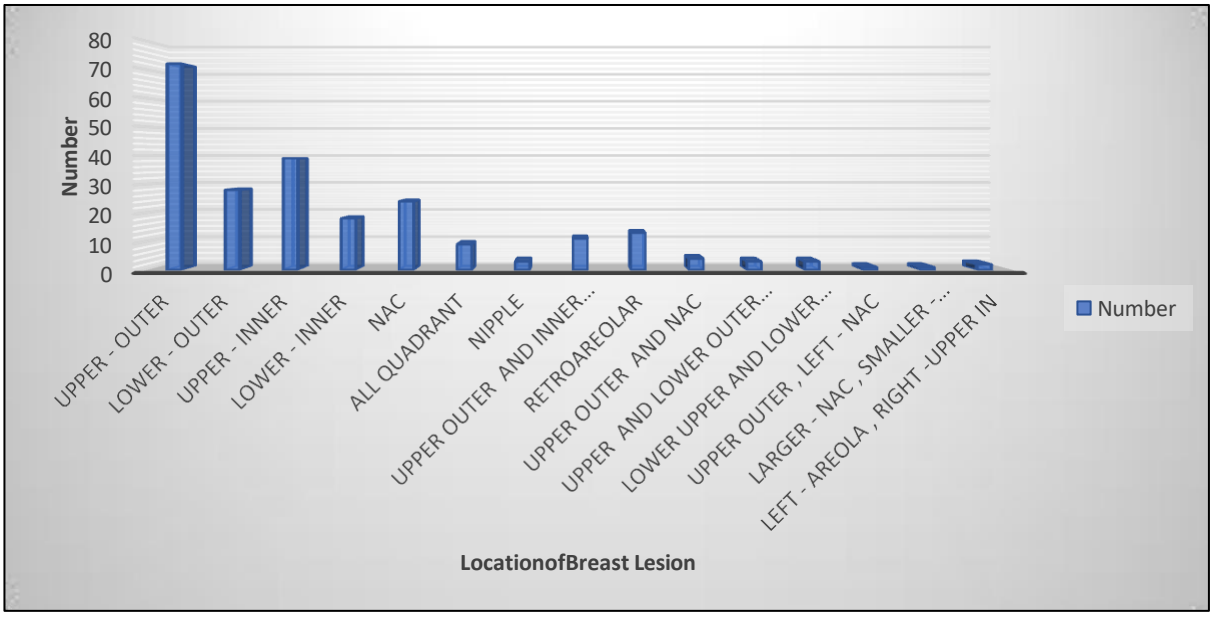


Table5:Distributionaccordingtosite

Unilateral/Bilateral	N	%
Unilateral	224	96.97
Bilateral	7	3.03

Here,unilateralsideismorecommon(96.97%)followedbyonly3.03%has both bilateral breast carcinoma.

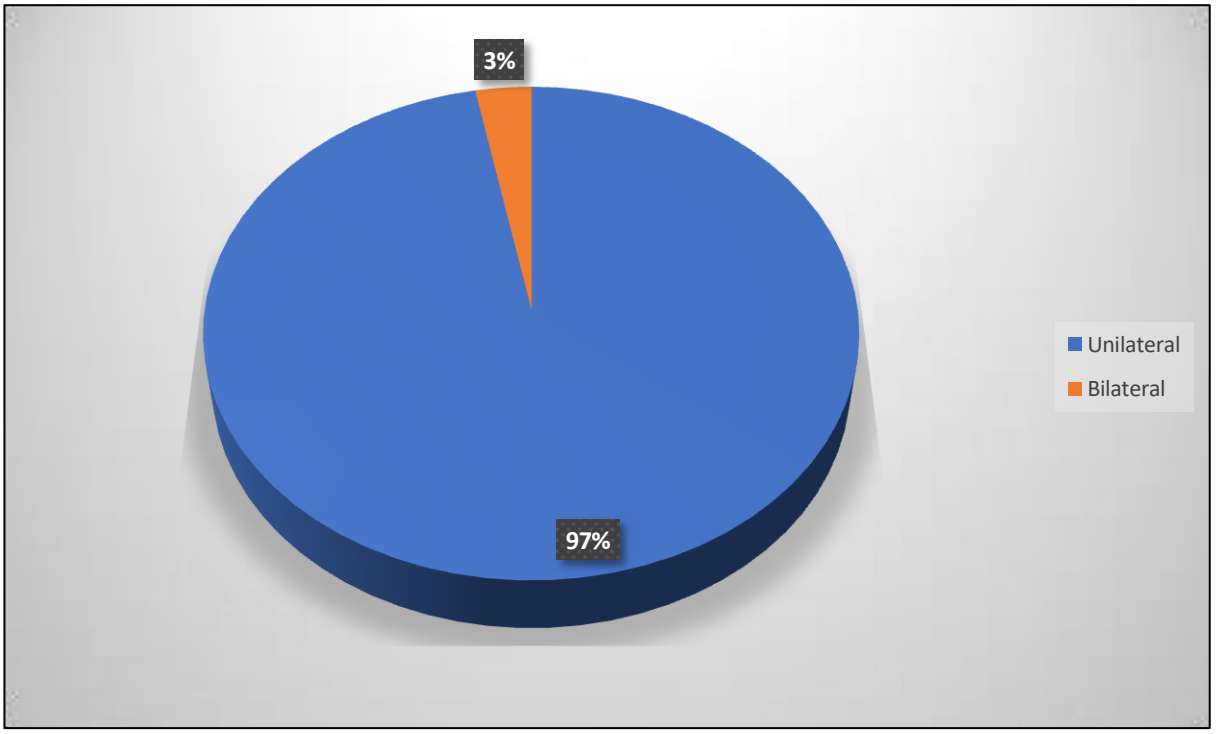


Table6:distributionofcasesaccordingtoC2lesion

C2Lesion	N	%
Galactocele	1	0.67
Phyllode	2	1.34
FatNecrosis	8	5.37
FibrocysticLesion	14	9.4
Mastitis	15	10.07
Gynecomastia	18	12.08
Fibroadenoma	91	61.07
Total	149	100

Among benign lesions, most common lesion is Fibroadenoma (61.07%) followed by 9.4% has fibrocystic lesions, 10.7% has Mastitis / Abscess,12.08% has Gynecomastia, fat necrosis is present in 5.37%, Phyllode in 1.34% and 0.67% has galactocele.

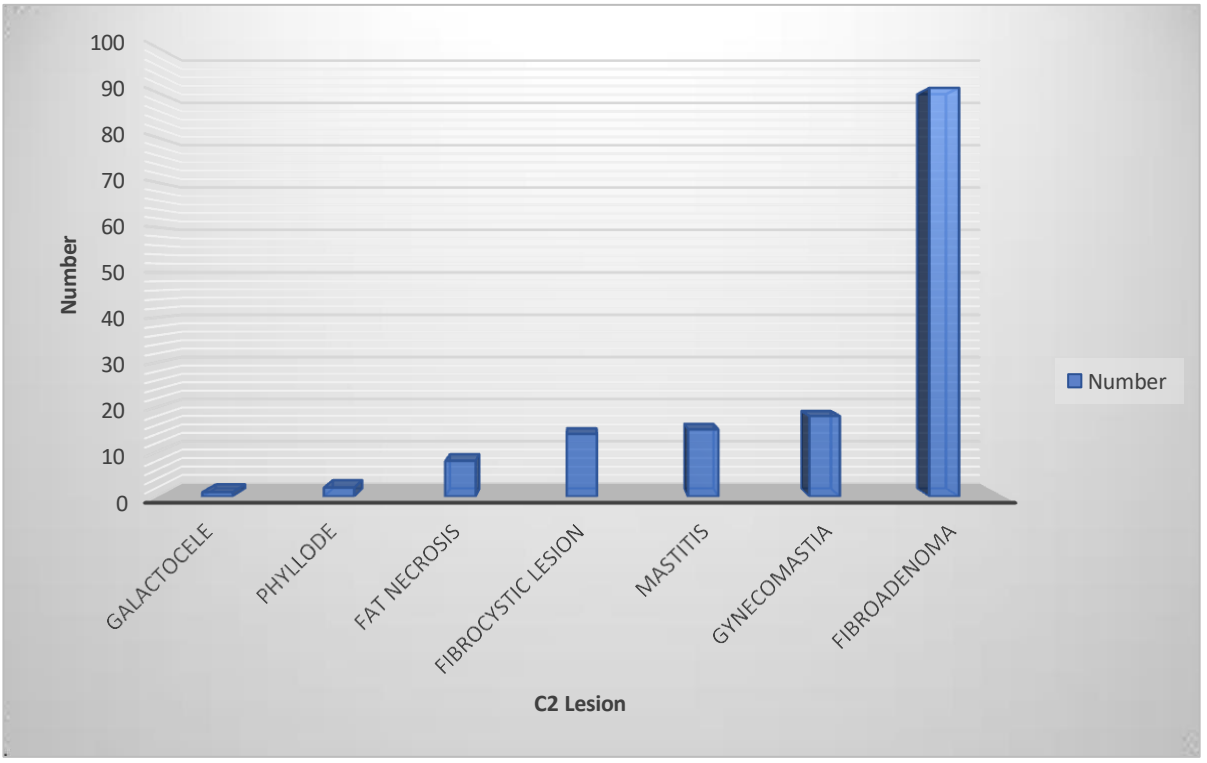
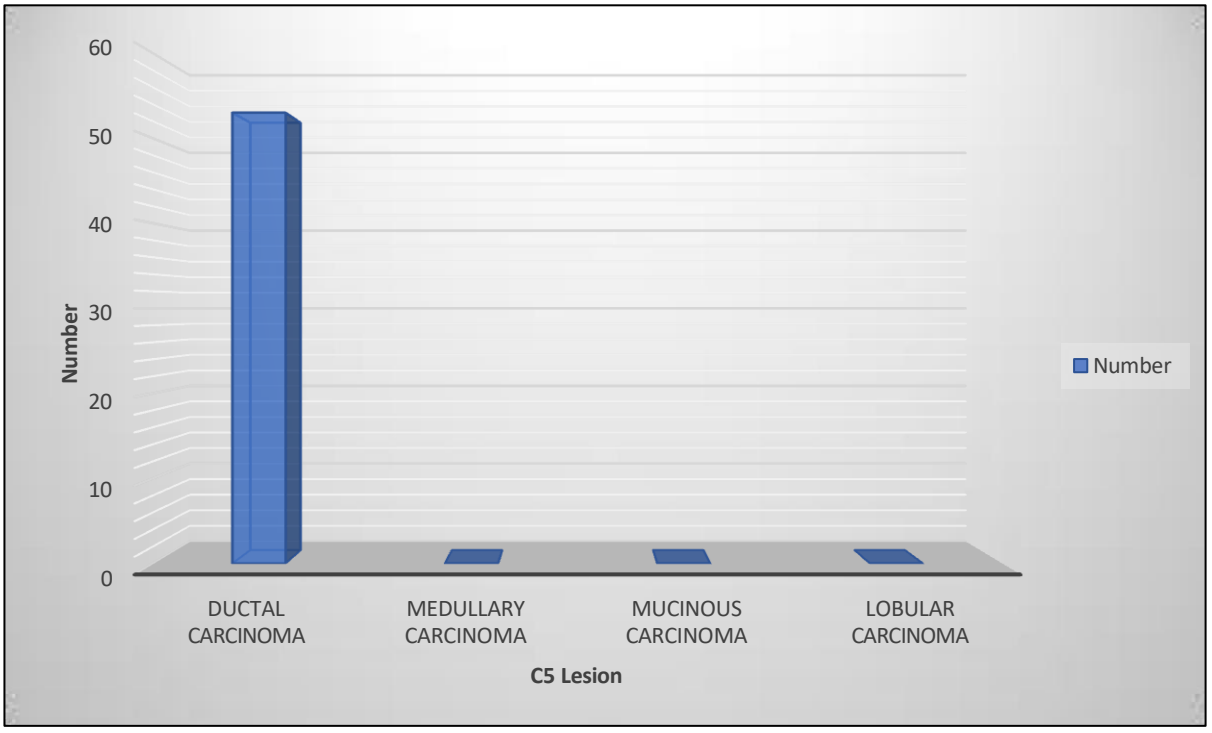


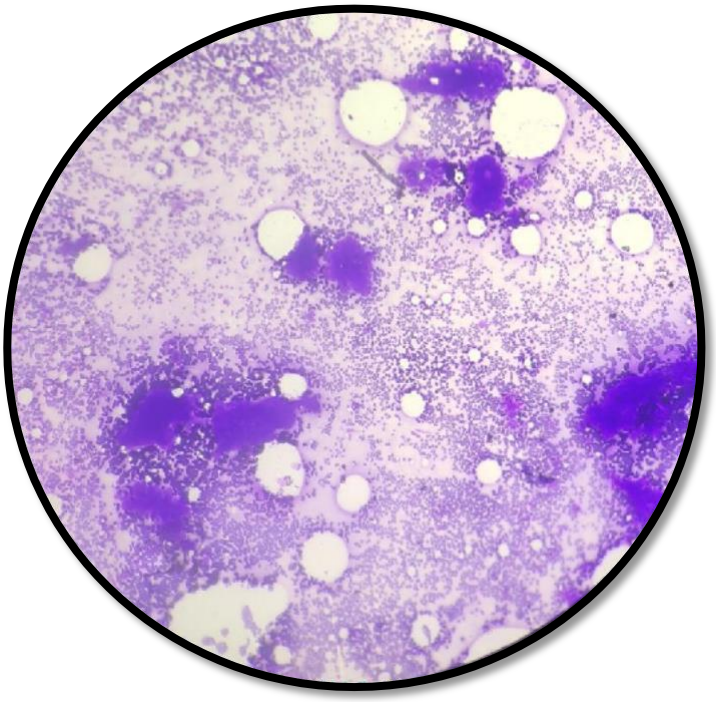
Table7:DistributionofcasesaccordingtoC5lesion

C5Lesion	N	%
Ductalcarcinoma	53	100
Medullary carcinoma	0	0
Mucinous Carcinoma	0	0
Lobularcarcinoma	0	0
Total	53	100

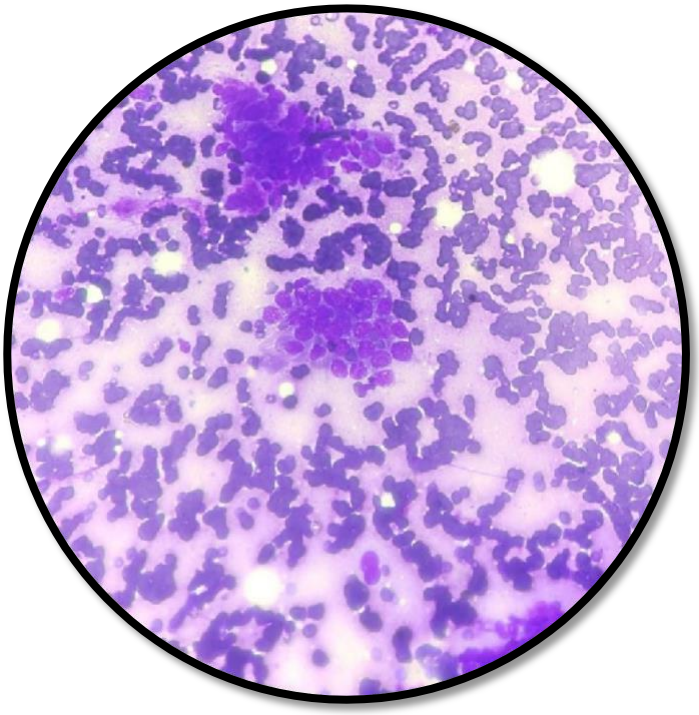
Amongmalignantlesions,mostcommonisductalcarcinoma(100%).



PHOTOGRAPHS

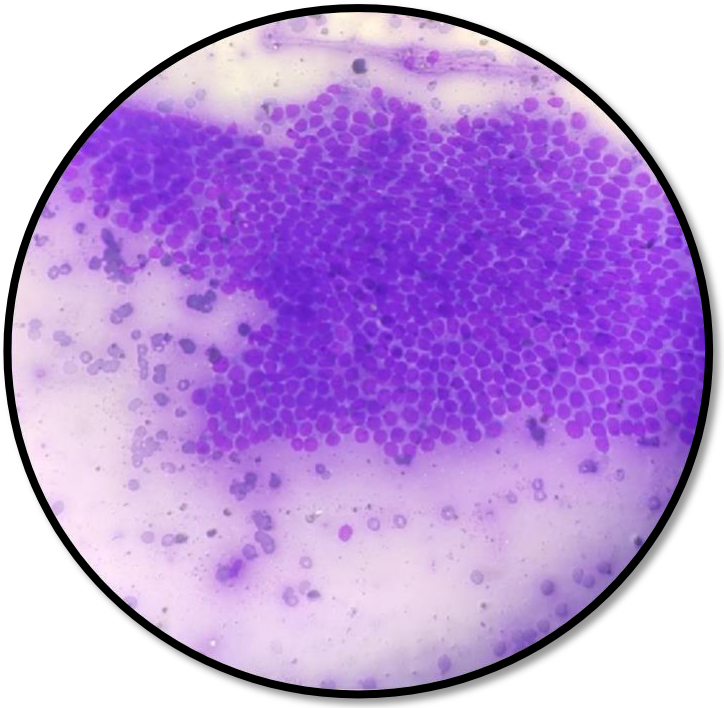


INTRADUCTALCARCINOMA, 10X

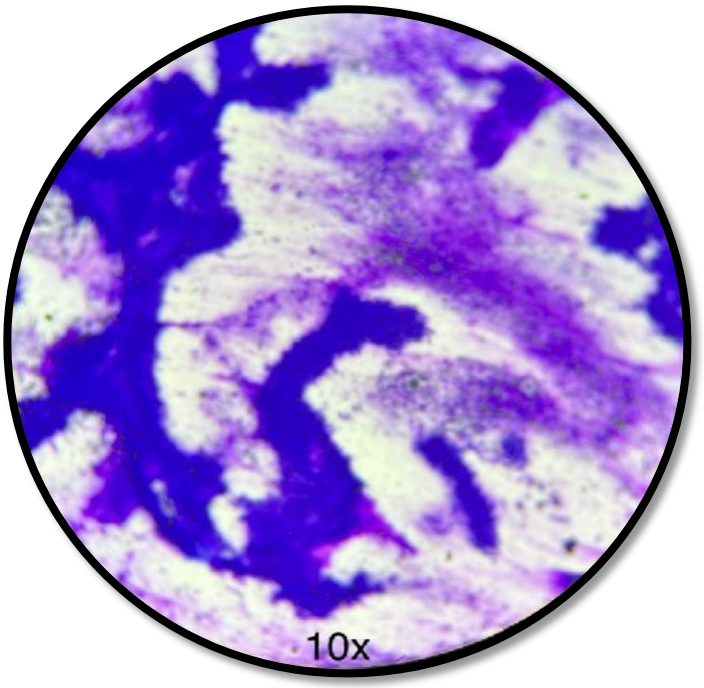


INTRADUCTALCARCINOMA, 40X

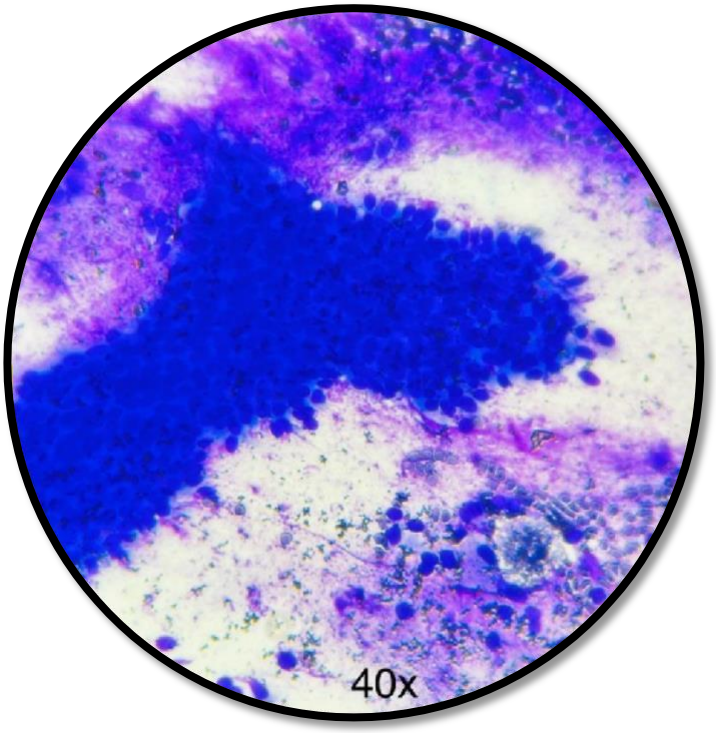
FIBROADENENOMA,10X



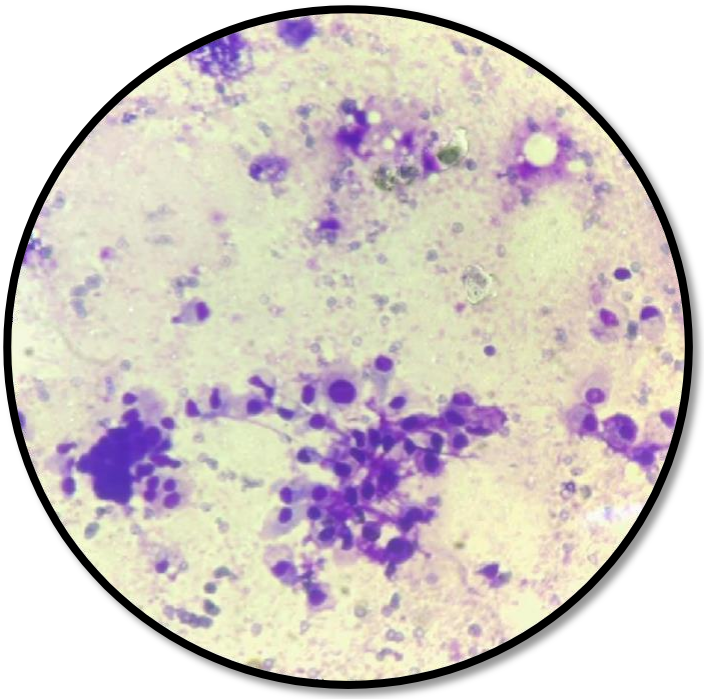
FIBROADENENOMA,40X



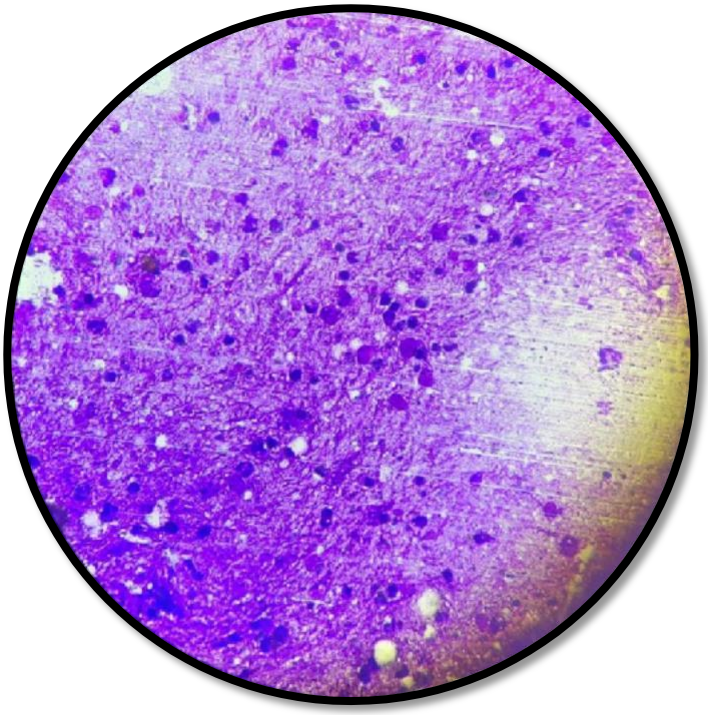
PHYLLODESTUMOR,10X



PHYLLODESTUMOR,40X



FIBROCYSTICDISEASE,40X



DUCTECTASIA, 40X

DISCUSSON

Lump in the breast may be either benign or malignant; however, fear of malignancy is the main reason to compel the patients report to the clinician. Thus, to relieve the stress of the patients, it is necessary to investigate these patients according to standard protocols.[83] FNAC is extensively recognized as a reliable procedure for the initial examination of palpable breast masses. It is minimallyinvasive, cost-effective,safe,simple,rapid andsensitiveas compared to biopsy.[84,85] The main objective of FNAC is to distinguish malignant lesions from benign lesions in order to plan for the treatment protocol and follow-up.

In our study mean age of cases is 37.39 years with majorityare in age group 21- 30 years (26.41%) followed by 19.48% in age group 31-40 years. And, Benign lesionsare more common in age group 11-20 years (94.44%) followed by21-30 years(78.69%)and71.11%inagegroup31-40years.Malignantlesionsare morecommonin61-70years(55.56%)followedby50%inagegroup>70 years and 48.15%in age group 51-60 years. In**Sharif et al**[63]study age rangedfrom15to60yearswithmeanageof33.11years.Themostaffectedpatients belongedto 31–35years agegroup (47%) followed bythe agegroup 41–45years (37%).Allthemalignantcaseswereundertheageof22–60yearswithmean age of 41.48years. The most common age group affected being slowed by theage groups 41–50 and 51–60years (24.39%) each. The patients affected withfibroadenomafallunder16–39yearsofagewithmeanageof21.37yearsand

themostaffected(53.57%)patients wereundertheageof15–20years.Themost affected patient with acute pyogenic mastitis belonged to 26–30years age (33.33%) while the majority of the patients affected with tuberculous mastitis were under 21–25 years age (33.3%). Similar findings were reported by **Goyal et al**[86]who con- ducted a study in India and found most of the breast cancer patients belong to 15–70 years age. It is found that Age is the strongest risk factor for breast cancer. It is proportional to risk, that is, the older the age, the higher the risk, but chances are increased markedly in postmenopausal years, that is, age >50 years. In **Essiben et al**[87]study, majority of the cases were between the age of 30–45years. This indicates that females at their early agesare presenting with breast cancer. In **Vijaya and Sirisha**[88]study benign lesions of the breast were seen in the age group 17 to 55 years, whereas malignant lesions were observed mostly in the age group 35 to 75 years.

According to size of lesion, most common size in between 2.1 cm to less than 3 cm (44.59%) followed by 27.71% cases has size of lesion is between 3.1 cm to less than 4 cm, 14.29% lesions has size between 1.1 cm to less than 2 cm. only 10.39% lesion has size more than 4.1cm.

In our study, according to location of breast, most common location is upper outer quadrant (31.17%) followed by 16.88% has upper inner quadrant, 12.12% has lower outer quadrant and 7.79% has lower inner quadrant.And, unilateral side is more common (96.97%) followed by only 3.03% has both bilateralbreast carcinoma.

The most common type of lesions are benign (64.50%) followed by 22.51% are Malignant, 8.66% insufficient or inadequate material, 3.46% has suspicious lesion, 0.87% has atypical lesions. And, among benign lesions, most common lesion is Fibroadenoma (61.07%) followed by 9.4% has fibro-cystic lesions, 10.7% has Mastitis / Abscess, 12.08% has Gynecomastia, fat necrosis is present in 5.37%, Phyllode in 1.34% and 0.67% has galactocele.And, among malignant lesions, most common is ductal carcinoma (100%).

Comparable to our results, **Sharif et al**[63]found that 54% are benign (C2), 2% atypia/suspicious probably benign (C3), 3% suspicious probably malignant(C4), and 41% malignant (C5). Among the benign (C2) cases, 21% were inflammatory and 33% benign. Inadequate/insufficient materials (C1) were not included in the study. Among the total studied cases of breast lesions, FNAC diagnosis of 54% cases was reported as benign and 41% cases as malignant by FNAC In benign lesions, the

maximum cases were of fibroadenoma (24%) followed by fibrocystic disease (4%), lipoma (3%), while benign phyllodes tumor and galactocele were only 1% each. Among all these lesions, carcinoma was the most common lesions constituting 41%. **Bukhari et al**[89]also reported 31% malignant cases in their study which agree to our study findings. In Nigeria, similar findings were found by **Egwuonwu et al**[90]and **Mayun et al**[91]

who reported 47.3% and 40% malignant lesions in their study patients, respectively. **Ahmed et al**[92]reported 30.5% cases of malignancy in their study conducted in Sudan. This study results are also consistent with the findings of **Siddiqui et al**[1]and **Lakhana and Khalid**[93]who found breast cancer as themost commonly encountered lesion. In **Vijaya and Sirisha**[88]study Of the 76 benign cases identified by FNAC majority were fibroadenoma -55, followed by fibrocystic disease - 15, suppurative inflammation i.e abscess -4, and phyllodes tumor -1. The cytological spectrum of 10 malignant cases showed that 8 cases were IDC and 1 each of medullary carcinoma and lobular carcinoma.

CONCLUSION

Commonest presenting complains were breast lump with a wide variety of diagnosis. Nearly all patients accidently found breast lump and were notfamiliar with breast self-examination. Delay in seeking medical treatment was another noteworthy finding. This study supports that cytological examination using FNAC is economical, rapid, easy and valuable diagnostic tool. It can provide information about the type of lesion which helps in planning the treatment modalities.LIMITATION

Thisstudyhasthelimitationsare:

- Smallsamplesize
- Notincludingtheinsufficientmaterialofbreastlesionsindetailedcytological examination.

BIBLIOGRAPHY

1. Siddique R, SinhaA,AdhikaryM, Phukan JP. Comparative studyof fine- needle aspiration cytology and needle core biopsy in the diagnosis of breast lumps with histopathological correlation. J Sci Soc 2022;49:70-5.
2. Kline TS, Neal HS. Role of needle aspiration biopsy in diagnosis of carcinoma of the breast. Obstet Gynecol 1975;46:89-92.
3. Josephine Nyabeta Rioki et al. Cytomorphological patterns of breast lesions among women with palpable breast lumps attending select teaching and referral hospitals in Kenya: a descriptive cross-sectional study. Pan African Medical Journal. 2023;44(171).
4. PLAN-3
5. Shabot MM, Goldberg IM, Schick P, Nieberg R, Pilch YH. Aspiration cytology is superior to tru-cut needle biopsy in establishing the diagnosis of clinically suspicious breast masses. Ann Surg 1982;196:122-6.
6. Parkin DM, Bray FI, Ferlay J & Risani P. 2001. Estimating the world cancer burden. Int J Cancer; 94: 153-156.
7. ChopraR.TheIndianscene.JClinOncol2001;19:106-11.
8. Ahmed I, Nazir R, Chaudhary MY, Kundi S. Triple assessment of breast lump. J Coll Physicians Surg Pak. 2007;17:535-8.
9. Makhija S, Patil SB. Cytology of breast-lesions. IPArchives of Cytology and Histopathology Research. 2020 Mar 15;5(1): 81-5. Google Scholar.
10. EmbayeKS,RajaSM,GebreyesusMH,GhebrehiwetMA.Distribution of breast lesions diagnosed by cytology examination in symptomatic patients at Eritrean National Health Laboratory, Asmara, Eritrea: a retrospective study. BMC Womens Health. 2020 Nov 10;20(1): 250.
11. MartinHE,EllisEB.Biopsybyneedlepunctureandaspiration.Ann Surg.1930 Aug;92(2);169-81.
12. MartinHE,EllisEB.AspirationBiopsy.Surgery,GynaecologyandObstetrics 1934; 59:578-589.
13. Stewart F.W. The diagnosis of tumors by aspiration. AM J Pathol 1933; 9:801-12.
14. Adair FE. Surgical problems involved in breast cancer. Ann R Coll Surg Engl 1949; 4;360-380.

15. Godwin JT, Aspiration biopsy: technique and application. Ann NY Acad Sci 1956; 63:1348-1373.

16. PranabDey-Diagnosticcytology,Secondedition, Springer,2014,p 248.

17. Meena SP, Hemrajani DK, Joshi N. A comparative and evaluative study of cytological and histological grading system profile in malignant neoplasm of breast — An important prognostic factor. Indian J Pathol Microbiol 2006;49:199-202.

18. Iqbal MH, Iqbal K, Nadeem A. Diagnostic accuracy of fine needle aspiration cytology (FNAC) in patients with breast lump. PJMHS Dec. 2015;9(4):1210-2.

19. Zagorianakou P, Fiaccavento S, Zagaorianakou N. FNAC: Its role, limitation and perspective in the preoperative diagnosis of breast cancer. Eur. J. Gynae. Oncol. - ISSN: 0392-2936 XXVI, n. 2, 2005.

20. Hindle WH, Payne PA, Pan EY. The use of fine needle aspiration in the evaluation ofpersistentpalpable dominantbreast masses.AmJ Obstetrics Gynaecol 1993;168 (6) :1814-8.

21. Koirala S. Comparative study of aspiration and nonaspiration cytology of Palpablebreastlumpsandcorrelation withhistopathology.JPatholNepal 2014;4(8):639–43.

22. HussainMT.Comparisonoffineneedleaspiration cytologywithexcision biopsy of breast lump. J Coll Physicians Surg Pak. 2005;15:211-4.

23. Saleh FM, Ansari NP, Alam O. Comparison between fine needle aspiration cytology with histopathology to validate accurate diagnosis of palpable breast lump. Mymensingh Med J 2012;21(3):450–5.

24. Shrestha A, Chalise S, Karki S, Shakya G. Fine needle aspirationcytology in a palpable breast lesion. J Pathol Nepal 2011;1(2):131–5.

25. Youngson B.J., Liberman L., Rosen P. P: Displacement of carcinomatous epithelium in surgical breast specimen following stereotaxic core biopsy. Am. J. clin. Pathol., 1995; 103:598.

26. HomeshNA,IssaMA,El-SofianiHA.DiagnosticAccuracyofFine NeedleAspirationCytologyinPalpableBreastLump(s).SaudiMedJ

2005;26(1):42–6.

27. Jemal A, Siegel R, Ward E, Hao Y, Xu J, Thun MJ. Cancer statistics, 2009. CA Cancer J Clin. 2009; 59:225-49.

28. Sariego J. Breast cancer in the young patient. Am Surg. 2010; 76(12):1397-1400.

29. Ataollahi MR, Sharifi J, Paknahad MR, Paknahad A. Breast cancer and associated factors: a review. J Med Life. 2015;8(Spec Iss 4):6-11.

30. Mahvi DA, Liu R, Grinstaff MW, Colson YL, Raut CP. Local Cancer Recurrence: The Realities, Challenges, and Opportunities for New Therapies. CA Cancer J Clin. 2018 Nov;68(6):488-505.

31. Menon G, Alkabban FM, Ferguson T. Breast Cancer. [Updated 2024 Feb 25]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482286/.

32. Mehrotra R, Yadav K. Breast cancer in India: Present scenario and the challenges ahead. World J Clin Oncol 2022; 13(3): 209-218

33. PDQScreening and Prevention Editorial Board. PDQCancer Information Summaries [Internet]. National Cancer Institute (US); Bethesda (MD):Jan 19, 2024. Breast Cancer Screening (PDQ®): Health Professional Version. [PubMed]

34. Doren A, Vecchiola A, Aguirre B, Villaseca P. Gynecological- endocrinological aspects in women carriers of BRCA1/2 gene mutations. Climacteric. 2018 Dec;21(6):529-535.

35. Ibikunle DE, Omotayo JA, Ariyibi OO. Fine needle aspiration cytologyof breast lumps with histopathologic correlation in Owo, Ondo State, Nigeria: a five-year review. Ghana Med J. 2017 Mar;51(1):1-5.

36. CasaubonJT,Tomlinson-HansenSE,ReganJP.FineNeedleAspirationof Breast Masses. [Updated 2023 Jul 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470268/.

37. Shirian S, Daneshbod Y, Haghpanah S, Khademi B, Noorbakhsh F, Ghaemi A, Mosayebi Z. Spectrum of pediatric tumors diagnosed by fine- needle aspiration cytology. Medicine

(Baltimore). 2017 Feb;96(6):e5480.

38. Giamanco NM, JeeYH, WellsteinA, Shriver CD, Summers TA, Baron J. Midkine and pleiotrophin concentrations in needle biopsies of breast and lung masses. Cancer Biomark. 2017 Sep 07;20(3):299-307.

39. Yii N, Read T, Tan CC, Ng SL, Bennett I. Diagnosing phyllodes tumours of the breast: how successful are our current preoperative assessment modalities? ANZ J Surg. 2018 Oct;88(10):988-992.

40. Rosai and Ackerman` Surgical pathology .Juan Rosai , 9 th edin, 2005 , breast , p 1762-1875.

41. MasciadriN,FerrantiC.Benignbreastlesions:Ultrasound.J Ultrasound. 2011Jun;14(2):55-65.

42. StavrosA.T.LippincottWilliams&Wilkins;Philadelphia:2004.Breast ultrasound.

43. BergW.A.,CampassiC.I.,IoffeO.B.Cysticlesionsofthebreast: sonographic-pathologic correlation. Radiology. 2003;227:183–191.

44. HarlowC.L.,SchackmuthE.M.,BregmanP.S.,ZeligmanB.E.,Coffin C.T. Sonographic detection of hematomas and fluid after imaging-guided core breast biopsy. J Ultrasound Med. 1994;13:877–882.

45. Pignatelli V., Basolo F., Bagnolesi A., Cartei F., Grassi L., Savino A. Hematoma and fat necrosis of the breast: mammographic andechographic features. Radiol Med. 1995;89:36–41.

46. Soo M.S., Kornguth P.J., Hertzberg B.S. Fat necrosis in the breast: sonographic features. Radiology. 1998;206:261–269.

47. Webb L.A., Young J.R. Case report: haemangioma of the breast-appearancesonmammographyandultrasound.*Clin Radiol.* 1996;51:523–524.

48. Thorncroft K., Forsyth L., Desmond S., Audisio R.A. The diagnosis and management of diabetic mastopathy. Breast J. 2007;13:607–613.

49. Azzopardi JG. Problems in Breast Pathology.London: WB Saunders; 1979. Infiltrating epitheliosis; pp. 174–87.

50. Rakha EA, Badve S, Eusebi V, Reis-Filho JS, Fox SB, Dabbs DJ, Decker T, Hodi Z, Ichihara S, Lee AH, Palacios J, Richardson AL, Vincent- Salomon A, Schmitt FC, Tan PH, Tse GM, Ellis IO. Breast lesions of uncertain malignant nature and limited metastatic potential: proposals to improvetheirrecognition andclinical management. Histopathology.2016

Jan;68(1):45-56.

51. Kutnahorsky R, Tortel MC, Burger JP, et al.Adenoid cystic carcinoma or cylindroma of the breast. General review in light of one case report. J Gynecol Obstet Biol Reprod (Paris) 1991;20(7):908–12.

52. Rosen PP. Microglandular adenosis: a benign lesion simulating invasive mammary carcinoma. Am J Surg Pathol. 1983;7:137–44.

53. KocjanG,BourgainC,FassinaA,HagmarB,HerbertA,KapilaK,etal. ,TheroleofbreastFNACindiagnosisandclinicalmanagement:a survey of current practice ,Cytopathology , 19: 271-278 , 2008

54. MossS.M.,WaleC.,Smith R.,EvansA.,CuckleH.,DuffyS.W.Effectof mammographic screening fromage 40 years on breast cancer mortality in the UK Age trial at 17 years' follow-up: a randomised controlled trial. Lancet Oncol. 2015;16:1123–1132. doi: 10.1016/S1470-2045(15)00128-X.[PubMed][CrossRef][GoogleScholar][Reflist]

55. Hemlata Pawar , Pooja Ingle , Tummidi Santosh , Vandita singh , Amit Bugalia , Nighat Hussain 2020 : FNAC of breast lesions with special refrence to IAC standardized reporting and comparative study .J Cytol 2020 JAN - MAR ; 37(1): 34-39.

56. Mendoza P, Lacambra M, Tan PH, Tse GM. Fine needle aspiration cytology of the breast: the nonmalignant categories. Patholog Res Int. 2011;2011:547580.

57. Zakhour H, Wells C. *Diagnostic Cytopathology of the Breast.* London, UK: Churchill Livingstone; 1999.

58. Lanyi M. Mammography. Springer-Verlag; Berlin, Heidelberg, New York: 2003. Diagnosis and pathological analysis.

59. Ingle SB and Hinge CR. Fine Needle Aspiration Cytology [FNAC] – Review Article. Int J Cur Res Rev. 2018; 10(15): 20-25.

60. PLAN-32

61. Manasa GC, Sneha SP, Govardhan A. The spectrum of palpable breast lesions-Acytopathological study of 1193 cases. Trop J Pathol Microbiol. 2021;7(3):144-149.

62. Parakh D, Goswami SS, KeshanA. Study of palpablebreast lesions using a diagnostic tool of fine needle aspiration cytology at tertiary care hospital. IAIM, 2021; 8(4): 94-98.

63. Sharif A, Tabassum T, Riaz M, Akram M, Munir N. Cytomorphological patterns of palpable breast lesions diagnosed on fine needle aspiration cytology in females. European Journal of Inflammation. 2020; 18: 1-8.

64. Khattak MS, Ahmad F, Rehman KU. Role of fine needle aspiration cytologyindiagnosisofpalpablebreastlesions andtheircomparisonwith histopathology. J Ayub Med Coll Abbottabad 2020;32(1):83–6.

65. Bachu B, Adepu U, Appam H, Tippani A, Sunder AS. Analysis of Fine Needle Aspiration Cytology in Diagnosing the Patients with BreastLump: A Prospective Study. Adv. Med. Dental Health Sci. 2019;2(2):22- 5.

66. Kazi Farzana Khanama, Nasima Akterb, Tarana Tabashumb, Abu Khalid Muhammad Maruf Razac g, Asma Ul Hosnad, Farzana Rahmane,Afroza Begum. A Clinicopathologic Study of Various Breast Lesions by Fine Needle Aspiration Cytology (FNAC) Journal of Current Surgery. 2018 Nov; 8(3):27-31.

67. Vyas A, Rai NN. A Study of Role of FNAC in Palpable Breast Lump. J Mahatma Gandhi Univ Med Sci Tech 2018;3(1):1–6.

68. David E. Ibikunl , John A. Omotayo and Olufemi O. Ariyibi. www.ghanamedj.org Volume 51 Number 1March 2017 Fine needle aspiration cytology of breast lumps with histopathologic correlation in Owo, Ondo State, Nigeria: a five-year review Ghana Med J 2017; 51(1): 1-5

69. Mane PS, Kulkarni AM, Ramteke RV. Role of fine needle aspiration cytologyin diagnosis of breast lumps. Int J Res Med Sci 2017;5:3506-10.

70. Shobha SN and RajashekarYR. Role of FNAC in Breast Lesions. Journal of Diagnostic Pathology and Oncology, January-March 2017;2(1):3-5.

71. Poudel S, Ranabhat S, Parajuli B, Pun G. Evaluation of Breast Lump by Fine Needle Aspiration Cytology. J-GMC-N. 2016;9(2): 38-42.

72. KocaayAF,Celik SU,SevimY,OzyaziciS, Cetinkaya OA,AlicKB.The role of fine needle aspiration cytology and core biopsy in the diagnosis of palpable breast masses. Niger Med J

2016;57:77-80.

73. Adnan Khan, Raza Jamali, Muneeb Jan, Maria Tasneem. Corelation of fine needle aspiration cytology and histopathology diagnosis in the evaluation of breast lump. 2014 Mar-Jun; 2(2)40-43.

74. Thakkar B,Parekh M, Trivedi NJ, Agnihotri3 AS,and Mangar U. Role Of Fine Needle Aspiration Cytology In Palpable Breast Lesions And Its Correlation With Histopathological Diagnosis. National Journal Of Medical Research. 2014;4(4): 283-288.

75. Sankaye SB, Dongre SD. Cytological study of palpable breast lumps presenting in an Indian rural setup. Indian J Med Paediatr Oncol 2014;35:159-64.

76. Modi P, Oza H, Bhalodia J. FNAC As Preoperative Diagnostic Tool For Neoplastic And Non-Neoplastic Breast Lesions: A Teaching Hospital Experience. National Journal Of Medical Research. 2014; 4(4): 274-278.

77. Yalavarthi S, Tanikella R, Prabhala S, Tallam US. Histopathological and cytological correlation of tumors of breast. Med J DY Patil Univ [serial online] 2014 [cited 2022 Oct 9];7:326-31.

78. Mital Chokshi, Nandita Mehta cytological study of palpable breast lumps (407 cases) with their histological correlation International Journal of Medical Science and Public Health. 2014; 3(2):181-85. DOI: 10.5455/ijmsph.2013.191120134.

79. Chaudhurya S, Alamb MK and Haqu MS. The Role of FNAC in Diagnosis of Breast Disease at Different Ages - 208 Cases. Journal of Bangladesh College of Physicians and Surgeons. 2012;30(3): 1-5.

80. Bukhari MH, Arshad M, Jamal S, Niazi S, Bashir S, Bakhshi IM, Shaharyar.Useoffine-needleaspirationintheevaluationofbreastlumps. Patholog Res Int. 2011;2011:689521.

81. Tiwari M. Role of fine needle aspiration cytology in diagnosis of breast lumps. Kathmandu University Medical Journal. 2007; 5(2): 215-217.

82. Singh K, Sharma S, Dubey VK and Sharma PR. ole of FNAC in Diagnosis of Breast Lumps. JK Science: 2001;3(3):126-128.

83. Kahn ZM (2013) The frequency of various causes of breast lumps in females presenting to surgical OPD in a tertiary care hospital. Annals of Pakistan Institute of Medical Sciences 9: 26–29.

84. Nguansangiam S, Jesdapatarakul S and Tangjitgamol S (2009) Accuracy of fine needle aspiration cytol- ogy from breast. Asian Pacific Journal of Cancer Prevention 10: 623–626.

85. Kalhan S, Dubey S, Sharma S et al. (2010) Significance of nuclear morphometry in cytological aspirates of breast masses. Journal of Cytology 27(1): 16–21.

86. Goyal SK, Choudhary D, Beniwal S et al. (2016) Retrospective analysis of breast lumps in a given pop- ulation: An institutional study. International Surgery Journal 3: 1547–1550.

87. Essiben F, Foumane P, Meka EJ et al. (2017) Descriptive analysis of 192 cases of breast cancer occurring before age 40 in Yaounde, Cameroon. International Journal of Reproduction, Contraception, Obstetrics and Gynecology 6: 2704–2710.

88. Vijaya K, Sirisha O. Study of fine needle aspiration cytology of breast lumps and their histopathological correlation among rural population of Vikarabad, TS. *Indian J Pathol Oncol* 2021;8(2):198-201.

89. Bukhari M, Arshad M and Jamal S (2011) Use of fine- needle aspiration in the evaluation of breast lumps. *Pathology Research International*2011: 689521.

90. Egwuonwu O, Anyanwu S, Chianakwana G et al. (2009) Breast lumps in NAUTH, Nnewi: A 5 year review. *Nigerian Journal of Surgery* 15: 6–9.

91. Mayun A, Pindiga U and Babayo UD (2008) Pattern of histopathological diagnosis of breast lesions in Gombe, Nigeria. *Nigerian Journal of Medicine* 17(2): 159–162.

92. Ahmad N, Kalsoom S, Mahmood Z et al. (2019) Comparative evaluation of selected sex hormones in premenopausal and postmenopausal women with breast cancer. *International Journal of Biosciences (IJB)* 15: 10.

93. Lakhana N and Khalid F (2002) Morphology of breast lumps: A retrospective study. *Journal of Pakistan Institute of Medical Sciences* 13: 631–634.

ABBREVIATIONS

CNB - Core needle biopsy DCIS - Ductalcarcinomainsitu

FNAC - Fine needle aspiration cytology IAC - InternationalAcadamyofcytology LCIS - Lobular carcinoma In situ

MA - Microglandularadenosis NPV

- Negativepredictivevalue OPD

- Out patient department PA - Pleomorphic adenoma

PASH - Pseudoangiomatousstromalhyperplasia PPV - Positive predictive value

TDLU - Terminalductlobularunit UDH

- Usual ductal hyperplasi