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Retrospective Study

Cytomorphologic Study of Breast Lesions: Spectrum of Lesions and Histopathological Correlation

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ABSTRACT

Introduction

Breast masses are a diagnostic dilemma in clinical practice, even if majority of them are benign. Hence, a reliable and rapid diagnostic modality is crucial in the management of breast lesions, and fine-needle aspiration cytology (FNAC) has been considered a reliable, rapid and economical method when combined with clinical and radiological findings, the triple test, to accurately diagnose palpable breast masses. It has an estimated sensitivity of 90-99% and a diagnostic accuracy of 96.2%.

Objectives

To describe cytomorphologic patterns of breast lesions and to determine diagnostic accuracy of FNAC.

Methods

A 3 year retrospective cross-sectional descriptive study was conducted. All patients who had breast FNAC from September 2019 to August 2022 at pathology department of Jimma University Medical Centre (JUMC) and that fulfilled the eligibility criteria were selected along with their matching histopathology reports. The collected data was coded, cleaned, and entered into Epidata 3.1, then exported to SPSS v26 and analyzed. Descriptive analysis was done for frequency and distribution of the disease. The risk of malignancy (ROM) for each International Academy of Cytology (IAC) yokahama category was determined and diagnostic performance was evaluated based on a three-category approach.

Results

An increasing occurrence of malignant breast lesions was observed, from 21.7% in 2019/20 to 29.9% in 2021/22. The mean age was 41.4±13.38 and 28.7±11.3 for malignant and benign breast lesions respectively. The most common benign breast lesion was fibroadenoma 322 (38%) in females and gynecomastia 75 (87.2%) in males. The ROM for each category was for C1 66.6 %, C2 0%, C3 30.5%, C4 54.5% and C5 98.7 %. The absolute sensitivity, complete sensitivity, specificity, PPV and NPV were 77.2%, 100%, 99.1%, 98.7% and 100%, respectively.

Conclusion

There is an increasing incidence of malignant breast lesions with majority of the cases occurring in younger patients. The higher sensitivity and specificity FNAC in diagnosing malignant lesions supports its use.

Keywords

Breast mass; Breast cancer; FNAC; Risk of malignancy.

INTRODUCTION

Breast masses are a diagnostic dilemma in clinical practice, despite the fact that more than 90% of the cases are benign, on account of the probability of cancer.[1] Breast cancer is the most common cancer in women worldwide representing about 24.5% of all new cancer cases, as well as the 4th leading cause of cancer death. In Ethiopia, breast cancer (BC) is the most prevalent cancer, accounting for 31.9% of the total new cancer cases and the leading cause of cancer related death, according to GLOBOCAN 2020.[2,3]

About 80% of reported cancer cases are diagnosed at ad-

vanced stages in Ethiopia, when very little can be done to treat the disease, leading to low patient survival. This is largely due to poor awareness of cancer signs and symptoms, an absence of organized early detection programs, and poor facilities for accurate and timely diagnosis and treatment. Therefore, early diagnosis of BC is an important early-detection strategy, particularly in low- and middle-income countries where the disease is diagnosed in late stages and resources are very limited.[4-6]

Various diagnostic methods have been developed to evaluate palpable and non-palpable breast lesions with the goal of identifying a sensitive, specific, efficient, and economical approach to diagnosing breast cancer. Physical examination, mammography, ultrasonography, fine-needle aspiration cytology (FNAC), core needle biopsy, and open excisional biopsy are all used to a greater or lesser extent in the diagnostic workup of a palpable breast mass.[1,7]

In developed countries, core needle biopsy (CNB) is preferable to FNAC since it offers greater specificity than FNAC in the diagnosis of lesions associated with micro-calcifications, the diagnosis of certain proliferative lesions and low-grade ductal carcinoma *in situ*, as well as for confirming invasive carcinoma. In addition, CNB offers the ability to perform necessary prognostic marker testing and reduces rates of "indeterminate" interpretations. However, it has some drawbacks when compared to FNAC, such as being a more invasive procedure with a higher rate of complications, a less rapid turn-around time to diagnosis, greater expense, and an increased risk of carcinoma seeding.[8,9]

FNAC of palpable breast masses, however, has gained popularity as a diagnostic method as it provides a sensitive, expedient, and economical method of obtaining cytologic material for examination. Its distinct advantages include accurate diagnosis, low cost, excellent patient acceptance, and minimal or no morbidity.[9]

Beside the merits mentioned, FNAC also has its own limitations, such as false negatives, false positives, and suspicious results. The accuracy of results depends on several factors, such as sample adequacy, localization technique, aspiration techniques and skill, the experience of the pathologist interpreting the smear, and the overlapping cytological features between some benign and malignant neoplasms. The accuracy of FNAC is optimized when it is performed by cytopathologists, experienced radiologists, or clinicians in multidisciplinary clinics, utilizing ultrasound guidance as required with rapid on-site evaluation (ROSE) of Giemsa-stained slides to triage cases.[9,10]

Overall, breast FNAC can attain a sensitivity of 96.3% (90-99%), specificity of 98.8%, a positive predictive value (PPV) of malignancy approaching 100% and a high degree of accuracy that is up to 96.2%.[9,11]

It is crucial that performance testing in breast cytology, like in all other diagnostic modalities, be repeatedly and regularly evaluated by a standardized and reproducible system due to the complex circumstances surrounding the benefits and limitations of these modalities.[10]

OBJECTIVE

General Objective

To assess the cytopathologic patterns of breast lesions and to correlate them with their corresponding histopathologic results at JUMC, south-west Ethiopia.

Specific Objective

- To describe the cytopathologic patterns of breast lesions at JUMC
- To evaluate the Cyto-histopathologic correlation of breast lesions at JUMC
- To determine the diagnostic accuracy of FNAC

MATERIALS AND METHODS

Study Area and Period

The study was conducted at JUMC, pathology department which is located in Jimma, south-west Ethiopia. FNAC is performed by either a pathology resident or a pathologist using 21 G needle attached to 5 cc or 10 cc syringe. Smears are air dried and stained by Wright stain without ROSE. The study was conducted from September 2019 to August 2022.

Study Design

A retrospective cross-sectional descriptive study design was implemented.

Study Population

All patients who had FNAC performed for breast lesions at JUMC from September 2019 to August 2022.

Inclusion Criteria

All patients who had undergone breast FNAC at JUMC during the study period.

Exclusion Criteria

- Patients with recurrence of tumor.
- Patients with repeated FNAC from a similar lesion.
- FNAC reports that do not have all of the following variables: patient age, sex, and cytopathologic diagnosis.

Sample Size and Sampling Technique

All breast FNAC reports from September 2019 to August 2022 in the archive of department of pathology, JUMC were retrieved using non-probability convenient sampling method.

Data Collection Tools and Procedures

Relevant information was collected using a structured checklist containing demographic and clinicopathologic questions by two first-

year pathology residents (MD) and one lab technician (BSC), under the close supervision and assistance of the principal investigator.

Study Variables

- FNAC diagnostic category
- FNAC specific diagnosis
- Histopathologic diagnosis
- Demographic factors: Age, Sex
- Mobility of the mass

Operational Definition

FNAC diagnostic category: FNAC diagnostic category are the categories utilized in the infrastructure as code (IAC) Yokohama reporting system; which is Insufficient/inadequate (C1), Benign (C2), Atypical (C3), Suspicious of malignancy (C4), and Malignant (C5) (Annexure).

Cases diagnosed as cellular fibroadenoma were categorized as benign; since the diagnosis was made mostly due to increased epithelial not stromal cellularity.

Atypical category: Atypical category includes cases diagnosed as atypical not otherwise specified, papillary lesions, phyllodes tumor, atypical with biopsy recommended, and atypical proliferative lesions.

Inflammatory breast lesion: Inflammatory breast lesion: includes mastitis, abscess, granulomatous inflammation and tuberculosis (TB).

Histopathologic diagnosis: A gold standard diagnostic method performed by preparing tissue for the study of the origin, structure and pathology. The diagnosis of the definitive management procedure was taken whenever there was more than one histopathologic result.

On histopathology; atypical ductal hyperplasia was categorized as benign and borderline phyllodes tumor was categorized as malignant.

Risk of malignancy (ROM): The number of confirmed malignant cases per total number of cases in the diagnostic category.

Absolute sensitivity: Percentage of cases cytologically rated as 'malignant (C5)' among all cases of 'adequate' samples histologically rated as malignant.

Complete sensitivity: Percentage of cases cytologically rated as 'C3', 'C4 or 'C5' among all cases of 'adequate' samples histologically rated as malignant.

Inadequate rate: Percentage of cases cytologically rated as 'Insufficient/inadequate (C1)'among the total aspirated cases.

Suspicious rate: Percentage of cases cytologically rated as Atypical (C3) or Suspicious of malignancy (C4) among the total aspirated cases.

Data Processing and Analysis

The collected data was coded, cleaned, and entered into Epidata 3.1, then exported to Statistical Package for the Social Sciences (SPSS) v26 and analyzed. A descriptive analysis was done for the frequency and distribution of the disease.

Sensitivity, specificity, PPV, negative predictive value (NPV), accuracy ratios, and ROM were calculated using three cut-off points to define malignancy (Table 1). Insufficient/inadequate reports were excluded from the analysis, for these calculations. The findings were presented using text, tables, and diagrams.

Table 1. *Cut off for Diagnostic Categories for Diagnosis of Malignancy to Calculate Sensitivity, Specificity, PPV, NPV, and Accuracy*

Categories	Explanation
Category A	Benign, atypical, and suspicious of malignancy categories were all classified as non-malignant, whereas only the malignant category was classified as malignant
Category B	Benign and atypical categories were considered non-malignant but suspected of malignancy, and malignant categories were considered malignant
Category C	Only the benign category was categorized as benign (non-malignant), whereas atypical lesions, suspected of malignancy, and malignant categories were labeled as malignant

Data Quality Control

Two-day training was given to the data collectors on how to retrieve, categorize, and record the data. The principal investigator closely supervised and assisted the data collectors while they retrieved and recorded the data. The principal investigator also rechecked every data for completeness and accuracy every day to ensure the quality of the data.

Limitation of the Study

Fine Needle Aspiration Cytology results are not computerized and compiled with the patient's clinical data; thus, associated factors with breast lesions cannot be assessed. It is also difficult to identify repeated and recurrent cases due to the absence of a constant identification code. In addition, there is no archive for FNAC slides, so it was not possible to review slides and determine the probable reason for cyto-histopathologically discordant cases.

RESULTS

Demographic Characteristics

A total of 1437 breast FNAC cases, which were performed between September 2019 and August 2022, were analyzed with a mean of 479 cases per year. Majority of the cases were females 1318 (91.7%), with a female to male ratio of 11.1. The overall mean age of patients was 32.2 (range: 9 months to 90 years) with a standard deviation of 12.96. The most commonly affected age group was 20-29 years old in females and 40-49 years old in males,

as summarized in Table 2.

Table 2. *OMF Mass Distribution with the Anatomic Site in JUMC from 2016 to 2021*

		Sex		
		Male	**Female**	**Total**
Age group	under 10	0	2	2
	10-19	7	154	161
	20-29	17	521	538
	30-39	20	329	349
	40-49	26	158	184
	50-59	16	69	85
	60-69	18	40	58
	≥70	13	13	26
Total		117	1286	1403

Majority of the cases 718 (67.8%) presented with mobile mass and 96 (9.07%) cases were fixed (Figure 1).

Cytopathologic Patterns of Breast Lesions

Among the total 1437 breast FNAC cases, 2 of them didn't have a cytopathologic diagnosis and they were removed from further analysis. The remaining 1435 cases were distributed according to the IAC Yokohama reporting system (Figure 2). The inadequate rate was 2.5% whereas the suspicious rate was 10.5%.

In both sexes, benign lesions were the dominant lesions, with benign to malignant ratio of 2.94:1 and 3.18:1 in females and males respectively.

The peak age of incidence for malignant breast lesions was the 4th decade (31.8%) with mean age of 41.4±13.38 and

Figure 1. *Pie Chart Showing Mobility of the Breast Masses, JUMC, Jimma, Ethiopia, November 2022. (n=1437)*

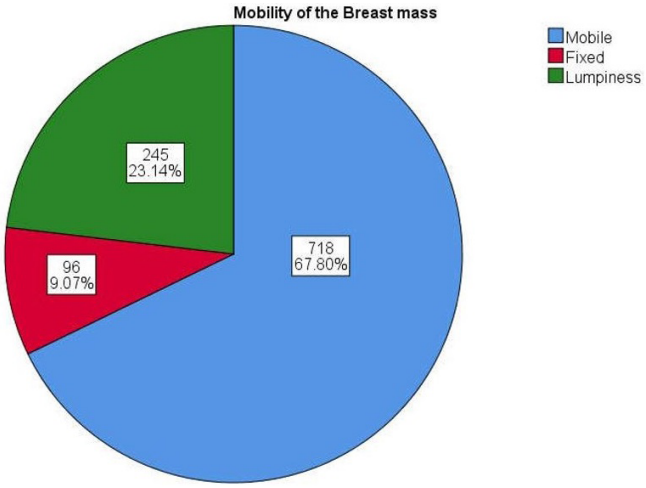
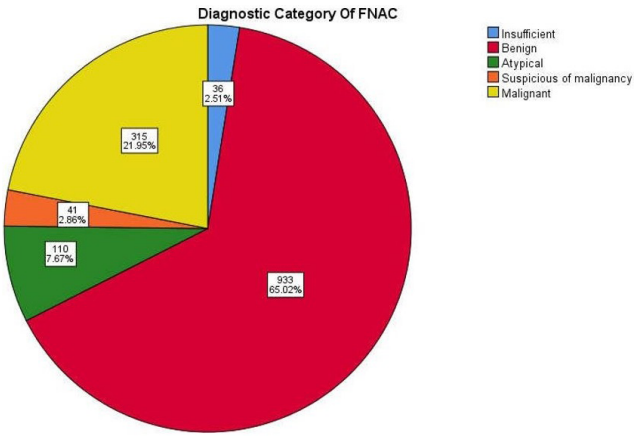


Figure 2. *Pie Chart Showing Overall Proportions of Diagnostic Category of FNAC, JUMC, Jimma, Ethiopia, November 2022 (n=1437)*



70.1% of these cases were below the age of 50 years. However, for benign breast disease, the 3rd decade (46.5%) was the peak age of incidence, with a mean age of 28.7±11.3. There were 2 malignant cases diagnosed before the age of 20, a 16 and an 18 year old girls diagnosed with Non-Hodgkin Lymphoma of Intrammamary lymph node and breast carcinoma respectively. The majority of benign as well as malignant cases presented with a mobile mass, as shown in Figure 3.

Out of the total 1435 cases, it was possible to classify 1268 (88.2%) cases as neoplastic and non-neoplastic. Majority of the cases 763 (60.2%) were neoplastic in nature and most of them were benign (69.2%).

However, majority of benign breast lesions were non-neoplastic (54.1%). The most common benign breast lesion in females was fibroadenoma 322 (38%), followed by fibrocystic change 192 (22.7%), and inflammatory breast lesions 146 (17.2%). The mean age at diagnosis of fibroadenoma was 23.2±7.1, with 85.4% of the cases between 10 and 30 years of age, whereas 30.6±9.2 for FCC. The majority of inflammatory breast lesions occurred in the age group of 20-40 years, with a mean age of 29.1±9.2, and abscess was the most common inflammatory lesion (39%).

On the other side, gynecomastia was the most common benign breast lesion in males (75, 87.2%), followed by lipoma and inflammatory breast lesions, each accounting for 3 (3.5%) cases.

There was a single case of fibrocystic change in 36-year-old male who presented with bilateral breast lumpiness. The mean age at diagnosis of gynecomastia was 43.1±17.6, with peak age at the 5th decade.

Out of 110 cases categorized as atypical, majority of them were proliferative lesion with atypia 35 (31.82%) (Figure 4).

Figure 3. *Bar Graph Showing Distribution of Breast FNAC Diagnostic Categories with Mobility of the Mass, JUMC, Jimma, Ethiopia; November 2022. (n=1437)*

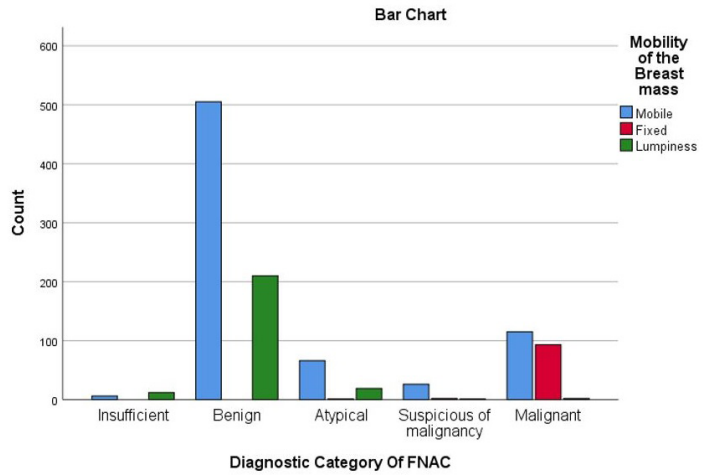
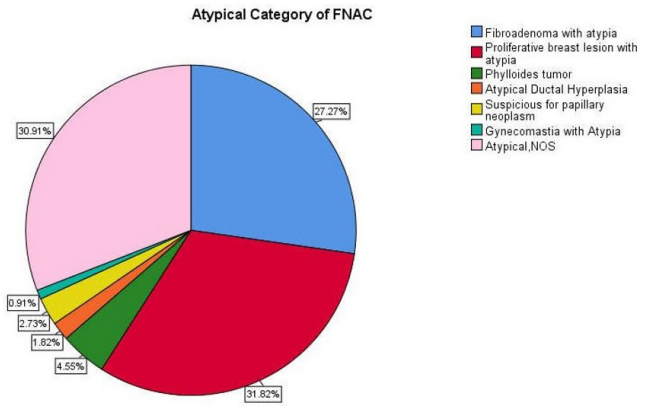
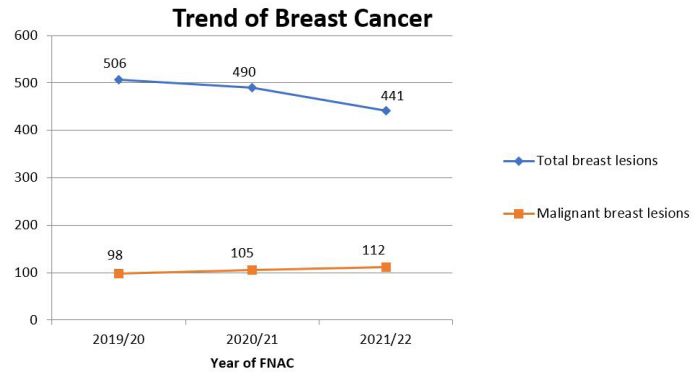


Figure 4. *Pie Chart Showing Distribution of Subtypes of Atypical Breast Lesions, JUMC, Jimma, Ethiopia; November 2022 (n=1437)*



The number of malignant cases generally increased from 98 (21.7%) in 2019/20 to 112 (29.9%) in 2021/22 despite the decrement of total FNAC cases. The trend of breast cancer in the last 3 years is given in Figure 5. Ductal carcinoma was the most common malignant breast lesion 289 (91.7%), followed by non-hodgkin lymphoma-3 (NHL-3) (1%).

Figure 5. *Line Chart Showing Distribution of Malignant Cases with their Corresponding Year Performed, JUMC, Jimma, Ethiopia; November 2022 (n=1437)*



Cyto-Histopathologic Correlation

A total of 212 breast FNAC cases were found to have a subsequent histopathologic diagnosis. The histopathologic results were categorized as malignant 103 (47.58%), benign 107 (50.47%) and non-diagnostic 2 (0.94%). The two non-diagnostic cases were removed from further analysis.

The ROM for each of the IAC Yokohama category was calculated, as shown in Table 3.

Table 3. *Cross Tabulation Showing the Cyto-Histopathologic Correlation along with the Risk of Malignancy (ROM) of each IAC Yokahama Category, JUMC, Jimma, Ethiopia, November 2022 (n=212)*

		Histopathologic Diagnosis			
		Non-Malignant	Malignant	Total	ROM %
Diagnostic category of FNAC	Inadequate	1	2	3	66.6
	Benign	70	0	70	0
	Atypical	25	11	36	30.5
	Suspicious for malignancy	10	12	22	54.5
	Malignant	1	78	79	98.7
	Total	107	103	210	

Comparison of the cytological results that had a determinate diagnosis 149 (72%) with their corresponding histological diagnosis revealed that almost all 148 (99.3%) cases were concordant (TP=78, TN=70) with a false negative rate of 0%. Only one case was discordant (false positive), which was diagnosed as ductal carcinoma on FNAC but later diagnosed as gynecomastia on biopsy. The false positive rate was 0.3% (Figure 6).

Among the 36 atypical cases, majority 25 (69.4%) were diagnosed as benign on biopsy, fibroadenoma being the commonest 9 (36%), followed by FCC 7 (28%). In contrast, malignancy was slightly predominant among the suspicious of malignancy category; FCC and usual ductal hyperplasia were the main types of benign diagnosis in this category.

Diagnostic performance of FNAC was calculated using the IAC Yokohama category, under different diagnostic cut-offs for diagnosing malignant breast disease, as shown in Table 4. The absolute sensitivity, complete sensitivity and specificity were 77.2%, 100% and 99.1%.

DISCUSSION

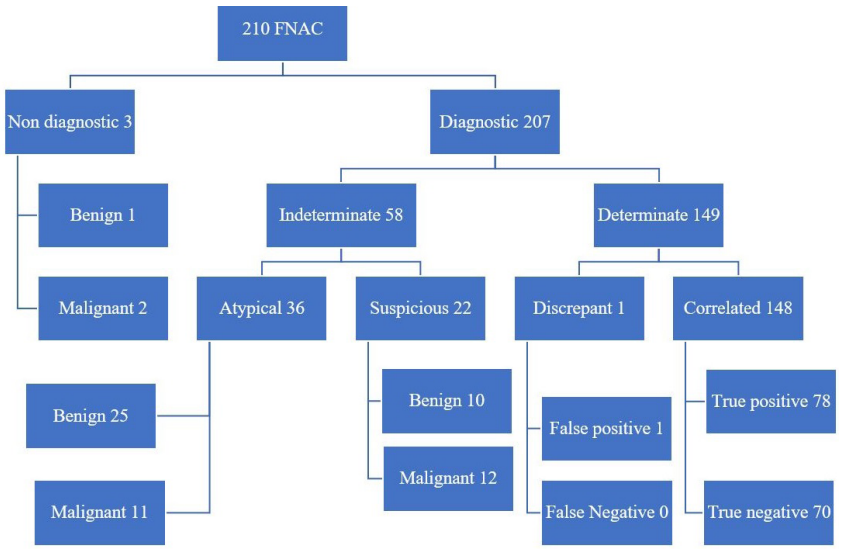
Breast cancer is the most common cancer among women in the

Table 4. *The Sensitivity, Specificity, PPV, and NPV for Breast FNAC Using the IAC Yokohama System, Under Different Diagnostic Cut-offs for Diagnosing Malignant Breast Disease, JUMC, Jimma, Ethiopia, November 2022 (n=212)*

	Category A	Category B	Category C
Sensitivity	77.2% (67.82, 84.98)	89.1% (81.35, 94.44)	100% (96.41, 100)
Specificity	99.1% (94.86, 99.98)	89.6% (82.19, 94.7)	66% (56.2, 74.96)
PPV	98.7% (91.71, 99.82)	89.1% (82.32, 93.5)	73.7% (68.27, 78.53)
NPV	82% (76.11, 86.74)	89.6% (83.12, 93.81)	100%
Diagnostic accuracy	88.4% (83.24, 92.43)	89.4% (84.35, 93.22)	82.6% (76.75, 87.51)

Category A: only malignant cases considered positive; category B: suspicious and malignant cases considered positive; category C: atypical, suspicious, and malignant cases considered positive. NPV, negative predictive value; PPV, positive predictive value
Note: *The 95% Confidence intervals are given in square brackets.*

Figure 6. *Diagram Showing the Cyto-Histologic Correlation of 210 Breast FNAC Results, JUMC, Jimma, Ethiopia, November 2022 (n=212)*



world, as well as in Ethiopia, and its incidence is rising, especially in low- and middle-income countries.[2,4]

The trend of breast cancer has also been shown to increase in the last 3years, from 21.7 % of the total breast lesions in 2019/20 to 29.9% in 2021/22. This is in agreement with the studies by Boyle et al[12] and Abate et al.[13] This finding appears to be attributable to a mixture of various factors such as; earlier age at menarche, women having fewer children and having their first child at a later age, increased body mass index and a reduction in physical activity.

Overall, malignant breast lesion constituted 22% of all lesions in this study, which is in line with reports from Ethiopia (21%), Kenya (26%), and USA (26.6%).[14-16] In contrast, it was higher than a report from a previous study done in the same hospital as the current study, which reported 17%, as well as reports from India and Thailand that showed 13.7% and 15%, respectively.[17-19] This higher value may suggest a possibility of higher prevalence or increasing rates of breast cancer, or it may be due to the increase in people's awareness of breast cancer and its diagnosis; further research is needed.

The peak age of incidence of breast cancer was in the 4th and 5th decade, which accounted for 53.1% of malignant cases, and this is in agreement with studies done in India that showed a peak age of incidence in the 5th decade, with more than 60% of malignant cases below the age of 50, but lower than reports from the USA and Norway, which reported the 6th and 8th decade, respectively.[20-22]

More than two-thirds of breast cancer cases are diagnosed in women aged 50 and older in developed countries. In contrast, this study showed more than 70% of breast cancer cases being diagnosed before the age of 50, generally reflecting the breast cancer trend in developing countries.[13,19,23] This increased occurrence of breast cancer in younger individuals likely reflects the younger age structure of the source population, consequent to higher fertility and a shorter life expectancy.[4]

Overall, fibroadenoma (38%) was the commonest subtype of benign breast lesion in females, followed by FCC (22.7%), which is supported by the studies from Eritrea and Nigeria.[24,25]

Among males, gynecomastia was the most common benign lesion (87.2%), with a mean age of 43.1, which is consistent with other studies done in Nigeria and Saudi Arabia, except for the higher mean age, which reported a mean age of 33.2 and 31 years, respectively.[25,26] This observation can be further investigated by follow-up studies, including associated factors, in the future.

Interestingly, there was a single case of FCC in a male patient, which is in contrast with most studies that reported FCC only in females.[19,24] Although rare, there are case reports of FCC in males that are confirmed histologically, but our patient doesn't have histologic diagnosis.[27] This observation also needs further study.

Inflammatory breast lesion constituted 17.2% of the total benign lesions in females, and in keeping with the established associations of breast inflammations with pregnancy and lactation, the present study found most patients (73.9%) in the reproductive age group, which is consistent with other studies.[19,28] During the reproductive age, breasts show periodic changes with menstruation, increased blood flow, and dilated ducts during pregnancy and lactation, making them more susceptible to infections.[28]

The associated ROM was calculated for each category of IAC yokahama reporting system, the ROM for C1 was 66.6 %,

which is higher than the other studies that reported a ROM ranging from 2.6-45.4%.[11,29] The higher ROM is likely due to the very small number of inadequate cases in this study; only 3 inadequate cases were analyzed.

Surprisingly, the benign category showed no ROM (0%) which was lower than the other reports in Ethiopia (4.4%), Kenya (12%), and the USA (4.7%).[15,30,31] Late presentation of breast cancer patients at an advanced stage and a lower threshold for diagnosis of atypia could be some of the reasons for this null ROM.

The ROM in the atypical category was 30.3%, which is comparable with the studies done in Kenya and Pakistan that reported 25 % and 30.6%, respectively (27,44), but higher than other reports from the USA (13%) and Australia (15.7%).[31,32]

The ROM for suspicious of malignancy was 54.5%, which is comparable with a study done in Kenya (46%), but lower than reports from various literatures.[11,33] This finding of higher ROM in the atypical category and lower ROM in the suspicious category may suggest overlooking malignant cells and over interpreting benign atypical cells as suspicious. This observation can be further investigated by reviewing FNAC slides and conducting follow-up studies in the future.

As anticipated, the highest specificity was obtained in category A (99.1%), while the highest sensitivity was achieved in category C (100%). This is comparable to various studies done in Africa, Asia, and the USA.[11,15,18]

The suspicious rate in this study was 10.5%, which is comparable to studies done in the USA (8.8%), Nigeria (8%).[16,34] It is also far below the standard cut off proposed by UKBSP, which is below 25%.[10]

Reported inadequate rates in literatures ranges from 0.7% to 47%.[9,35] However, in this study the inadequate rate of FNAC was low (2.5%), which is in agreement with the recommendation by the IAC yokahama group of a less than 5% insufficient rate. The large variation in inadequate rate can be due to various reasons, such as differences in definition of inadequacy, the qualities of the FNAC operator, use of rapid on-site cytological evaluation (ROSE) and so on.[31]

CONCLUSION

Benign breast lesions are the most common breast lesions, the majority non-neoplastic, emphasizing the usefulness of FNAC in avoiding unnecessary surgeries done due to fear of cancer. Breast cancer is increasing in incidence, with more than 70% of the cases being diagnosed before the age of 50.

Breast FNAC is an accurate, sensitive, and highly specific test enabling effective diagnosis of breast lesions, with absolute sensitivity and specificity of 77.2% and 99.1% respectively.

The importance of cytopathological analysis of palpable breast lesions cannot be overemphasized, especially on account of most of the cancers being mobile and, at a younger age, mimicking benign lesions clinically.

For the identification of malignant lesions, FNAB has proven to be highly sensitive and specific. As a result, it can be utilized in low- and middle-income countries where radiological facilities are scarce, and CNB is not readily available and too costly.

ETHICAL CONSIDERATION

Ethical clearance was obtained from the Institutional Review Board of Jimma University as well-permission to conduct the study was obtained from the Department of Pathology.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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ANNEXURE

The International Academy of Cytology Yokohama System for Reporting Breast Fine Needle Aspiration (Diagnostic category)

Insufficient/Inadequate: This category is used when the smears are too sparsely cellular or distorted to allow a microscopic diagnosis or the aspirate is inconsistent with the clinical and image findings. Since this is a subjective diagnosis an explanation of why the sample is insufficient/inadequate should be given.

Benign: This diagnostic category is used when the sample is adequate and shows no evidence of malignancy.

Atypical: This category is used with the presence of cytological features seen predominantly in benign processes or lesions, but with the addition of some features that are uncommon in benign lesions and which may be seen in malignant lesions

Suspicious of malignancy: This diagnostic category is used when the smears show features suggestive of but not diagnostic of malignancy. The malignant cells may be too scanty, obscured by artifact or show atypical features more marked than in the atypical or indeterminate category but not diagnostic of malignancy.

Malignant: This diagnostic category is used when the aspirate is clearly malignant. This diagnostic category includes invasive breast carcinoma, ductal carcinoma in-situ and other malignancies.