Original Research Article

Cytology during Covid-19 Pandemic: A Retrospective Study at Government General Hospital, Mahabubnagar

M P Akarsh[1], Sri Lakshmi Gollapalli[2*], Naval Kishore[3]

[1]Assistant Professor, Department of Pathology, Govt Medical College/GGH Mahabubnagar, Telangana, India
[2]Associate Professor, Department of Pathology, Govt Medical College/GGH, Mahabubnagar, Telangana, India
[3]Professor, Department of Pathology, Govt Medical College, Mahabubnagar, GGH Telangana, India

Received: 27-11-2021 / Revised: 14-12-2021 / Accepted: 09-01-2022

Abstract

Introduction: The Coronavirus disease 2019 (COVID-19) has greatly impacted health care delivery world wide and has changed the practice of Pathology including Cytology. During the pandemic of Covid 19, it is observed in Cytology practice to prioritise patients at high oncological risk, while deferring benign cases. **Aim**: The present study is an institutional experience of COVID19 impact on Cytology services carried out in this hospital. **Methods:** The Cytological sample types processed at the Government General Hospital, Mahabubnagar, during April 1, 2020 to 31 March 2021 were compared with those of the same period of April 1, 2019 to 31 March 2020. **Results**: During the Covid period the overall Cytology cases were drastically reduced, Statistically significant decrease of samples was noted in Thyroid and Lymphnode in Covid Pandemic era. A slight increase in percentage of Malignant cases was noted in Covid Pandemic era which was not statistically significant. **Conclusions:** Cytological examination was safely carried out in patients at high oncological risk, without postponing during COVID pandemic. As the Covid-19 infectivity has come down, Cytology can be practiced with adequate safety precautions. None of our faculty contracted Covid while doing FNAC procedure.

Key words: Covid 19,Cytology, pandemic.

Introduction

Human civilizations and infectious diseases grew hand in hand. History has continuously witnessed Pandemic infectious diseases like Plague, Cholera, Spanish flu and COVID-19 pandemic[1,2,3]. Coronaviruses (CoV) comprise a large family of viruses that cause illness ranging from the common cold to more severe diseases such as Middle East respiratory syndrome (MERS)-CoV and severe acute respiratory syndrome (SARS)-CoV[4,5]. Coronavirus derive their name from the glycoprotein spikes on their surface resembling a crown on 2-dimensional picture of transmission electron microscopy.[6]Corona viruses are large enveloped viruses with positive strand RNA.The receptor for SARS-CoV-2 is ACE 2 receptor on ciliated bronchial epithelial cells[6]. Coronaviruses are zoonotic , meaning they are transmitted between animals and people[7]. Detailed investigations found that SARS-CoV was transmitted from civet cats to humans and MERS-CoV from dromedary camels to humans[8]. Several known coronaviruses are circulating in animals that have not yet infected humans. Common signs of infection include respiratory symptoms, fever, cough, shortness of breath and breathing difficulties. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death. Standard recommendations to prevent infection spread include regular hand washing, covering mouth and nose when coughing and sneezing[4,5]. Covid-19 disease is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was first identified in December 2019 in Wuhan, China and has spread globally[9,10]. Owing to large scale spread across the globe WHO on 11 March 2020 declared Covid19 as a pandemic.The first case of COVID-19 in India was reported on 30 January 2020 in the state of Kerala[11].

*Correspondence
Dr. Sri Lakshmi Gollapalli
Associate Professor, Department of Pathology, Govt. Medical College/GGH, Mahabubnagar, Telangana, India.
E-mail: srilakshmi30doc@gmail.com

The mode of transmission of Covid-19 is through aerosols, and less common mechanisms are contact with infected surfaces or fomites. The rapid spread of the infection and disease severity has made sanitization and social distancing measures the need of the hour.Cytology is abranch of pathology where the cytopathologist interacts with patients while performing procedure such as fine-needle aspiration cytology (FNAC)[12]. During the procedure of fine needle aspiration cytology the cytopathologists, cytotechnologists, technicians, and other laboratory personnel are susceptible to contracting infections, such as COVID19 as they are exposed at close quarters to potentially infectious patients as well as to specimens, like expelled material from needle hubs, syringes, oral scrapes, lavage, and sputum[12]. The laboratory personnel are susceptible to contract COVID-19 due to exposure to patients and to Specimens and hence adequate safety precautions should be followed thoroughly with appropriate disinfection measures At the Government General Hospital Mahabubnagar, Cytopathology encompassing both FNAC and Exfoliative Cytologywas carried out smoothly from its inception has been challenged by the extraordinary outbreak of the Coronavirus disease 2019 (COVID-19) in India.

Fine needle aspiration Cytology (FNAC) is the study of cells aspirated from lesions or masses in various body sites by using a needle attached to syringe For example Breast. Exfoliative Cytology is the study of cells collected which have been either spontaneously shed by the body or manually scraped/brushed off from a surface in the body, for example, pleural fluid, peritoneal fluid. The national lockdown in India was imposed on 24 march 2020, to stop the spread of the Virus. The life came to a standstill and people were required to remain at home and in phase wise manner things were unlocked. The pandemic has been a cause of worry and anxiety to public as well as to health care professionals. The containment measures gave remarkable results in flattening the spread of the virus and on the other hand there was reduction in the number of elective procedures performed Our practice of cytopathology also changed. The executive committee of Indian Academy of Cytologists has prepared guidelines for safe laboratory functioning during Covid-19[12]. These guidelines

emphasized on safety measures in Cytology laboratories in India, for the safety of the laboratory personnel[12]. Owing to the potential presence of the virus in Cytology specimens, we adopted more stringent safety proceduresalong with policy of sample prioritization[13,14,15,16].·Our Cytological screening activities were postponed, However initially our Cytology laboratory continued to function providing the best possible service to oncological patients. It is Cytological evaluation which un earths the hidden malignancy in the observed lumps clinically. As the Pandemic unfolds we state that the Cytological examination may be safely carried out without the need to be postponed by taking adequate safety measures. In this study we share our experience in cytopathological evaluation by comparing the Cytological data during the PreCovid Pandemic era in the period between 1 April 2019 to 31 March 2020 to Covid era Pandemic era 1 (April 2020 to 31 March 2021).

Aims and Objectives

1. To study the impact of Covid-19 on the Cytological services carried out at Government General Hospital ,Mahabubnagar.
2. To emphasise on the safety precautions adopted by Cytopathologists, Cytotechnicians in the Cytology Laboratory at Government,General hospital,Mahabubnagar.

Methods

This is a retrospective descriptive study on Cytology casesat the Government General Hospital Mahabubnagar, TelanganaState,India,during Covid-19 out break. All Cytological reports issued from 1 April 2019 to 31March 2020(This period referred as Pre Covid-19 Pandemicera) were reviewed and were compared with those relative to 1 April 2020 to 31March 2021(This period referred as Covid19 Pandemic era).In boththe groups, the total number of samples processed was recorded and were distributed into 5 categories Breast,Thyroid,Lymphnodes,Salivary glands, and others(comprising of /Pap Smears,Softtissue,Body fluids etc)[17]. Final diagnosis was categorized as Non neoplastic,Benignneoplasms,Malignant Neoplasms Statistical analysis was done by Chi square test or Fishers exact test basing on sample size to testfor variation in proportions between PreCovid Pandemic era to Covid Pandemic era with the help of open source epidemiologic statistics for Public Health[18]. A "P value" less than 0.05 was considered to be statistically significant.In this study we share our experience in cytopathological evaluation and differences in cytology practices during Pre Covid19 Pandemic era and during Covid19 Pandemic era.

Inclusion criteria

1.All cytology cases in the time period between 2019 March to 2021 April with adequate cellular adequacy.

Exclusion Criteria

2. All cytology slides time period between 2019 March to 2021 without cellular adequacy and slides where aspirated material showed blood and blood cellular elements.

Results

The results were divided into total number of cases in Pre covid pandemic era(1 April 2019 to 31 March 2020) and compared to Covid pandemic era (1 April 2020 to 31 March 2021). The cases were then categorized organ wise. Further the total number of cases were divided into diagnostic criteria as Non neoplastic,Benign neoplastic,Malignant Neoplastic.

Table 1: Comparision of total number of cases in pre covid pandemic erato covid pandemic era

Year	Total number of cases
2019-2020	570
2020-2021	264

The Cytology cases were 570 in the year Pre Covid era(2019-2020) and fell to 264 in Covid era (2020-2021),showing a decline of 46.31%.

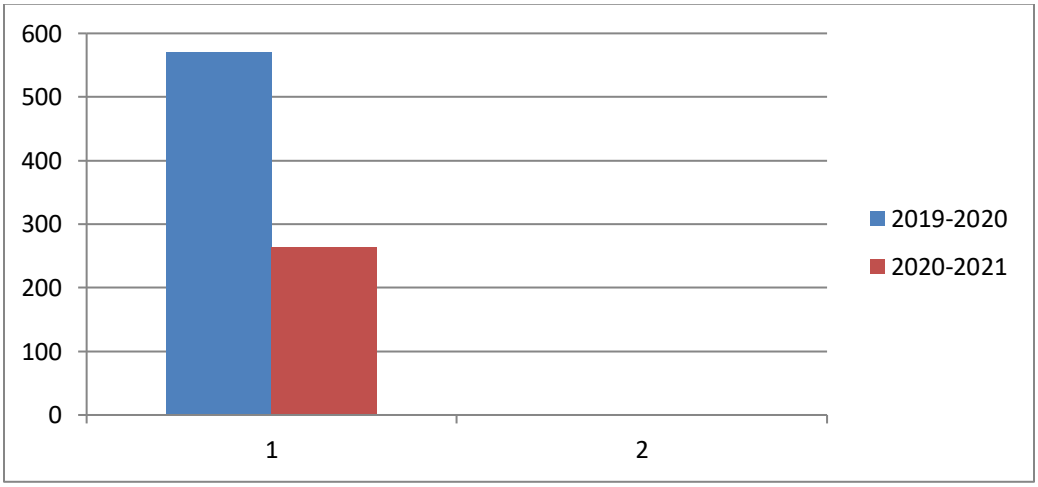

Fig.1: Comparision of total number of cases in pre covid pandemic era(2019-2020)**to covid pandemic era**(2020-2021),

Blue Bar -2019-2020, RedBar-2020-21

Table 2: Distribution of cytology samples pertaining inpre covid pandemic erato covid pandemic era

Organ	Year 2019-2020	Year 2020-2021	Difference(%)	P value
Breast	73(12.80)	41(15.53%)	-2.73	0.338
Thyroid	70(12.28%)	15(5.68%)	+6.6	**0.005**
Lymphnode	97(17.01%)	62(23.48%)	-6.47	**0.034**
Salivary gland	10(1.75%)	3(1.13%)	+0.62	0.737
Others	320(56.14%)	143(54.16%)	+1.98	0.6465
Total	570	264	+46.31	

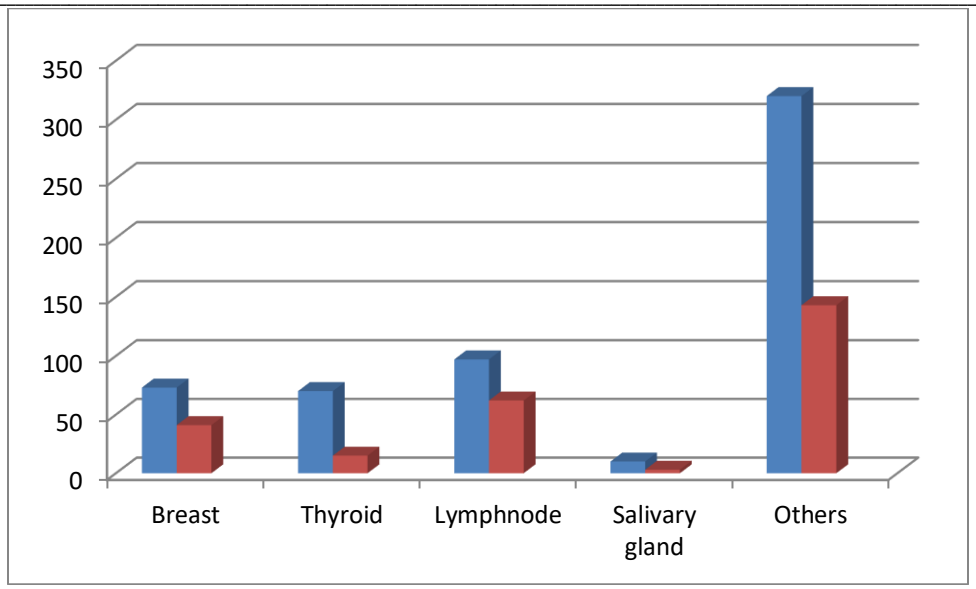

Fig. 2: Distribution of cytology samples pertaining inpre covid pandemic era to covid pandemic era(blue-2019-2020, red-2020-21)

Blue Bar -2019-2020, RedBar-2020-21

All thecategories showed a decline in the number of cases in the post Covid era when compared to preCovidera.The total number of Breast cytology cases fell from 73(2019-20) to 41 in (2020-21).The cases in Thyroid Cytology fell from 70(2019-20) to 15(2020-21). In Lymphnode category the cases fell from 97(2019-2020) to 62(2020-21). The decline in salivary gland cases was from 10(2019-2020) to 3(2020-21). In others category the decline was from 320(2019-20) to 143(2020-21).

Table 3: Distribution of cytology samples pertaining to diagnostic category in 2019-20,2020-21 (blue-2019-2020,red-2020-21)

Diagnostic category	Year 2019-2020	Year 2020-2021	Difference(%)	P value
Non Neoplastic	350(61.40%)	166(62.40%)	-1	0.740
Benign Neoplastic	199(34.91%)	84(31.81%)	+3.1	0.424
Malignant	21(3.68%)	14(5.30%)	-1.62	0.368
Total	570	264	+46.31	

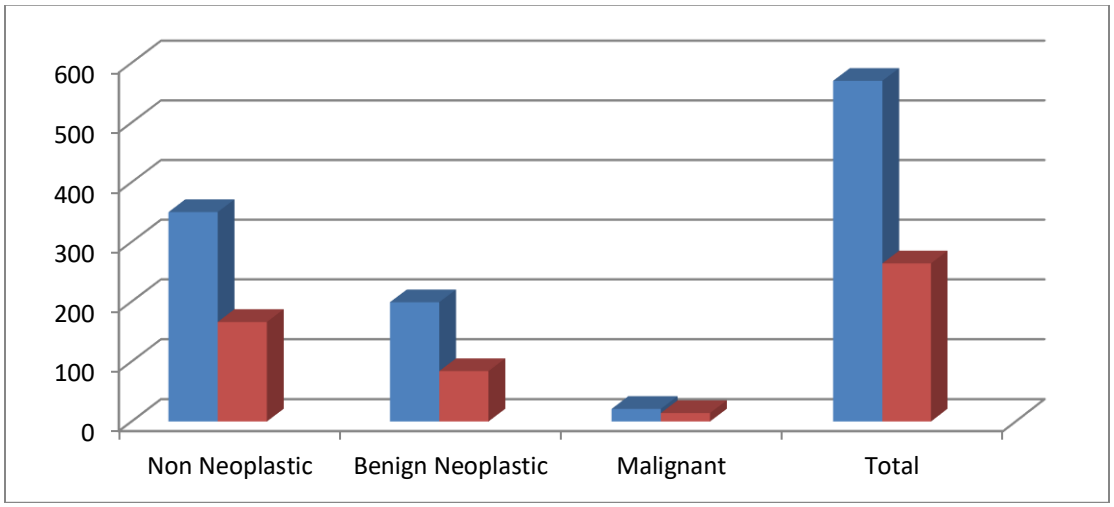

Fig. 3: Distribution of cytology samples pertaining to diagnostic category in 2019-20,2020-21 (blue-2019-2020,red-2020-21)

Blue Bar -2019-2020, RedBar-2020-21

The cases in diagnostic categories also showed a decline in all the categories. The non neoplastic cases decreased to 166(2020-21) from 350 (2019-20). The benign neoplastic lesions fell from 199(2019-20) to 84 (2020-21). In malignant cases the decline was from 21(2019-20) to 14(2020-21).

Discussion

The COVID-19 emergency forced the hospitals to revisit their practices and approaches. The health care sector underwent drastic transformation in their mode of function. Guidelines were formed on safe handling of potentially infective aspirated material, safe working atmosphere and usage of personal protective equipment. The out patient care, research and laboratory activities were limited. Decisions

were taken to prioritize the essential healthcare workers and reduce elective outpatient visits and inpatient admissions for elective interventions or operations at various hospitals and health care institutions. These measures helped to mitigate the risk of infection to patients with routine health checkups and and to increase the available capacity of the hospitals in the event of surge of infections[19]. Safety procedures as recommended by Indian academy of cytologists were adopted due to the virus presence in Cytology aspirates. Worldwide agencies have given such recommendations[20]. The first study investigating the effects of the COVID-19 pandemic on cytopathology practice was reported by the cytopathology laboratory of the University of Naples "Federico II", Italy, in April 2020[20]. The overall cases in both fine needle aspiration Cytology and Exfoliative Cytology decreased in the year 2020-21 by 46.31% and this decline can be attributed to postphonement of screening activity, reduction in elective surgeries performed and deferring benign cases while giving service to suspicious malignant cases. Viglair et al published a study during Italian lockdown period where Cytological sample reduction was noticed when compared to PreCovid era[21]. Similarly, in September 2020, Rana et al. documented an Indian institutional experience during the national lockdown period, reporting a marked reduction in cytological samples compared with the pre-COVID-19 era[17]. O'Connor E et alpublished a 2 year study for evaluating trends in non gynaecological (FNA and exfoliative) cytology case loads in which the year 2019 was taken as pre-COVID-19calenderyear for the number of cytology specimens and were compared with the year 2020 acting as a calendar year impacted by the COVID-19 pandemic[22]. The decline in cases can also to attributed to the fact that many people didn't visit the hospital owing to the risk of contracting Covid19.On coming to the type of specimen there was over all reduction of specimens in the 5 categories in Pre Covid to Covid era. Statistically significant value of P less than 0.05 was noted in Thyroid and Lymphnode. In the diagnostic categories also there was decline in sample number in the Pandemic period with a slight increase in malignancy cases of 1.68% during Covid era was noted which was not statistically significant. Laboratory biosafety guidelines were followed with appropriate disinfection with 1 % sodium hypochlorite of all the laboratory surfaces multiple times a day. All the working surfaces, laboratory furniture, door knobs were equipment were decontaminated[9]. Initially Before FNAC procedure the patients were checked for Covid19 symptoms and none of our FNAC patients hadCovid Symptoms or exposure history. The patient access area adjacent to FNAC laboratory displayed in local language safety precautions to be adopted during Covid-19 like usage of mask, proper hand sanitization and social distancing. The entry of patient attendants to the FNAC zone was limited except in cases were presence of attendants were mandatory The entry of patients into FNAC procedure room was strictly one patient at a time. If an attender had to accompany a patient it was limited to one attender with one patient. The patients and their accompanying attenders were advised to use sanitisers to sanitise their hands. The FNAC procedure was completed quickly to reduce the exposure time. Later on Rapid Antigen Test for Covid-19 was made mandatory for screening the patients If patients were symptomatic even after Rapid antigen test for Covid19 was negative, an RTPCR test for Covid-19 was performed. If Patients were positive for Covid 19, the procedure was deferred, patients were advised quarantine and FNAC was done after RTPCR was negative. In addition none of the staff members contracted Covid-19 while doing FNAC. Cytopathologistsand Cytotechniciansused safety equipment like N95 masks,Face shields and head cap[12]. A policy of using double glove was adopted with upper gloves being discarded after each FNAC. The patients were also advised to use a face mask during FNAc and if face mask interferes with the procedure the patinets were told to position head in such a way that they breathe away from the health care workers[12]. The patients were advised not to cough during FNAC procedure[12]. Caution was excercised while expelling the FNAC material from the syringe and needle hub as this can invariably lead to droplet and aerosol generation. The material aspirated by FNAC was gently expelled on to the slide with Cytopathologists holding their face at a distance. The expelled material promptly fixed in alchohol based fixatives of above 70% to prevent potential laboratory contamination[12]. of smears by shaking or blowing was avoided[12]. Used needles were discarded in sharp resistant waste containers[9] Access to soap and water as well as alcohol based sanitizer containing atleast 70% alchohol was provided. Samples of body fluids wereethanol fixed to make virus inactive. TheCytopathologists wore gloves and used face mask while reporting the slides during microscopic analysis. After microscopic analysis the Cytopathologists washed their hands or used hand sanitizer.

We conclude we have observed significant decrease in the sample number in the Pandemic period. All the specimen categories showed a decline in samples with statistically significant P value in Thyroid and, Lymphnodecategories. We noticed a slight increase in Malignancy percentage in Covid Pandemic period. Appropriate safety measures like social distancing, practicing personal hygiene, using preventive measures while performing cytology procedures and during sample handling will minimise the chances of COVID-19 infection. As cytology is the first line of investigation in clinical lumps it is a pivotal point from which the impact of Covid19 can be assessed. We recommend to do FNAC procedure in all the cases which are negative by initial screening by Rapid Antigen Test/RTPCR. Vaccination drive has played a crucial role in strengthening health care, diagnostic and preventive services. Since there is accumulation of cases waiting for Cytological analysis the cytology cases are slowly increasing. The rate of infectivity of Covid-19 is going down and there is increase in number of Cytology patients in recent times. The Covid protocols are being followed strictly and no Pathologist contacted Covid in our Cytology lab. We conclude that Cytology is safe procedure during Covid Pandemic.

References

1. Sampath S, Khedr A, Qamar S, et al. Pandemics Throughout the History. *Cureus*. 2021;13(9):e18136.
2. Past pandemics . World Health Organization. http://www.euro.who.int/en/health-topics/communicable-diseases/influenza/pandemic-influenza/past-pandemics
3. Huremović D. Brief History of Pandemics (Pandemics Throughout History). *Psychiatry of Pandemics*. 2019;7-35.
4. Coronavirus disease: What you need to know. Available from: *https://www.afro.who.int/news/coronavirus-disease-what-you- need-know,* accessed on February 18, 2020
5. Yin Y, Wunderink RG. MERS, SARS and other coronaviruses as causes of pneumonia.Respirology. 2018 Feb;23(2):130-137. doi: 10.1111/resp.13196. Epub 2017 Oct 20.
6. Pambuccian SE. The COVID-19 pandemic: implications for the cytology laboratory [Internet]. Vol. 9, Journal of the American Society of Cytopathology. 2020;202–11.
7. Gollakner R, Capua I. Is COVID-19 the first pandemic that evolves into a panzootic? *Vet Ital.* 2020; 56:7–8.
8. Zhu, Z., Lian, X., Su, X. *et al*. From SARS and MERS to COVID-19: a brief summary and comparison of severe acute respiratory infections caused by three highly pathogenic human coronaviruses. *Respir Res* 2020;21:224.
9. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R. Features, Evaluation, and Treatment of Coronavirus (COVID-19). 2021 Sep 2. In: StatPearls. Treasure Island (FL): Stat Pearls Publishing; 2021.
10. Hui DS, Azhar EI, Madani TA, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health – the latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis*. 2020. Feb;91:264-266.
11. Andrews MA, Areekal B, Rajesh KR, et al. First confirmed case of COVID-19 infection in India: A case report. *Indian J Med Res*. 2020;151(5):490-492.
12. Srinivasan R, Gupta P, Rekhi B, et al. Indian academy of cytologists national guidelines for cytopathology laboratories for

handling suspected and positive COVID-19 (SARS-COV-2) patient samples. *J Cytol*. 2020;37(2):67-71.
13. Centers for Disease Control and Prevention (CDC) Interim laboratory biosafety guidelines for handling and processing specimens associated with coronavirus disease 2019 (COVID-19), 2020. Available: https://www.cdc.gov/coronavirus/2019-nCoV/lab/lab-biosafety- guidelines.html Google Scholar
14. World Health Organization. Laboratory biosafety guidance related to the novel coronavirus (2019-nCoV): interim guidance, 2020. Available: https://www.who.int/docs/default-source/coronaviruse/ laboratory-biosafety-novel-coronavirus-version-1-1. pdf?sfvrsn=912a9847_2 Google Scholar
15. COVID-19 - recommendations for laboratory work - Institute of BiomedicalScience, 2020.Available: https://www.ibms.org/resources/news/covid-19-recommendations-for-laboratory-work/
16. Iwen PC , Stiles KL , Pentella MA Safety considerations in the laboratory testing of specimens suspected or known to contain the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Am J ClinPathol.
17. Rana C, Kumar S, Babu S, et al. Impact of ongoing COVID-19 pandemic on cytology: An institutional experience. *Diagn Cytopathol*. 2021;49(2):311-315.
18. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version. www.OpenEpi.com, updated 2013/04/06, accessed 2021/10/25.
19. Sorino C, Magrì D, Oliviero G, Milani G. Clinical Utility and Interpretation of Laboratory Tests in Respiratory Medicine Diagnostic Evaluation of the Respiratory System. 2017;28–28.
20. COVID-19 - recommendations for laboratory work - Institute of Biomedical Science , 2020.
21. https://www.ibms.org/resources/news/covid-19-recommendations-for-laboratory-work.
22. Vigliar, E.; Iaccarino, A.; Bruzzese, D.; Malapelle, U.; Bellevicine, C.; Troncone, G. Cytology in the Time of Coronavirus Disease (Covid-19): An Italian Perspective. J. Clin. Pathol. 2020;1–3.
23. O'Connor E, O'Connor D, Murray D, *etal*Impact of the COVID-19 pandemic on cytopathology services in the West of Ireland *Journal of Clinical Pathology* Published Online First: 13 September 2021. doi: 10.1136/jclinpath-2021-207850

Conflict of Interest: Nil Source of support: Nil