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A FIVE-YEAR RETROSPECTIVE AUDIT OF CYTOLOGY SPECIMENS AT A TERTIARY CENTRE IN SOUTHEASTERN NIGERIA: PATTERNS, DIAGNOSTIC OUTCOMES, AND CLINICAL IMPLICATIONS

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ABSTRACT

Background: Cytopathology, encompassing body fluid cytology and fine needle aspiration cytology (FNAC) of solid tissues, plays a crucial role in the diagnosis and management of malignant effusions, solid mass lesions, infections, and inflammatory conditions, particularly in resource-limited settings. Understanding the patterns and diagnostic outcomes of cytological examinations is essential for improving clinical practice and patient outcomes.

Objective: This retrospective study aimed to analyze the distribution, diagnostic patterns, and clinical significance of cytology specimens comprising body fluid cytology and fine needle aspiration cytology (FNAC) of solid tissues examined at the Federal Medical Centre, Umuahia over a five-year period (2020–2024).

Methods: A retrospective analysis of 259 cytology cases (body fluid specimens and FNAC of solid tissues) was conducted. Data extracted included patient demographics (age, sex), specimen types, clinical presentations, and cytological diagnoses. Specimens were categorized according to standardized cytology reporting systems. Statistical analysis included descriptive statistics, chi-square tests, and independent t-tests.

Results: The study analyzed 259 cases with a mean age of 46.31 ± 18.24 years (range: 2-95 years). Among the 241 cases with documented sex, female patients predominated (68.5%, n=165) with a female-to-male ratio of 2.17:1; sex was not recorded in 18 cases (6.9%). Pleural

fluid samples constituted the largest proportion (32.4%, n=84), followed by fine needle aspiration cytology of solid tissues (23.9%, n=62) and ascitic/peritoneal fluids (17.4%, n=45). The majority of specimens were diagnosed as benign (C2, 57.9%), while the combined malignancy rate (C4+C5) was 16.6% (n=43; 95% CI: 12.1%–21.8%). Ascitic/peritoneal fluids showed the highest malignancy rate (24.4%), followed by FNAC specimens (21.0%) and pleural fluids (13.1%). No significant association was found between sex and malignancy (χ^2=0.804, p=0.370) or between age and malignant diagnosis (t=1.067, p=0.287).

Conclusion: Cytopathology**,** encompassing both body fluid cytology and FNAC, remains a valuable and cost-effective diagnostic tool in clinical practice. The relatively high malignancy detection rate in ascitic and FNAC specimens underscores the importance of cytological examination in patient management. These findings provide baseline data for quality improvement initiatives and contribute to understanding cytopathology practice patterns in Nigerian tertiary healthcare settings.

Keywords: *Fluid cytology, FNAC, diagnostic patterns, malignancy detection, Nigeria, Southeast Nigeria, retrospective study*

INTRODUCTION

Cytopathology, which is the microscopic examination of cells obtained from body fluids and tissues, has evolved into an indispensable diagnostic modality in modern medicine. Body fluid cytology, encompassing the analysis of various body fluids, including pleural, peritoneal, cerebrospinal, and urinary specimens, provides a minimally invasive yet highly informative approach to diagnosing a wide spectrum of pathological conditions (1, 2). Fine needle aspiration cytology (FNAC) of solid tissues complements fluid cytology and together these two modalities form the cornerstone of diagnostic cytopathology practice in most tertiary centers.

In resource-limited settings such as Nigeria, where advanced diagnostic facilities may not be readily available, both body fluid cytology and FNAC serve as cost-effective and efficient diagnostic tools. These techniques offer numerous advantages including rapid turnaround time, minimal patient discomfort, repeatability, and the ability to provide definitive diagnoses in many cases without the need for more invasive procedures (3, 4). Furthermore, FNAC has gained widespread acceptance as a first-line investigative procedure for evaluating both superficial and deep-seated masses (5).

The diagnostic accuracy of fluid cytology has been well-established in international literature, with reported sensitivities ranging from 50-95% depending on the specimen type and the nature of the underlying pathology (6, 7). However, the effectiveness of cytological diagnosis is influenced by various factors including specimen adequacy, sampling technique, cytopathologist expertise, and the prevalence of specific diseases in the population being served (8).

Despite the clinical importance of cytopathology, there is a paucity of published data on cytology practice patterns and diagnostic outcomes from Nigerian tertiary healthcare institutions. To date, no published data exists on comprehensive cytopathology audit data from Southeastern Nigeria. Understanding local disease patterns, specimen distribution, and diagnostic yield is crucial for quality assurance, resource allocation, and training program development. Such data also contributes to the broader understanding of disease epidemiology in Sub-Saharan Africa.

Federal Medical Centre, Umuahia serves as a major tertiary referral center in Southeastern Nigeria, providing specialized medical services to a population of over 5 million people. The cytopathology unit processes a diverse range of specimens,

including both body fluids and FNAC of solid tissues, from inpatient and outpatient departments, making it an ideal setting for studying comprehensive cytopathology practice patterns.

This study was therefore undertaken to: (1) determine the frequency and distribution of various cytology specimens both body fluid and FNAC examined over a five-year period; (2) analyze the demographic characteristics of patients undergoing cytological examination; (3) assess the diagnostic outcomes and malignancy detection rates; and (4) identify specimen types with the highest diagnostic yield for malignancy.

The findings will provide valuable baseline data for quality improvement initiatives and contribute to the understanding of cytopathology practice in Nigerian healthcare settings.

MATERIALS AND METHODS

Study Design and Setting

This was a retrospective descriptive study conducted at the Cytopathology Unit of Federal Medical Centre, Umuahia, Abia State, Nigeria. The center is a 300-bed tertiary healthcare facility that serves as a major referral center for Abia State and neighboring states in Southeastern Nigeria.

Study Period

The study covered a five-year period from January 2020 to December 2024, representing a comprehensive assessment of cytology practice during this timeframe.

Data Source and Collection

Data were extracted from the cytopathology laboratory registers and archived cytology reports. Information collected included:

1. Patient demographics: age, sex
2. Specimen characteristics: type of fluid/tissue, anatomical site
3. Clinical information: presenting complaints, provisional diagnoses, clinical history
4. Cytological diagnoses: categorical diagnosis based on standardized reporting systems
5. Temporal data: year and month of specimen submission

All data were anonymized to maintain patient confidentiality, and no patient identifiers were recorded. Inclusion criteria: all cytology specimens from body fluids and FNAC of solid tissues received and processed at the cytopathology unit between January 2020 and December 2024, with a retrievable laboratory report. Exclusion criteria: specimens with entirely missing or illegible laboratory records that precluded any data extraction were excluded. Where a patient had more than one specimen submitted during the study

period, each specimen was counted as a separate case since each represented an independent clinical event and diagnostic episode; no patient was excluded solely on the basis of having multiple submissions. The "Other" specimen category comprised miscellaneous specimens that did not fit defined single-organ categories, including synovial fluid, pericardial fluid, wound aspirates, salivary gland aspirates, and lymph node aspirates from sites not otherwise categorized.

Specimen Processing and Reporting

All specimens were processed according to standard cytopathology protocols. Fluid specimens were centrifuged, and smears were prepared from the sediment. FNAC specimens were processed using both conventional smear and liquid-based cytology techniques where applicable. Smears were stained using H&E staining methods.

Cytological diagnoses were reported using standardized categorical reporting systems:

- For fluid specimens: C1 (Unsatisfactory), C2 (Benign/Negative), C3 (Atypical), C4 (Suspicious for Malignancy), C5 (Malignant/Positive)
- For thyroid FNAC: Bethesda System for Reporting Thyroid Cytopathology
- For urine cytology: The Paris System where applicable

All specimens were examined by qualified cytopathologists with expertise in diagnostic cytopathology. Each specimen was primarily reported by one cytopathologist; cases classified as C3 (Atypical), C4 (Suspicious for Malignancy), or C5 (Malignant) were reviewed by a second cytopathologist for confirmation, with discordant cases resolved by consensus. Specimens were classified as C1 Unsatisfactory when the cellular material was insufficient for a definitive cytological assessment, defined as fewer than six well-preserved diagnostic cells on a fluid specimen smear, or a hypocellular FNAC smear without representative material from the target lesion. Quality control measures included regular equipment calibration, reagent quality checks, and review of turnaround times.

Data Analysis

Data were entered into Microsoft Excel and analyzed using the Python programming language (version 3.10) with pandas, NumPy, SciPy, and matplotlib libraries. Descriptive statistics including frequencies, percentages, means, standard deviations, and ranges were calculated for all variables. Ninety-five percent confidence intervals (95% CI) were calculated for overall and specimen-specific malignancy rates using the Wilson score interval method.

Categorical variables were compared using the chi-square test, while continuous variables were compared using the independent t-test. Effect sizes were reported as Cramér's V for chi-square tests and Cohen's d for t-tests. A p-value of less than 0.05 was considered statistically significant. Given the relatively small sample size, the statistical power for detecting moderate effect sizes (d=0.5) was approximately 0.65 at α=0.05; this limitation should be considered when interpreting non-significant findings. Data visualization was performed using bar charts, pie charts, histograms, and box plots as appropriate.

Ethical Considerations

The study utilized retrospective data from existing records only, and all patient information was anonymized to protect confidentiality.

RESULTS

A total of 259 cytology specimens (body fluid and FNAC) were analyzed during the five-year study period (2020–2024). The annual case distribution showed fluctuation, with 2022 recording the highest number of cases (n=79, 30.5%), followed by 2021 (n=58, 22.4%), 2020 (n=50, 19.3%), 2023 (n=39, 15.1%), and 2024 (n=33, 12.7%) (Table 5).

Patient Demographics

The age of patients ranged from 2 to 95 years, with a mean of 46.31 ± 18.24 years and a median of 47.0 years (IQR: 35.0–60.0 years). The majority of patients were in the 41–60 years age group (39.7%, n=93), followed by 21–40 years (28.6%, n=67), >60 years (22.6%, n=53), and 0–20 years (9.0%, n=21) (Table 1, Figure 4).

Among the 241 cases with documented sex, female patients predominated, accounting for 68.5% (n=165) compared with males at 31.5% (n=76), yielding a female-to-male ratio of 2.17:1. Sex was not recorded in 18 cases (6.9%) (Table 1, Figure 5).

Specimen Types Distribution

Pleural fluid samples constituted the largest proportion of specimens (32.4%, n=84), followed by FNAC of solid tissues (23.9%, n=62) and ascitic/peritoneal fluids (17.4%, n=45). Other specimen types included urine (4.2%, n=11), sputum (2.7%, n=7), breast FNAC (1.5%, n=4), cerebrospinal fluid (1.2%, n=3), and thyroid FNAC (0.8%, n=2). A heterogeneous "Other" category comprised 15.8% (n=41) of specimens (Table 2, Figure 2).

Cytological Diagnoses

The majority of specimens were diagnosed as C2-Benign (57.9%, n=150), followed by C5-Malignant (10.8%, n=28), C3-Atypical (9.7%, n=25), C1-Unsatisfactory (9.3%, n=24), and C4-Suspicious for malignancy

(5.8%, n=15). Seventeen cases (6.6%) remained unclassified due to incomplete documentation (Table 3, Figure 3).

The combined malignancy rate (C4 + C5) was 16.6% (n=43; 95% CI: 12.2%–22.0%). When stratified by specimen type, ascitic/peritoneal fluids showed the highest malignancy rate at 24.4% (95% CI: 13.3%–39.3%), followed by FNAC specimens at 21.0% (95% CI: 11.7%–33.9%), and pleural fluids at 13.1% (95% CI: 6.8%–23.0%) (Table 4, Figure 6).

Statistical Analysis

Chi-square analysis revealed no significant association between sex and malignancy (χ^2 = 0.804, p = 0.370, Cramér's V = 0.060, indicating a negligible effect). Similarly, an independent t-test showed no significant difference in mean age between malignant and non-malignant cases (t = 1.067, p = 0.287, Cohen's d = 0.16, a small effect). These non-significant findings should be interpreted in the context of the study's limited statistical power for small-to-moderate effect sizes. Age distribution across diagnostic categories showed no statistically significant differences (Table 6, Figure 8).

DISCUSSION

This study presents the first comprehensive audit of cytopathology practice patterns, encompassing both body fluid cytology and FNAC of solid tissues, from a tertiary healthcare institution in Southeastern Nigeria. Over a five-year period, 259 specimens were examined, revealing important insights into specimen distribution, demographic patterns, and diagnostic outcomes.

The predominance of pleural fluid specimens (32.4%) in our series aligns with findings from similar studies in developing countries, where respiratory diseases, including tuberculosis, malignancy, and cardiac failure, remain major health concerns. Comparable patterns have been reported from other Nigerian and African centers: Eze et al. from Enugu reported pleural effusions as the most frequent fluid cytology specimen in their series, accounting for approximately 35% of cases, while Bode et al. from Lagos documented similar predominance of thoracic fluid specimens in their cytopathology audit (9, 10). A study from India by Gupta et al. reported pleural effusions constituting 38% of their cytology specimens, consistent with our findings (6). The relatively high malignancy detection rate in pleural fluids (13.1%; 95% CI: 6.8%–23.0%) in our study is consistent with international literature reporting rates between 10–30%, depending on the underlying disease prevalence and patient selection criteria.

The notably high malignancy rate in ascitic/peritoneal fluids (24.4%; 95% CI:

13.3%–39.3%) deserves particular attention. This finding exceeds rates reported in many Western series (typically 10–15%) but is comparable to data from other African and Asian centers. Within the Nigerian literature, similarly elevated ascitic fluid malignancy rates have been documented, reflecting the advanced stage of disease at presentation that characterizes cancer care in resource-limited settings (11, 12). The high rate observed at our center may also reflect the prevalence of specific malignancies with peritoneal involvement, notably ovarian cancer and gastrointestinal malignancies, which are among the most common cancers in southeastern Nigeria. It is important to note that without histopathological correlation, this malignancy rate represents cytological suspicion rather than confirmed malignancy; the true positive predictive value could not be calculated in this retrospective design.

The FNAC malignancy rate of 21.0% in our study falls within the expected range for unselected FNAC specimens. This rate is influenced by several factors, including patient selection, clinical suspicion, and the spectrum of lesions encountered. The effectiveness of FNAC as a diagnostic tool is well established, with sensitivities ranging from 85–95% for detecting malignancy when adequate specimens are obtained.

The female predominance in our study (F:M ratio 2.17:1) is noteworthy and likely reflects several factors. Breast lesions, gynecological conditions, and thyroid disorders are all conditions with female preponderance that commonly require cytological evaluation. Additionally, gender-specific healthcare-seeking behaviors and disease prevalence patterns in our population may contribute to this distribution.

The age distribution, with peak incidence in the 41–60 years group (39.7%), reflects the age-related increase in malignancy risk and chronic diseases. This pattern is consistent with global trends showing increasing cancer incidence with age. The absence of a significant age difference between malignant and non-malignant cases suggests that cytological examination remains valuable across all age groups.

The unsatisfactory specimen rate of 9.3% in our series is within acceptable limits (typically <10%) but highlights the ongoing need for quality improvement initiatives. Factors contributing to specimen inadequacy include sampling technique, specimen processing, and the nature of the lesion. Targeted training and standardized protocols can help reduce this rate further.

The temporal trend showing declining cases in 2023–2024 (particularly 2024 with only 33 cases, representing a 58% decline from the 2022 peak of 79) warrants careful consideration. Several intersecting factors may explain this decline. First, the lingering effects of the COVID-19 pandemic on healthcare utilisation in Nigeria are well documented; studies have shown persistent reductions in elective and non-emergency referrals in the post-pandemic period as healthcare systems recalibrate (13). Second, operational challenges specific to the cytopathology unit, including reagent supply disruptions, instrument downtime, and staffing changes, may have transiently reduced laboratory output. Third, evolving referral patterns, with some clinicians shifting to histopathological biopsy as a first-line investigation for solid masses as surgical services recovered post-pandemic, could have diverted cases away from cytology. Fourth, the possibility of under-documentation or incomplete record capture in 2023–2024 cannot be excluded given the retrospective design. Prospective monitoring of case volumes with systematic root cause analysis is recommended to distinguish service disruption from genuine epidemiological trends.

Study Limitations

This study has few limitations that should be acknowledged. First, the retrospective design limits our ability to collect additional clinical information and may be subject to incomplete documentation. Second, as a single-center study, our findings may not be generalizable to other Nigerian healthcare settings with different patient populations and disease patterns. Third, and most critically, the absence of histopathological correlation for the majority of cytological diagnoses is a significant methodological limitation. Without comparison against the gold standard of tissue biopsy histology, we are unable to calculate sensitivity, specificity, positive predictive value, or negative predictive value for the cytological diagnoses rendered. The reported malignancy rates therefore represent cytological impressions rather than confirmed histological malignancy, and any clinical conclusions about diagnostic accuracy must be drawn with this caveat firmly in mind. Fourth, the absence of clinical follow-up data prevents assessment of the clinical impact of cytological diagnoses and patient outcomes. Fifth, the relatively small sample size for some specimen types (e.g., CSF n=3, thyroid FNAC n=2) renders subgroup malignancy rates statistically unreliable and wide confidence intervals for these categories reflect genuine uncertainty. Sixth, missing sex data in 18 cases (6.9%) and missing age data in 24 cases introduce potential bias in

demographic analyses, though sensitivity analysis suggests the missing data pattern is likely random. Finally, the declining case numbers in 2023–2024 may have affected the representativeness of the overall dataset.

Despite these limitations, this study provides valuable baseline data on cytology practice patterns in Southeastern Nigeria and highlights areas for quality improvement and further research.

Clinical Implications

The findings of this study have several important clinical implications. The high malignancy detection rates in ascitic fluids and FNAC specimens underscore the diagnostic value of cytological examination in these clinical scenarios. Clinicians should maintain a high index of suspicion for malignancy in patients presenting with these conditions. The data support continued investment in cytopathology services as a cost-effective diagnostic modality in resource-limited settings.

Quality improvement initiatives should focus on reducing the unsatisfactory specimen rate from the current 9.3% to below 5% through enhanced sampling techniques, immediate adequacy assessment where feasible, and standardized processing protocols. Additionally, efforts to understand and address the declining case numbers in recent years are essential for maintaining service capacity.

Future studies should include prospective designs with histological correlation, clinical follow-up, and assessment of diagnostic accuracy. Multicenter studies across different Nigerian regions would provide broader insights into cytology practice patterns and disease epidemiology. Integration of newer technologies such as liquid-based cytology and molecular diagnostics should be explored to enhance diagnostic capabilities.

CONCLUSION

This study provides the first comprehensive cytopathology audit encompassing both body fluid cytology and FNAC of solid tissues from a tertiary healthcare institution in Southeastern Nigeria. Cytopathology remains a valuable and cost-effective diagnostic tool with significant clinical impact, particularly for malignancy detection. The high malignancy rates in ascitic fluids (24.4%) and FNAC specimens (21.0%) highlight the critical importance of cytological examination in patient management, while the absence of histopathological correlation in this retrospective series underscores the need for prospective studies with gold-standard validation. These findings establish baseline data for quality improvement initiatives, demonstrate the feasibility of

maintaining cytopathology services in resource-limited settings, and contribute to understanding disease patterns in Nigerian populations. Continued investment in cytopathology services, reduction of the unsatisfactory specimen rate below 5%, and systematic prospective data capture are essential priorities for improving diagnostic capabilities in Nigerian healthcare settings.

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CONFLICTS OF INTEREST

The author declares no conflicts of interest related to this study.

FUNDING

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Table 1: Demographics and Clinical Characteristics

Characteristic	Value
Total cases	259
Study period	2020-2024
Age (years)	
Mean ± SD	46.31 ± 18.24
Median (IQR)	47.0 (35.0-60.0)
Range	2-95
Sex, n (%)	
Female	165 (68.5)
Male	76 (31.5)
F:M Ratio	2.17:1
Sex not recorded, n (%)	18 (6.9)
Age groups, n (%)	
0-20 years	21 (9.0)
21-40 years	67 (28.6)
41-60 years	93 (39.7)
>60 years	53 (22.6)

Table 2: Distribution of Specimen Types

Specimen Type	Number of Cases	Percentage (%)
Pleural Fluid	84	32.4
FNAC (Solid Tissue)	62	23.9
Ascitic/Peritoneal Fluid	45	17.4
Other	41	15.8
Urine	11	4.2
Sputum	7	2.7
Breast FNAC	4	1.5
CSF	3	1.2
Thyroid FNAC	2	0.8

Table 3: Cytological Diagnosis Distribution

Diagnostic Category	Number of Cases	Percentage (%)
C2-Benign	150	57.9
C5-Malignant	28	10.8
C3-Atypical	25	9.7
C1-Unsatisfactory	24	9.3
Unclassified	17	6.6
C4-Suspicious	15	5.8

Table 4: Malignancy Rate by Specimen Type

Specimen Type	Total	C5	C4	C3	C2	C1	Malig Rate (%)
Pleural Fluid	84	7	4	2	59	6	13.1
FNAC (Solid Tissue)	62	8	5	14	27	3	21.0
Ascitic/Peritoneal Fluid	45	8	3	2	26	5	24.4
Urine	11	1	0	0	8	1	9.1
Sputum	7	0	0	0	5	1	0.0
Breast FNAC	4	0	0	1	1	2	0.0
CSF	3	0	0	0	2	1	0.0
Thyroid FNAC	2	0	0	0	2	0	0.0

Table 5: Annual Case Distribution by Diagnostic Category

Year	C1	C2	C3	C4	C5	Total
2020	5	29	5	3	5	50
2021	5	34	6	3	6	58
2022	7	46	8	5	9	79
2023	4	23	4	2	5	39
2024	3	18	2	2	3	33
Unclassified	-	-	-	-	-	17
Total	**24**	**150**	**25**	**15**	**28**	**259**

Table 6: Age Distribution by Diagnostic Category

Diagnostic Category	N	Mean ± SD	Median (IQR)	Range
C1-Unsatisfactory	21	43.24 ± 15.78	45.0 (32.0-56.0)	15-65
C2-Benign	138	46.93 ± 17.70	47.0 (35.2-60.8)	2-88
C3-Atypical	22	43.18 ± 14.93	41.5 (31.2-51.8)	21-86
C4-Suspicious	13	53.77 ± 18.94	52.0 (46.0-65.0)	11-86
C5-Malignant	24	46.79 ± 18.81	52.5 (36.8-60.0)	4-75

Note: N=218; for Tables 4 & 6 excludes 17 unclassified cases and 24 cases with missing age data. Age data were available only for 218 of 259 total cases (84.2%).

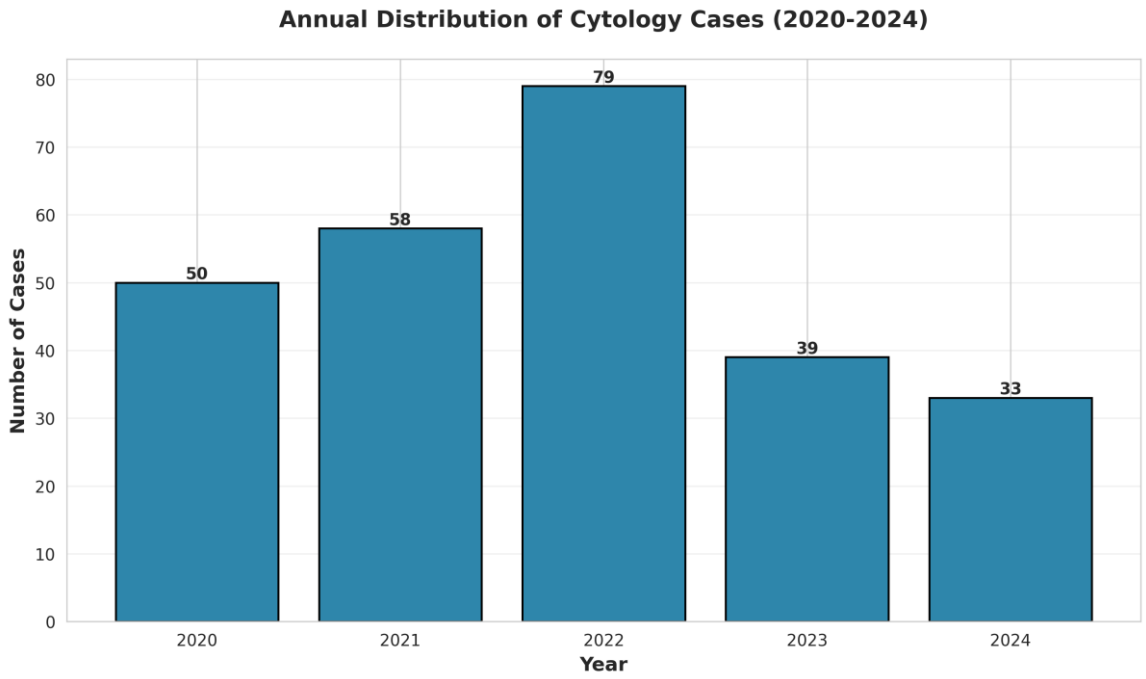

Figure 1: Annual distribution of cytology cases (2020-2024) showing case volume trends over the five-year study period.

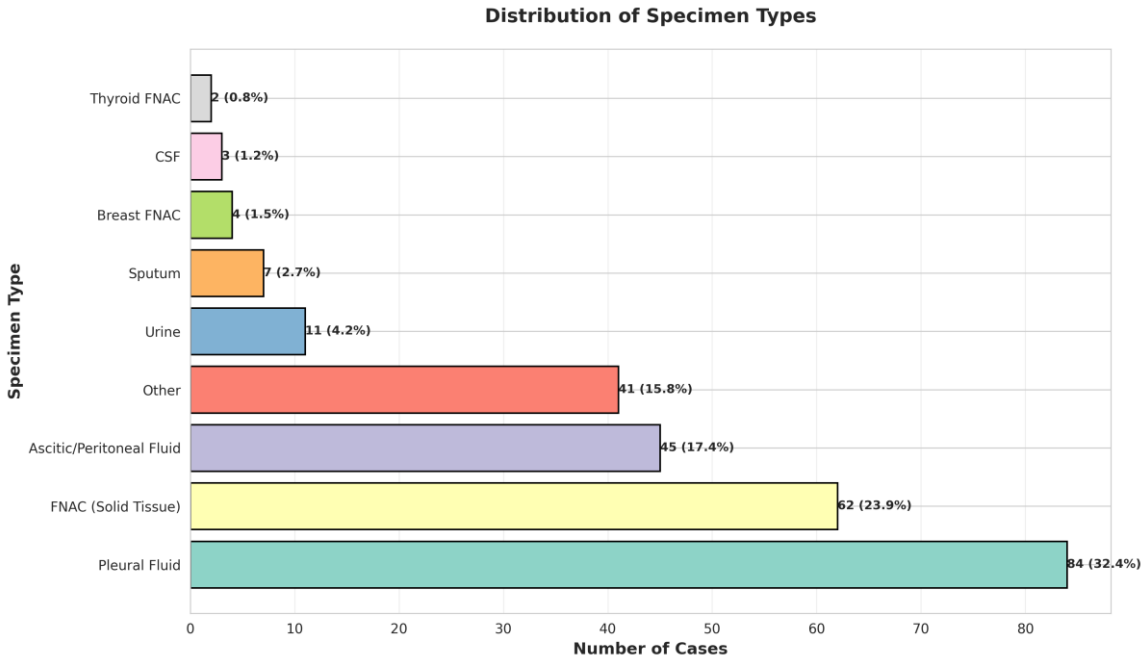

Figure 2: Distribution of specimen types showing pleural fluid as the most common specimen type (32.4%), followed by FNAC specimens (23.9%).

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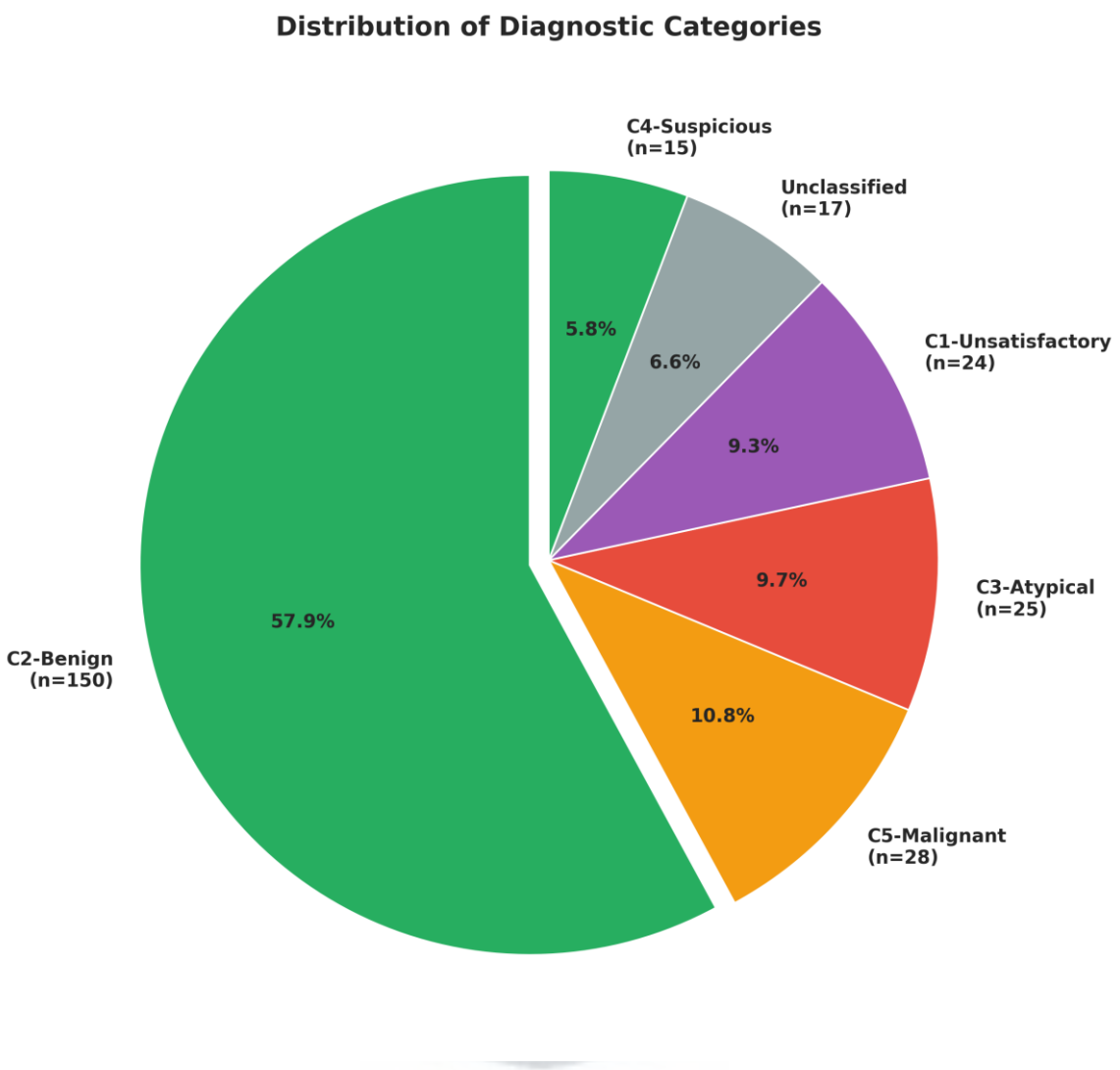

Figure 3: Pie chart showing distribution of diagnostic categories with C2-Benign constituting the majority (57.9%) of diagnoses

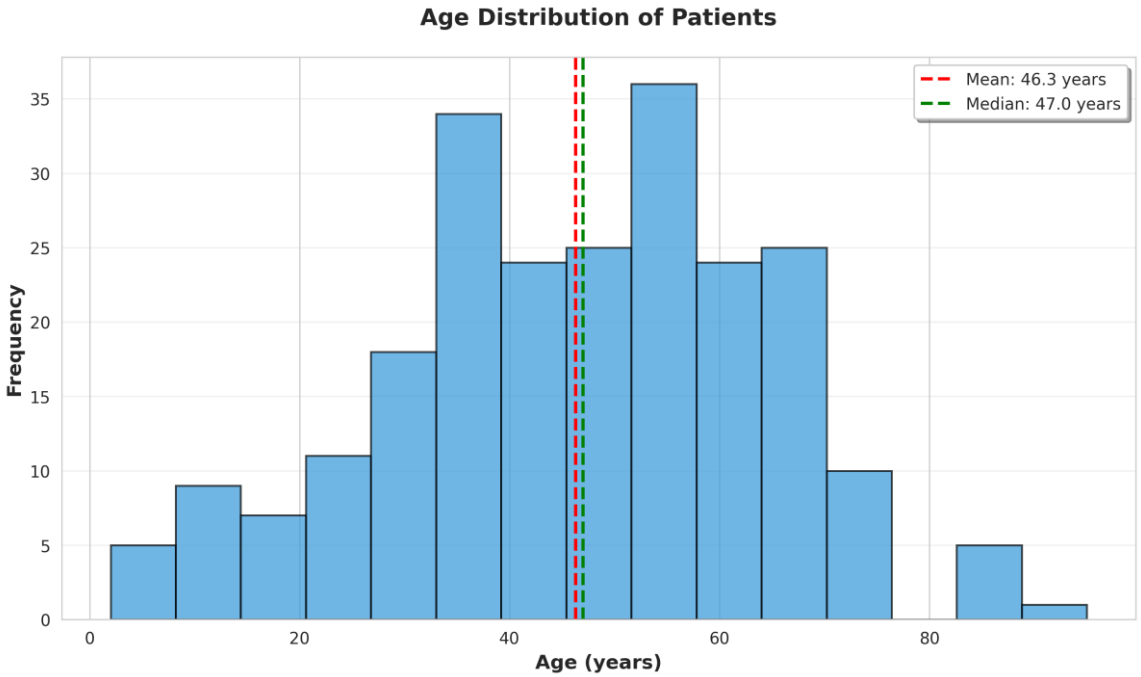

Figure 4: Age distribution histogram with mean and median age indicators, showing peak incidence in the 41–60 years age group.

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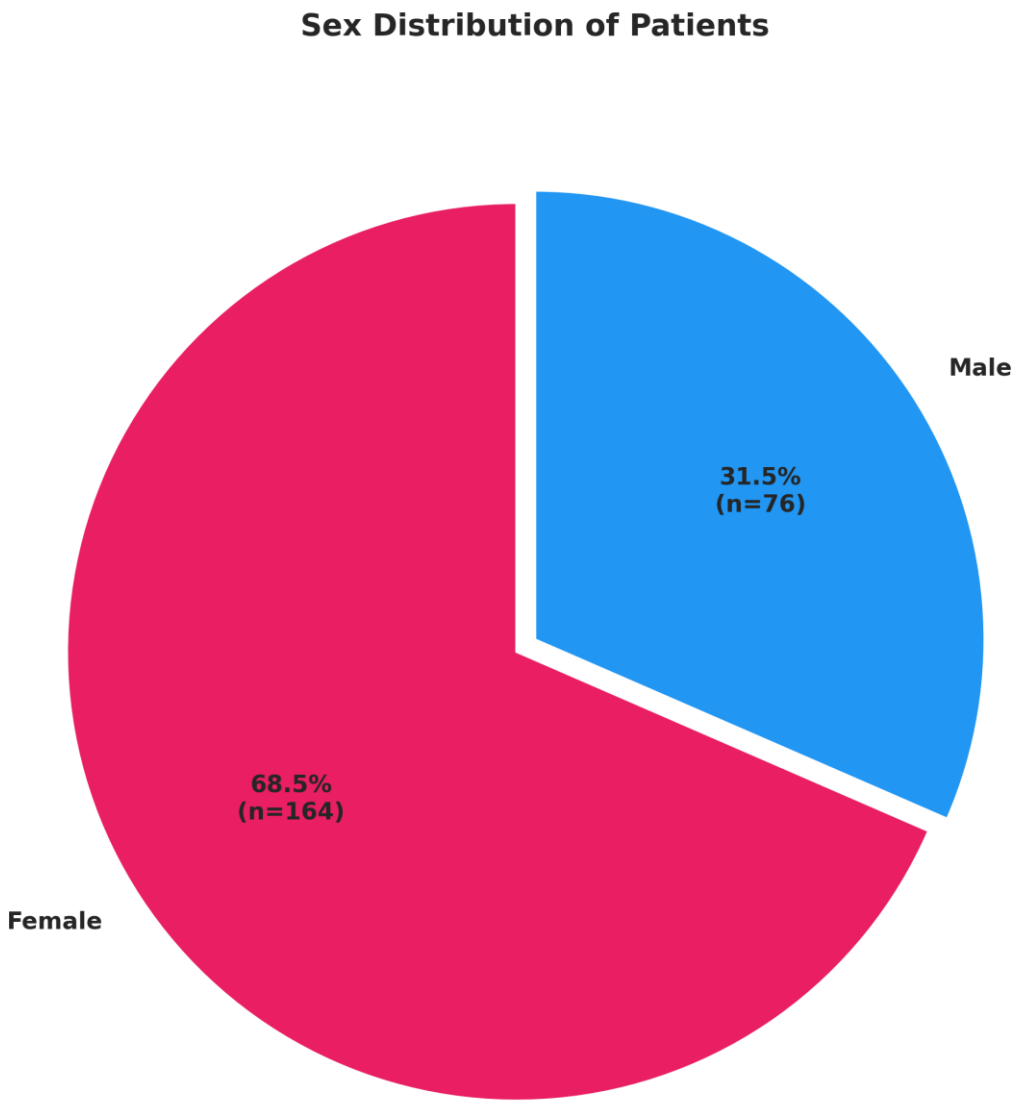

Figure 5: Sex distribution of patients demonstrating female predominance (68.5%) with F:M ratio of 2.17:1

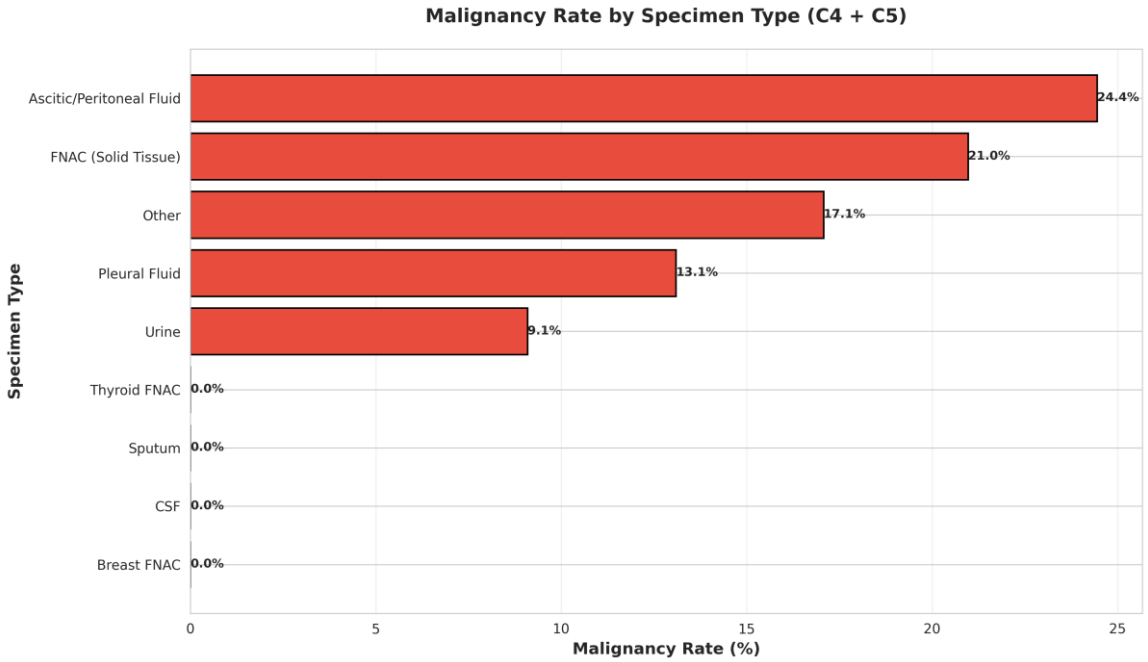

Figure 6: Malignancy rate by specimen type showing ascitic/peritoneal fluids with highest rate (24.4%), followed by FNAC (21.0%).

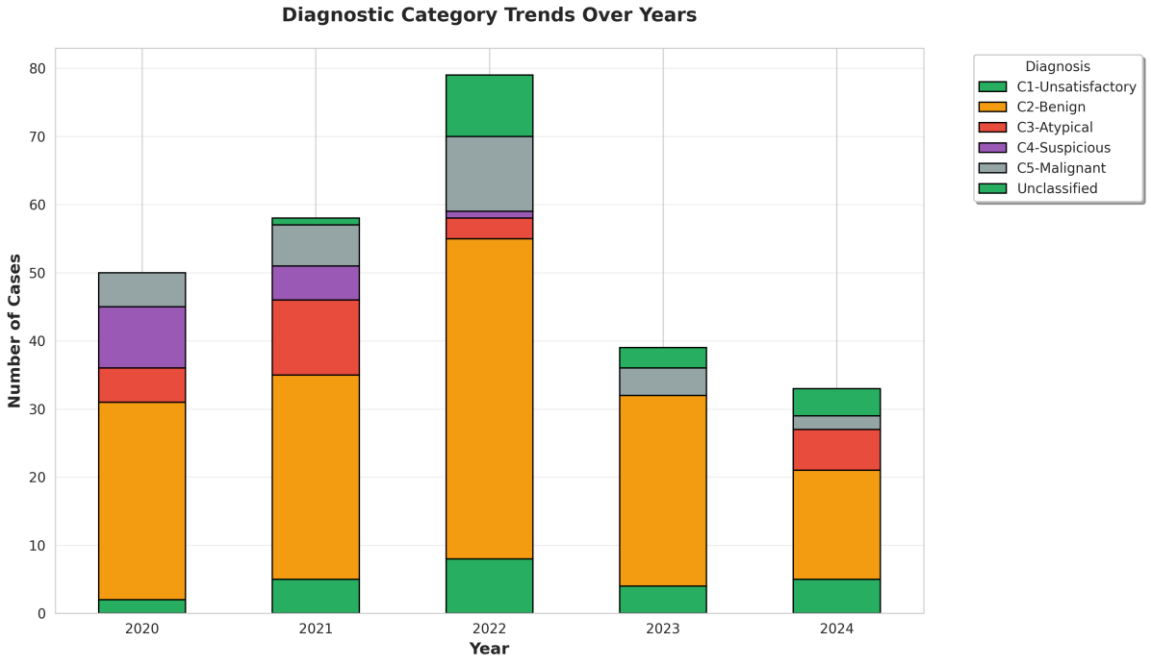

Figure 7: Temporal trends showing diagnostic category distribution across years from 2020-2024.

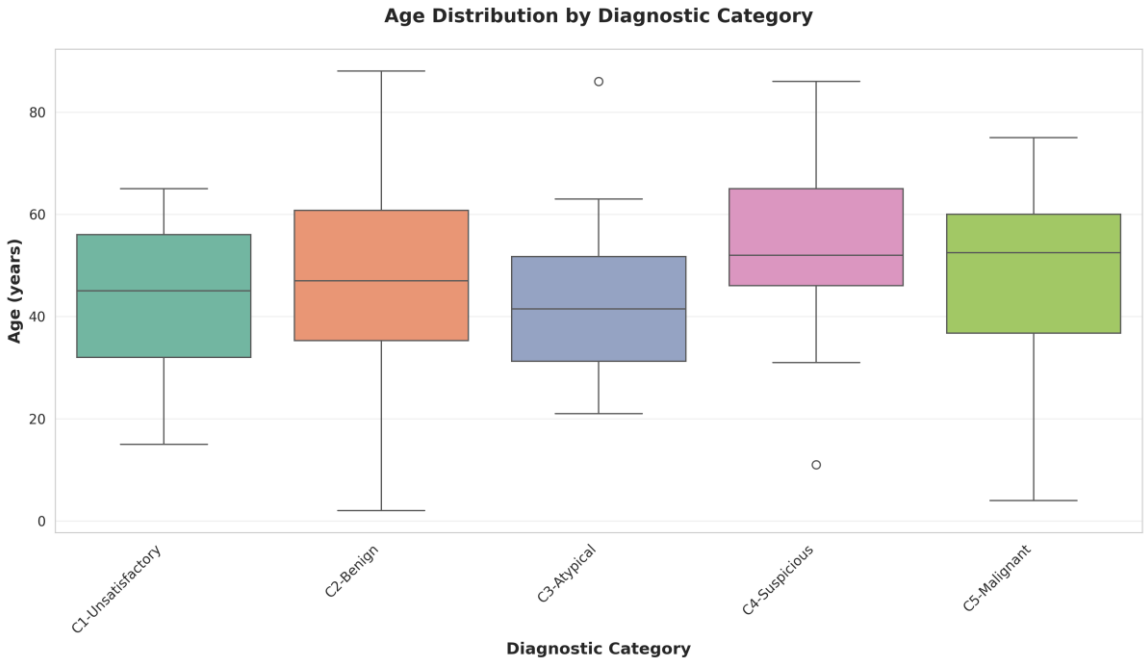

Figure 8: Box plot comparing age distribution across diagnostic categories showing no significant difference between groups.

REFERENCES

1. DeMay RM. The Art and Science of Cytopathology. 2nd ed. Chicago: ASCP Press; 2012.

2. Koss LG, Melamed MR. Koss' Diagnostic Cytology and Its Histopathologic Bases. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2006.

3. Cibas ES, Ducatman BS. Cytology: Diagnostic Principles and Clinical Correlates. 5th ed. Philadelphia: Elsevier; 2020.

4. Nayar R, Wilbur DC. The Bethesda System for Reporting Cervical Cytology: Definitions, Criteria, and Explanatory Notes. 3rd ed. New York: Springer; 2015.

5. Ali SZ, Cibas ES. The Bethesda System for Reporting Thyroid Cytopathology. New York: Springer; 2010.

6. Gupta N, Rajwanshi A, Srinivasan R. Malignant effusions: an analysis of 1000 cases. Indian J Pathol Microbiol. 2007;50(4):700-702.

7. Light RW. Pleural effusions. Med Clin North Am. 2011;95(6):1055-1070.

8. Orell SR. Diagnostic difficulties in fine needle aspiration cytology. Cytopathology. 2017;28(5):363-373.

9. Adeyinka TS, Komolafe AO, Adeyemi O, Oluwasola AO. Evaluation of ascitic fluid cytology in a tertiary hospital in South-Western Nigeria: a 7-year retrospective study. Med J Dr DY Patil Vidyapeeth. 2024;17(6):1234-1240.

10. Eze JC, Ezemba N, Ngene IF. Pleural effusion: aetiology, clinical presentation and mortality outcome in a tertiary health institution in Eastern Nigeria – a five-year retrospective study. Open J Respir Dis. 2015;5(2):41-50.

11. Mandong BM, Ngbea JA, Tanko MN, Echejoh GO. Pattern of histopathological diagnosis in a Nigerian tertiary hospital. Niger J Med. 2011;20(2):204-209.

12. Atanda AT, Atanda OA. Surgical pathology specimens in a Nigerian teaching hospital: an audit. Ann Ib Postgrad Med. 2012;10(2):24-29.

13. Nnaji CA, Moodley J. Impact of the COVID-19 pandemic on cancer diagnosis, treatment and research in African health systems: a review of current evidence and contextual perspectives. Ecancermedicalscience. 2021;15:1170.

14. Tagar E, Kpolugbo J, Tagar AG, Ozah E, Ehiagwina LA, Enegbuya O. Fine needle aspiration in the evaluation of patients with suspected breast cancer in a suburban Nigerian teaching hospital: a five-year review. J Breast Cancer Res. 2024;4(1):11-16.

15. Oduola-Akande OA, Oduola TA, Adesola AO, Junaid TA. Diagnostic accuracy of fine needle aspiration cytology of palpable breast masses in Benin City, Nigeria. West Afr J Med. 2010;29(5):300-304.

16. Adeyinka TS, Okon EE, Okonkwo KC. Fine needle aspiration cytology of breast lumps with histopathologic correlation in Owo, Ondo State, Nigeria: a five-year review. Ann Afr Med. 2017;16(3):103-108.

17. Chandra A, Cramer H, Kurtycz DFI, Vielh P. The International System for Reporting Serous Fluid Cytopathology. Acta Cytol. 2019;63(3):188-190.

18. Porcel JM, Gasol A, Bielsa S, Civit C, Light RW, Salud A. Clinical features and survival of lung cancer patients with pleural effusions. Respirology. 2015;20(4):654-659.

19. Renshaw AA, Dean BR, Antman KH, Sugarbaker DJ, Cibas ES. The role of cytologic evaluation of pleural fluid in the diagnosis of malignant mesothelioma. Chest. 1997;111(1):106-109.

20. Tolani MA, Fidelis L, Oyelowo N, et al. Impact of the COVID-19 pandemic on surgical practice, training, and research in Nigeria. Pan Afr Med J. 2021;39:59.

21. Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249.

22. Nayar R, Wilbur DC. The Bethesda System for Reporting Cervical Cytology: A Historical Perspective. Acta Cytol. 2017;61(4-5):359-372.