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Original Article

# Application of the Indian Academy of Cytologist (IAC) on Reporting Various Body Fluids at PDU Medical College and Hospital, Rajkot

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## ABSTRACT

**Introduction**: Serous effusion indicates accumulation of excess fluid in the body cavities, namely pleural, pericardial and peritoneal, the latter also reffered to as ascities. Effusion invariably indicates an underlying pathology and constitutes an important diagnosis sample in clinical practice, including oncology[1].The Indian Academy of Cytologists published Guidelines and categories for Reporting Serous Effusions (IACGRSE) in 2020 to improve consistency, reproducibility and standardize reporting and to guide patient management.

**Materials and Methods**: The study was carried out in the Cytopathology Laboratory, Department of Pathology, P.D.U Medical College and Hospital, Rajkot, Gujarat from 1st October 2024 to 30 April 2025. All samples were collected from different wards withrequisition form with necessary details such as name, age, sex, registration number, relevant clinical history and date and time of collection.In each case sediment smears were prepared using the cytocentrifugation method. One smear was fixed with alcohol spray and stained with haematoxylin and eosin stain the other was air-dried for Pap stain. Special staining such asGiemsa, Ziehl–Neelsen applied whenever necessary.The cellular component of each category was recorded. Each case was categorized into these five diagnostic categoriesAll the cases were categories according to IACGRSE 2020 Category.Clinical, radiological and histological information were obtained and correlated with the cytological findings wherever available.

**Result**: We have received total 175 fluid samples over a period of 6 months. Samples from different age groups ranging from 10 years to 89 years and the maximum numbers of the patient were from 40-60 years of age group. A total 175 fluid samples were examined out of which 107/175(61.2%) were pleural fluid and 68/175(38.8%) were peritoneal fluid. The majority of fluids belonged to category II, whereas only 3/107 (2.8%) of pleural fluid and 2/68(2.9%) of peritoneal fluid samples were malignant.

**Conclusion:** The Indian Academy of Cytologist' recommendation for reporting effusion fluid cytology with utilization of a five tiered reporting system and assess risk of malignancy for each category.

***Keywords***: *Cytology, Serous fluid, IAC category, Risk of malignancy.*

## INTRODUCTION

Serous effusion indicates accumulation of excess fluid in the body cavities, namely pleural, pericardial and peritoneal, the latter also reffered to as ascities. Effusion invariably indicates an underlying pathology and constitutes an important diagnosis sample in clinical practice, including oncology[1]. Cytolopathological analysis of serous fluids is a minimally invasive, cost effective and simple method that help incategorization of fluids according to The Indian Academy of

Cytologists(IAC) category. The Indian Academy of Cytologists published Guidelines and categories for Reporting Serous Effusions (IACGRSE) in 2020 to improve consistency, reproducibility and standardize reporting and to guide patient management. A standardized report of fluids cytologycan be of great help to inpatient management. Effusion is an invariable important diagnostic sample and is an essential landmark in the management roadmap, especially in diagnosing and staging malignancies.[2] Malignancies are the cause of serious effusion in approximately 10–25% of pleural and peritoneal effusions.[4] In many cases, it might be the first manifestation of an unknown primary tumor of body. Peritoneal effusion is the initial presenting feature in more than 50% of gynecological gastrointestinal malignancies with peritoneal metastasis.[5]

There are no uniform guidelines for the diagnostic categorization of the fluid samples. Many of the centers are following their own reporting system, thus creating a discrepancy in the diagnosis and due to that reason causing difficulties in reaching a definitive management plan. Following, the usefulness in the Bethesda system for pap smears and thyroid cytology, Milan system for reporting salivary gland cytology, Paris system for urine cytology, etc., The Indian Academy of Cytologists published Guidelines and categories for Reporting Serous Effusions (IACGRSE) was proposed, serous effusion fluids to provide uniformity across all laboratories and to implement a proper reporting format[11]. They have also categorized the reporting of effusion into five recommended categories-
Category: Category: I (Unsatisfactory For Evaluation)
II A (No Malignant Cells Detected)
II B (Benign Changes Seen)
III (Atypical Cells, Not Otherwise Specified)
IV (Atypical Cells, Suspicious for Malignancy)
V(MalignantCells)

To assess the feasibility of these diagnostic categories in effusion fluid samples, we giving our findings by categorizing the effusion fluids into reporting format as prescribed by IAC.

## MATERIALS AND METHODS

The present study was carried out in the Cytopathology Laboratory, Department of Pathology, P.D.U Medical College and Hospital, Rajkot, Gujarat carried out over a period of 6 months from October 2024 to April 2025.

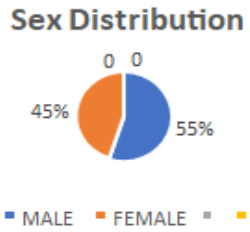
All samples were collected from different wards with requisition form with necessary details such as name, age, sex, registration number, relevant clinical history and date and time of collection.. The patient's demographic profile, cytology report, radiological diagnosis , histopathological follow-up, and relevant clinical history were collected and analyzed for each case. In each case sediment smears were prepared using the cytocentrifugation method. One smear was fixed with alcohol spray and stained with hematoxylin and eosin stain the other was air-dried for Giemsastain. Special staining such as Ziehl–Neelsen and periodic acid Schiff stains and PaP stain was applied wherever required. The leftover samples were stored in the refrigerator at 2–8°C until the case was reported by the pathologist The cellular component of each category was recorded. Each case was categorized into these five diagnostic categories All the cases were categories according to IACGRSE 2020 Category.

Category: I (Unsatisfactory For Evaluation)
II A (No Malignant Cells Detected)
II B (Benign Changes Seen)
III (Atypical Cells, Not Otherwise Specified)
IV (Atypical Cells, Suspicious for Malignancy)
V(MalignantCells)

## RESULT

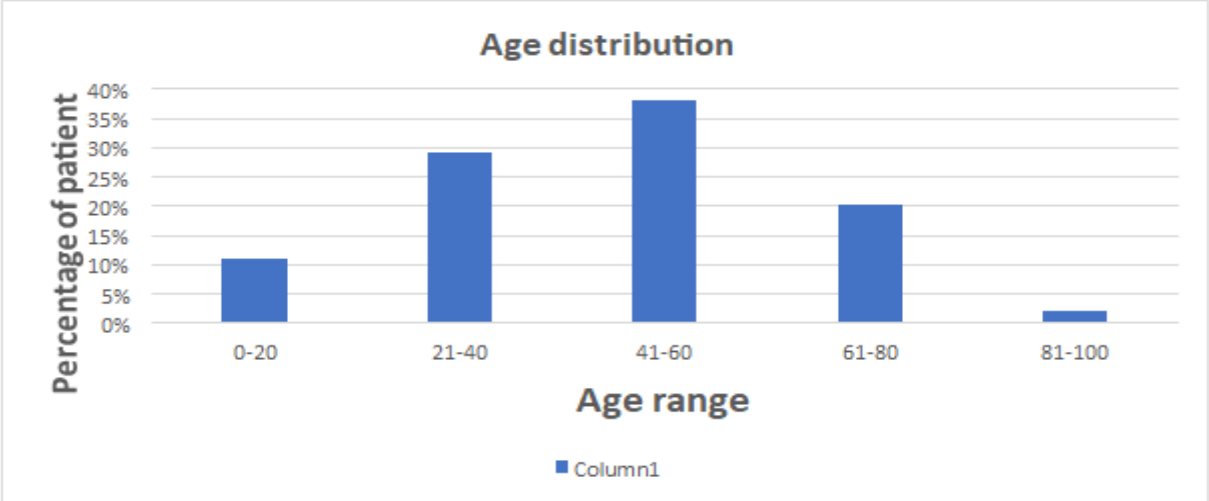
**Distribution of cases according to sex, age, type of fluids and risk of malignancy.**

**Table 1: - SEX DISTRIBUTION OF PATIENTS**



In the present study of 175 cases, 97cases (55%) were male, while 78 cases (45%) were female.

**Table 2: - AGE WISE DISTRIBUTION OF PATIENTS**




In our study we had male predominance and most of the serous fluid effusion were seen in the age group of 41-60 years.

**Table 3: -TYPES OF FLUIDS**

| SITE | CASES | PERCENTAGE |
|---|---|---|
| PLEURAL FLUID | 107 | 61% |
| PERITONEAL FLUID | 68 | 39% |
| TOTAL | 175 | 100% |

In our study we had more samples of pleural fluids than peritoneal fluid.

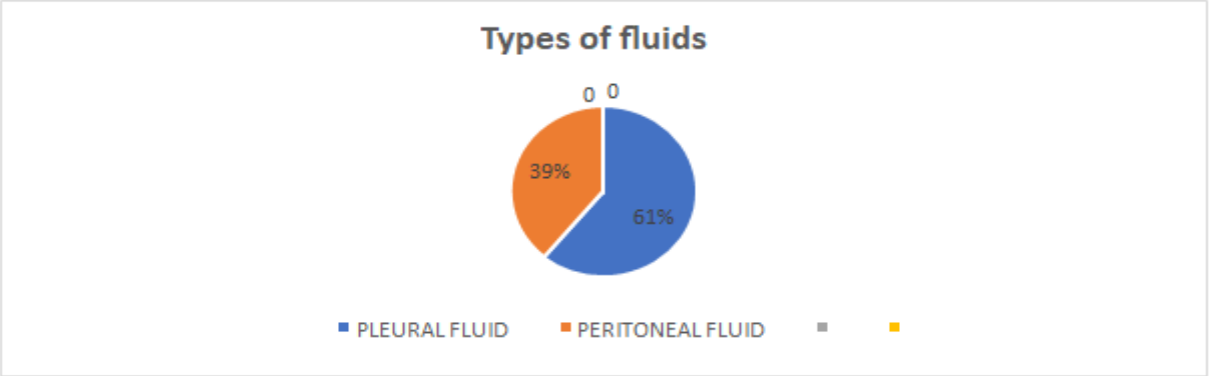



**Table 4: -** IACGRSE 2020 CATEGORY WISE DISTRIBUTION OF FLUIDS WITH RISK OF MALIGNANCY.

| CATEGORY | CASES | PERCENTAGE | ROM |
|---|---|---|---|
| I (Unsatisfactory For Evaluation) | 21 | 12% | 14% |
| II A (No Malignant Cells Detected)<br>II B (Benign Changes Seen) | 56<br>84 | 32%<br>48% | 4% |
| III (Atypical Cells, Not Otherwise Specified) | 02 | 1% | 50% |
| IV (Atypical Cells, Suspicious for Malignancy) | 07 | 4% | 85% |
| V (Malignant Cells ) | 05 | 3% | 99% |
| Total | 175 | 100% | |

A comparison of cases, their percentage and risk of malignancy in individual categories.
Risk of Malignancy (ROM) for each category was calculated according to the IACGRSE 2020 reporting system. ROM was defined as the proportion of cases in a given cytological category that were confirmed to be malignant on subsequent follow-up.

Follow-up confirmation of malignancy was established by histopathological examination and/or clinico-radiological correlatio,wherever available.

The ROM for each category was calculated using the following formula:
ROM (%) = {Number of malignant cases on follow-up in that category/Total number of cases in that categoy × 100
Category-wise ROM Analysis

In the present study, Category I (Unsatisfactory for evaluation)comprised 21 cases, of which 3 cases were found to be malignant on follow-up, resulting in a ROM of 14%.

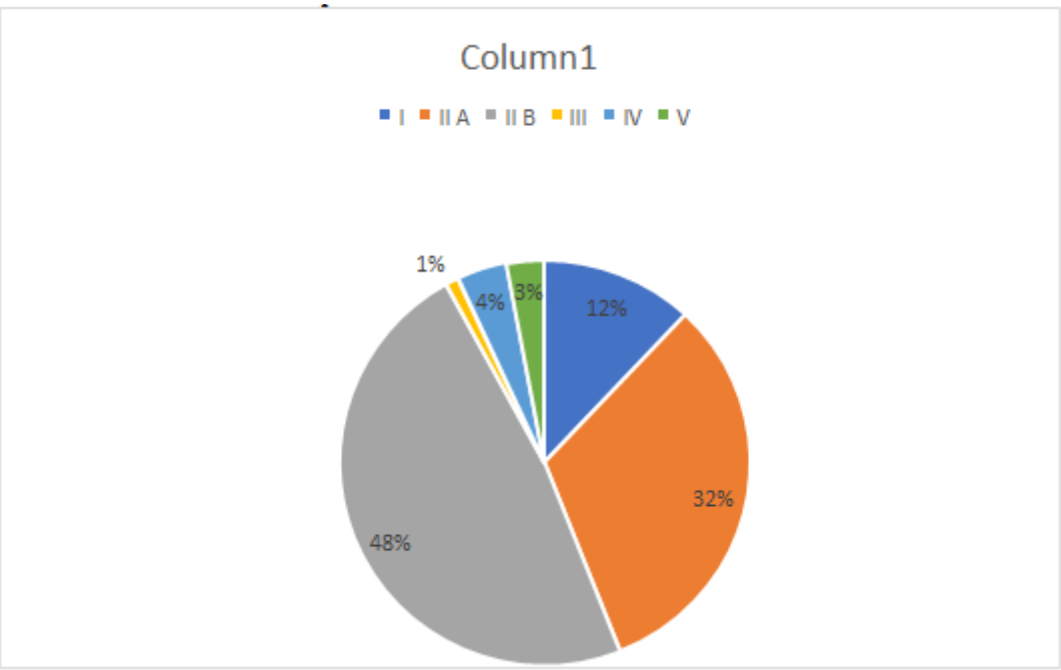
Categories IIA (No malignant cells detected) and IIB (Benign changes) together included 140 cases, with malignancy confirmed in 6 cases on follow-up, yielding a combined ROM of 4%

Category III (Atypical cells, not otherwise specified)** included 2 cases, of which 1 case showed malignancy on follow-up, resulting in a ROM of 50%

Category IV (Atypical cells, suspicious for malignancy)** comprised 7 cases, with 6 cases confirmed as malignant on follow-up, corresponding to a ROM of 85%.

Category V (Malignant) included 5 cases, of which malignancy was confirmed in all cases on follow-up, resulting in a ROM of 99%.

ROM for each diagnostic category based on the information available from the follow up- of the patient as per the clinical record or using histopathological diagnosis as a gold standard. The most commom primary cause of of pleural effusion was lung cancer followed by breast cancer. Gastrointestinal malignancies and ovarian cancer in females was the most common cause of peritoneal effusion.




There were maximum numbers of fluids are from category II and the 3% fluids are proven to be malignant.The most commom primary cause of of pleural effusion was lung cancer followed by breast cancer. Gastrointestinal malignancies and ovarian cancer in females was the most common cause of peritoneal effusion.

**DISCUSSION**

**Table 5: - IAC Diagnostic categories for reporting serous effusion cytology samples .**

| IAC reporting category | Cytopathology Diagnosis | Remarks |
|---|---|---|
| I | Unsatisfactory For Evaluation | No cells seen/Obscured by blood, artifacts, extensive degenerative Changes |
| II A | No Malignant Cells Detected | Correlate clinically and with imaging and microbiological studies |

| | | |
|---|---|---|
| II B | Benign Changes Seen<br>Reactive mesothelial cells<br>Inflammatory cells seen<br>Lymphocytes rich effusion<br>Specific infections<br>Tuberculosis, Microfilaria, Fungal infection, Hydatid cyst, any other. | |
| III | Atypical Cells, Not Otherwise Specified(NOS) | Repeat Cytology<br>Correlate clinically and with imaging studies<br>Ancillary techniques-Optional |
| IV | Atypical Cells, Suspicious for Malignancy | Repeat Cytology evaluation<br>Ancillary techniques-Optional/essential |
| V | Malignant Cells seen (of mesothelial or non mesothelial origin) | Subtype the malignancy wherever possible on Cytomorpholgy and ancillary techniques of IHC |

Category 1: Unsatisfactory for evaluation
Smears with no cells for evaluation or show contamination by artifacts, bacterial colony, or cells that are poorly preserved and show cellular degenerative changes, and therefor not able to give interpretation. Figure 1.

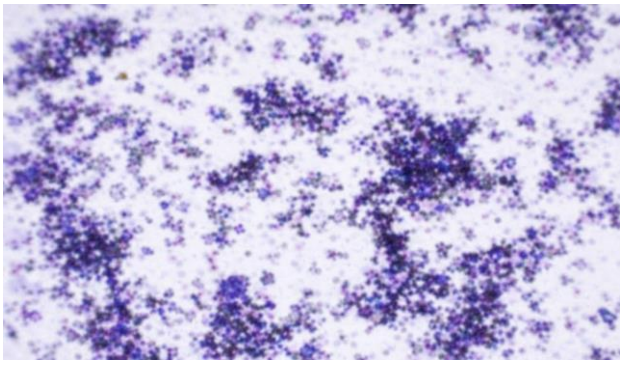
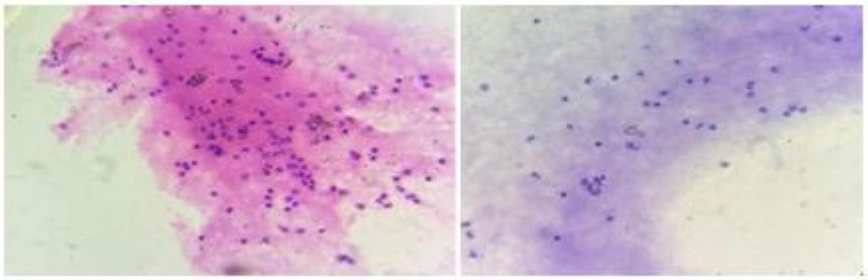


**Figure 1: Category 1. Smears show acellular non representative material.**

Category 2: No malignant cells detected/benign cellular changes
This category havea wide spectrum of cases of effusions. So in that cellular changes which can include the presence of mesothelial cells and inflammatory cells . The specific diagnosis in this category include (i) reactive mesothelial proliferation, (ii) acute inflammation, (iii) chronic inflammation, (iv) lymphocytic effusion, and (v) specific infections with organism identified such as cocci, bacilli, mycobacteria, nocardia, fungus, parasites such as microfilaria, hydatid cyst, or any other infectious agent. Representative cases are illustrated in image panels of Figure 2A and B.

Figure 2A




**Category 2: No malignant cells detected/benign cellular changes. (a) Mesothelial cells and inflammatory cells predominantly lymphocytes against eosinophilic background; (a) H & E Stain,20X (b) May–Grünwald Giemsa stain,20X.**

Figure 2B

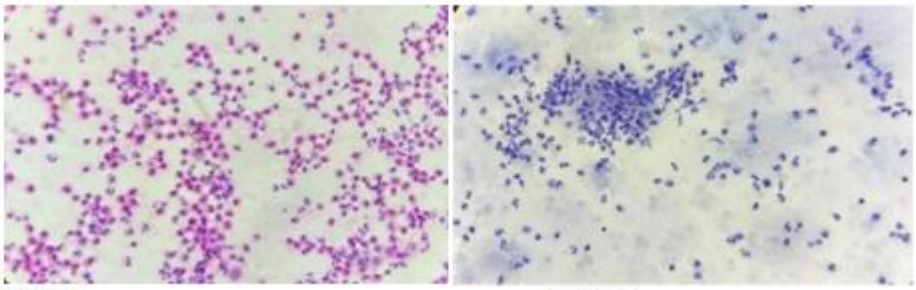


Figure a Figure b

**Category 2: No malignant cells detected/benign cellular changes. Images shows reactive mesothelial cells, eosinophils and inflammatory cells, mostly neutrophils against eosinophilic background; (a) H & E Stain,40X (b) May–Grünwald Giemsa stain,40X**

Category 3: Atypical cells, NOS

In this category smears show cells with cytological atypia that quantitatively or qualitatively do not favor malignancy

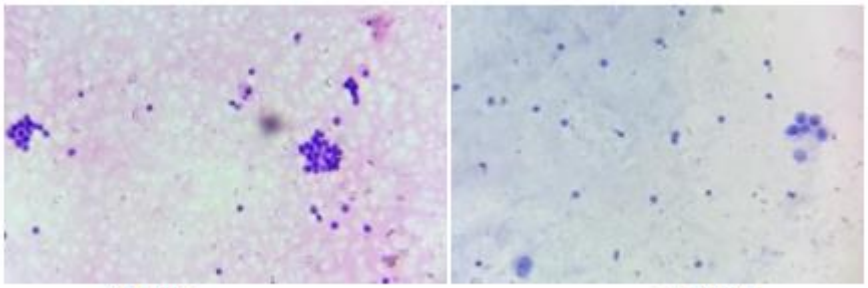


Figure a Figure b

**Category 3: Atypical cells, images shows loose aggregate of cells showing nuclear atypia; (a) H & E Stain,40X (b) May–Grünwald Giemsa stain,40X,**

**Category 4: Atypical cells, suspicious for malignancy**

In this category smears show cells with cytological atypia that suspicios of malignancy.

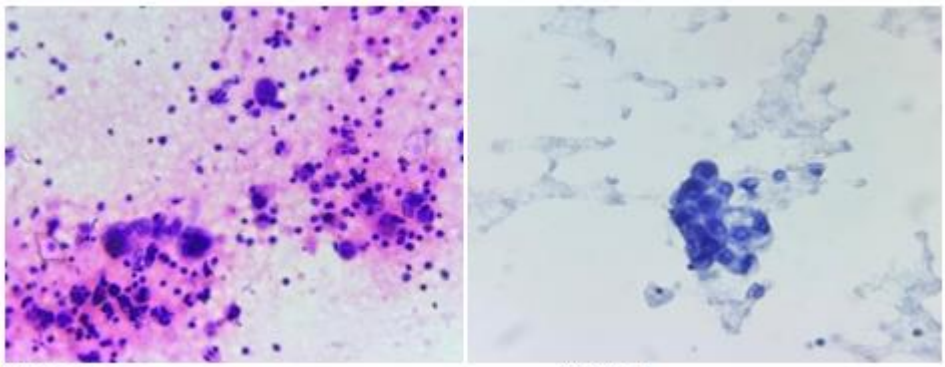


Figure a Figure b

**Category 4: Atypical cells, suspicious for malignancy Images shows mesothelial cells admixed with loose aggregate of cells ,dispersed cells showing nuclear atypia that fall short of a diagnosis of suspicion of malignancy; (a) H & E Stain,40X (b)May–Grünwald Giemsa stain,40X**

Category 5: Malignant cells seen

There were total 5 cases in this category, out of this 3 samples of pleural fluid and 2 samples of asciticfluid.The primary tumor in 2 pleural fluid sample was adenocarcinoma(a) and squamous cell carcinoma(b) of lung which was seen in men and 1 pleural fluid sample of women had a primary breast carcinoma. The primary tumor in ascetic fluid was ovarian carcinoma and lung carcinoma.

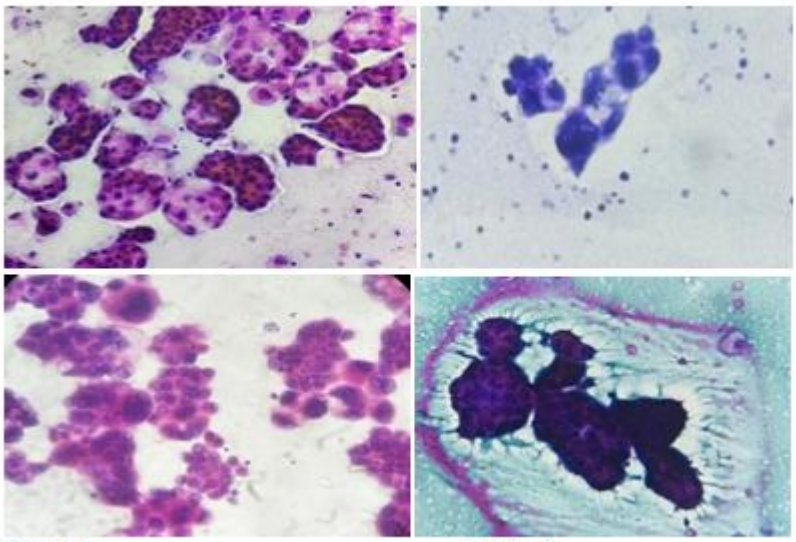


Figure b Figure d

**Category 5, ascetic fluid shows acini, cluster and 3D balls consistent with adenocarcinoma lung; (a,c) H & E Stain,40X (b) May–Grünwald Giemsa stain,400X (d) Acian blue stain,40X**

**Table 6: Comparison of the distribution of cases in various categories.**

| Study and year | Non-diagnostic | Benign | Atypical | Suspicious for malignancy | Malignant |
|---|---|---|---|---|---|
| Kundu et al. [3] (2021) | 2.6% | 71.2% | 1.3% | 4.4% | 20.5% |
| Jha et al. [7] (2022) | 4.26% | 83.7% | 5.2% | 3.25% | 8.22% |
| Kalita et al. [6] (2023) | 1.46% | 84.2% | 2.63% | 5.84% | 5.84% |
| Present study (2025) | 12% | 80% | 1% | 4% | 3% |

In now days, cytological diagnosis one of the 1st step to evaluate the effusion samples. Cytological assessment is minimal invasive, cost effective and simple which can help to clinician in patient managment. In the present study, 21/175(12%) effusion samples were from category I. These samples either had a less quantity, contaminated or clotted or too much anticoagulant, which caused crystal to develop. Repeat evaluation was advised. Similar results were observed in a Jhaetal.[7] in that 41/961(4.26%) cases of category I.

In present study140/175(80%) most cases were belongs to category II i.e., benign. Similar result were observed by Kunduetal.[3] and kalita et al.[6]. In present study 2/175(1%)cases belonged to category III, that is similar to Kundu et al.[3] and comparatively less than other studies like Jha et al[7] and Kalita et al.[6]. In present study category IV 7/175(4%) and category V 5/175(3%) that belonged to malignant category which is similar to other study like Kalitaetal.[6]. And different from the studies like [3],[7]. And limitation of the present study is that it is a single set up study and during study, some patient did not come for follow up and because of that hurdles we did not get a exact result.The result of using recently published the IAC Guidelines and Categories for Reporting Serous Effusion Cytology 2020
(IACGRSE 2020) by means of the reproducibility studies was studied here.

## CONCLUSION

Application of IACGRSE 2020 categories allowed all cases to be reported with definitive impression and feasible and convenient for the standardized reporting of effusion samples, thus avoiding subjective variation of reporting and it helps in better clinical practice as well as patient care management.These standardized reporting system can aid in improving a report's comprehension. This reporting system can be easily applied to effusion fluids for better management of patient.

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