





Evaluation of the Short and Long-term Impact of the COVID-19 Pandemic on Non-gynecological Cytology Practice

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Abstract

Objective: During the Coronavirus disease-2019 (COVID-19) pandemic, many screening and elective procedures were deferred, leading to a notable reduction in the volume of materials handled by the cytopathology laboratory. This study seeks to explore both the immediate and prolonged impacts of the pandemic on non-gynecologic cytology practices in a hospital, focusing on the timeframe beginning in March 2020, when the first case was identified in our country.

Methods: Starting from March 2020, when our country reported its first COVID-19 case, we compared the percentages of cytological samples processed at the cytopathology laboratory of University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital, for the three-month period of March to May in 2020 with those from the same months in 2019, 2021, and 2022. We also assessed the differences in malignancy rates.

Results: In the three-month study period of 2020, there was an 81.5% reduction in the total number of non-gynecologic cytological specimens compared to 2019. Conversely, the overall malignancy rate saw a significant increase (6.1% in 2019 and 10.8% in 2020). During the 3-month study period in 2021, cytologic specimens increased compared with 2020 (127.8%) but continued to decrease compared with 2019 (-57.8%). In 2021, the overall malignancy rate was higher than that in other years (12.5%). Similarly, in the 3-month period in 2022, cytologic samples increased compared with 2020 (221.6%), but despite this increase, the number of cases was still lower than in the pre-pandemic period (-40.5%). The overall malignancy rate continued to be higher than before the pandemic (2019: 6.1%, 2022: 10.1%).

Conclusion: The delay of elective procedures due to the COVID-19 pandemic has had a major impact on cytopathology practices. In both 2021 and 2022, the volume of non-gynecologic cytologic materials remained significantly lower than in 2019, highlighting the ongoing effects of the pandemic on cytopathology. Meanwhile, the rise in the overall malignancy rate underscores the need to prioritize diagnostic procedures for patients at high risk for cancer.

Keywords: Coronavirus, COVID-19, cytopathology, malignancy rate, work load

INTRODUCTION

The Coronavirus disease-2019 (COVID-19) pandemic is a type of virus outbreak that first emerged in the Wuhan region of China toward the end of 2019. The transmission rate of this virus, which spreads easily from person to person, increased in mid-January 2020, and cases began to be reported in various parts of the world over time (1,2). In March 2020, a global pandemic was declared by the World Health Organization (3).

During this period, the global health system was affected, and approximately 7.1 million people died (4). To reduce exposure and mortality, each country-initiated periods of home quarantine, limiting people's freedom of movement and activities of daily living. In pandemic hospitals, physicians, regardless of their specialty, were employed only in wards and outpatient clinics dedicated to COVID-19. Additionally, most non-urgent medical procedures, including cytopathology screening, were postponed (5,6). Naturally, there was a



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significant reduction in the amount of material processed in the cytopathology laboratory. This study aimed to investigate the short- and long-term impacts of the pandemic on the practice of non-gynecologic cytology in a hospital during the pandemic period in March 2020, when the first case was detected in our country.

METHODS

Based on March 2020, when the first COVID-19 case was detected in our country, non-gynecological cytological samples processed in the cytopathology laboratory of University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital between March and May 2020 (3-month period) were retrospectively evaluated and compared with samples from the same period in 2019, 2021, and 2022. All non-gynecologic cytology reports for the relevant periods were obtained from the University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital database. Cases were divided into 10 subgroups; cerebrospinal fluid (CSF), urinary-urinary bladder flush fluid, peritoneal-pleural-pericardial fluid, thyroid, lymph node, soft tissue, bone, salivary gland, breast, and

other fine niddle aspiration biopsies (FNAB). The total number of specimens was recorded. The numbers of non-diagnostic (NDC) and malignant cases were recorded and compared by year. Ethical approval for this study was obtained from the University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital Clinical Research Ethics Committee (decisison number: 177, date: 25.09.2023).

Statistical Analysis

Statistical analysis was performed using the SPSS software, with p-values <0.05 deemed statistically significant.

RESULTS

During the 3-month study period in 2020, overall non-gynecological cytological specimens decreased by 81.5% compared with 2019. The decrease rates for sample types were as follows: thyroid -87.9%, lymph node -74.8%, breast -86.1%, salivary gland -75%, bone -27.2%, soft tissue -25%, serous effusions (pleura, peritoneum, pericardium) -55.3%, urinary bladder-urine 78.2%, CSF -55% (Figure 1). In contrast, the overall malignancy rate increased significantly (2019: 6.1%, 2020: 10.8%) (Table 1).

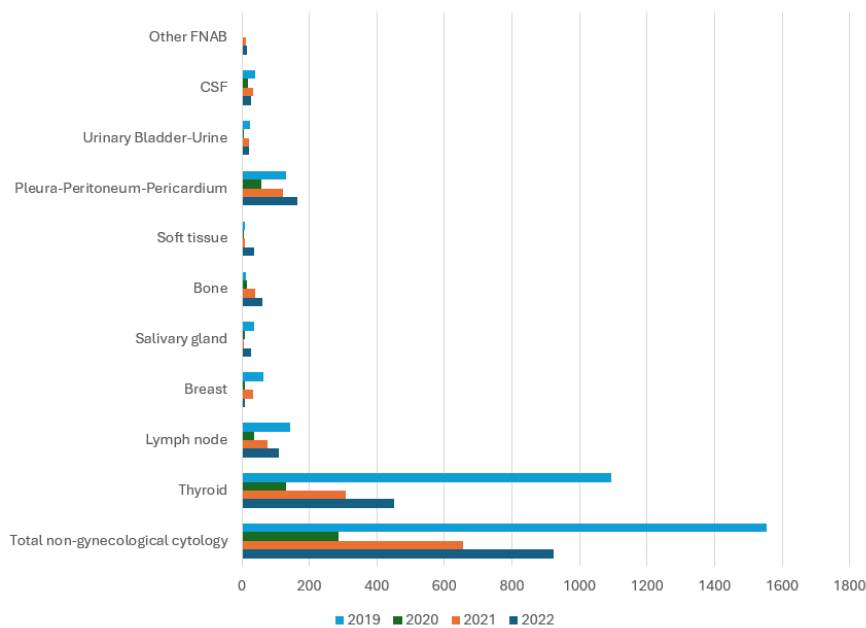


Figure 1. Distribution of cases according to sample locations and years
 FNAB: Fine niddle aspiration biopsies, CSF: Cerebrospinal fluid

	2019	2020	2021	2022
Non-gynecological samples	1553	287	654	923
Malign	95	31	82	94
Malignancy rates	6.11	10.80	12.53	10.18

During the 3-month study period in 2021, cytologic samples increased compared with 2020 (127.8%) but continued to decrease compared with 2019 (-57.8%). In 2021, the decrease rates of samples compared with 2019 were as follows: thyroid -71.9%, lymph node -47.5%, breast -49.2%, salivary gland -83.3%, serous effusions -6.1%, urinary bladder-urine -8.6%, CSF -0.2%. In 2021, bone fine needle aspirations (FNAs) increased (+2.6%), whereas soft tissue FNAs did not change (Table 2). The overall malignancy rate in 2021 was higher than that in other years (12.5%) (Table 1).

During the 3-month study period in 2022, there was an increase in cytologic samples compared with 2020 (221.6%), but a

continued decrease compared with 2019 (-40.5%). In 2022, compared with 2020, the decrease rates were as follows: thyroid -58.7%, lymph node -23.7%, breast -86.1%, salivary gland -0.25%, urinary bladder-urine -8.6%, CSF -3%. There was also an increase of 27% in serous effusions, 35% in soft tissue FNAs and 4.6% in bone FNAs. When 2022 was compared with 2021, there was an overall increase in the number of samples, except for breast FNAs and CSF sampling, but this increase remained below the levels observed in the pre-pandemic period (2019) (Figure 1, Table 2).

Total non-gynecologic cytology material, malignancy, and NDC rates by years are shown in Figure 2.

Years	2019	2020	2021	2022	2019-2020	2019-2021	2019-2022
Total non-gynecological cytology	1553	287	654	923	-0.81519639	-0.57887959	-0.405666
Thyroid	1094	132	307	451	-0.87934186	-0.71937843	-0.587751
Lymph node	143	36	75	109	-0.74825175	-0.47552448	-0.237762
Breast	65	9	33	9	-0.86153846	-0.49230769	-0.861538
Salivary gland	36	9	6	27	-0.75	-0.83333333	-0.25
Bone	11	14	40	61	0.272727273	2.636363636	4.5454545
Soft tissue	8	6	8	36	-0.25	0	3.5
Pleura-peritoneum-pericardium	130	58	122	165	-0.55384615	-0.06153846	0.2692308
Urinary bladder-urine	23	5	21	21	-0.7826087	-0.08695652	-0.086957
CSF	40	18	32	28	-0.55	-0.2	-0.3
Other FNAB	3	0	11	16	-1	2.666666667	4.3333333

CSF: Cerebrospinal fluid, FNAB: Fine niddle aspiration biopsies

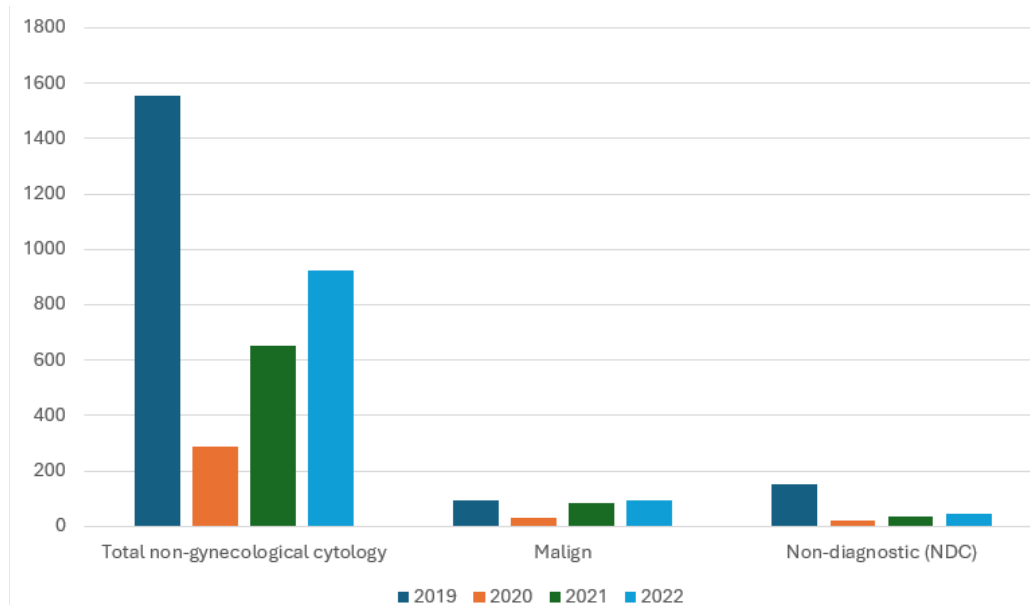


Figure 2. Total non-gynecologic cytology material, malignancy and non-diagnostic cytology (NDC) rates by year
NDC: Non-diagnostic cytology

DISCUSSION

The COVID-19 pandemic led to a considerable decline in cytopathology practices in our country due to the fact that almost all physicians, including pathologists, worked in pandemic clinics in pandemic hospitals, and elective procedures were postponed based on recommendations of the pathology scientific communities. Similar to studies conducted by Vigliar et al. (6) in Italy, de Pelsemaeker et al. (11) in Belgium, Hong et al. (13) in South Korea, and Kurtulan and Önder Çelik (9) in our country, our study observed an absolute decrease in the overall count of cytology samples during the COVID-19 quarantine period (March-April-May 2019) (6-13). Additionally, during and after the pandemic period, Vigliar et al. (6) reported in international and multicenter studies conducted in 3-month periods in 2020 and 2021, similar to our study, that there was a 26.5% decrease in cytological samples during the pandemic period (2020) compared with the same period of 2019, but a trend toward a return to pre-pandemic numbers over time (7). This study identified the most significant decreases in the following sample categories: thyroid (-32.8%), cervical-vaginal tract (-30.7%), breast (-20.8%), serous cavity (-16.8%), salivary gland (-14.4%), respiratory tract (-12.2%), urine (-10.5%), and lymph node samples (-7.5%). Conversely, four sample categories-central nervous system, gastrointestinal tract, biliary tract, and bone marrow-exhibited an increase in the number of cytological samples. Moreover, the malignancy rate and the rate of suspected malignancies were greater in the post-quarantine period than in the same timeframe in 2019 (7,14). In our study, the rate of decrease during the pandemic period compared with the pre-pandemic period (2020-2019) was 81.5%. In 2021 and 2022, the number of samples increased compared with the pandemic period but was lower than the pre-pandemic period (57.8% and 40.5%, respectively). However, in 2022, the rate of decline in samples decreased compared to 2021. The most dramatic decreases during the pandemic period were seen in thyroid, lymph node, breast, salivary gland FNAs, and urinary bladder-urine cytologies. However, their percentage in the overall cytologic material increased relatively compared to 2019. In the post-pandemic periods (2021 and 2022), there was also a decrease in the number of these samples. However, some samples, such as serous effusions, bone and soft tissue FNAs increased compared to the pre-pandemic period. This suggests that clinicians in our hospital continued to prioritize cytology for diagnostic and therapeutic purposes rather than screening purposes. As in studies conducted worldwide and our study, despite the increase in routine activities of health services and cytologic samples during the same period in 2021 and 2022, fewer samples and higher malignancy rates

were observed compared to the pre-pandemic period (2020: +4.69%, 2021: +6.42%, 2022: +4.07%). This underscores the significance of prioritizing patients at high oncological risk during the pandemic and the continuation of this practice. Additionally, we know that there were significant decreases in the PAP smear screening tests. Wang et al. (15) demonstrated that the pandemic led to a significant decline in the number of cervical smears in the Asia-Pacific region. The Ontario Cervical Screening Program study found a 63% reduction in the number of PAP tests and a 68% decrease in colposcopies during the pandemic in Canada (16). Similarly, there were significant disruptions in gynecology practices in Germany, with a 38% decrease in cervical cancer screening during the pandemic (17). We know that the number of PAP smear screenings decreased in our hospital during the pandemic, but our study focused on evaluating how non-gynecologic cytology was impacted by the COVID-19 pandemic both in the short term and long-term. Studies on the effects of the COVID-19 pandemic, It is believed that the reduction in hospital admissions and the number of samples for cancer screening caused delays in the diagnosis of possible malignancies. Therefore, there was an expectation of a corresponding increase in the number of malignancy diagnoses during the post-pandemic period (18-20). Our study showed that malignancy rates did not follow a linear decrease or increase across the pre-pandemic, pandemic, and post-pandemic periods (2019: 6.1%, 2020: 10.80%, 2021: 12.53%, 2022: 10.18%). We anticipate that malignancy rates will return to pre-pandemic levels as the sample size increases.

Study Limitations

Our study has certain limitations. We focused exclusively on the three-month periods of 2019, 2021, and 2022, comparing them to the equivalent period in 2020. Information for the other months of these years is not available. We also included only non-gynecological cytology material.

CONCLUSION

In conclusion, while the data indicate a notable decrease in the overall cytological workload during the COVID-19 lockdown, most samples were collected for diagnostic and therapeutic purposes, and high-risk oncological patients continued to receive care. It can be said that with the start of controlled social life in the post-quarantine period, screening programs and routine activities for health services and cytopathology laboratories quickly returned to pre-pandemic levels. To the best of our knowledge, no other study has investigated the long-term effects of post-pandemic COVID-19 on non-gynecological cytology.

Footnote

Ethics Committee Approval: Ethical approval for this study was obtained from the University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital Clinical Research Ethics Committee (decision number: 177, date: 25.09.2023).

Informed Consent: Were retrospectively evaluated and compared with samples from the same period.

Authorship Contributions

Concept: H.B., Ş.E.D., C.Ç., Ö.Y., Design: H.B., Ş.E.D., C.Ç., Ö.Y., Data Collection or Processing: H.B., Ş.E.D., Analysis or Interpretation: H.B., Ş.E.D., Literature Search: H.B., Writing: H.B.

Conflict of Interest: Özben Yalçın is an Associate Editor in the European Archives of Medical Research. She had no involvement in the peer-review of this article and had no access to information regarding its peer-review. Other authors declared no conflict of interest.

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REFERENCES

- Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med.* 2020;382:727-33.
- Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *Int J Antimicrob Agents.* 2020;55:105924.
- World Health Organization (WHO). Available at <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.
- World Health Organization (WHO). Available at: <https://data.who.int/dashboards/covid19/deaths>
- Rosenbaum L. The untold toll - the pandemic's effects on patients without COVID-19. *N Engl J Med.* 2020;382:2368-71.
- 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.* 2021;74:261-3.
- Vigliar E, Cepurnaite R, Alcaraz-Mateos E, Ali SZ, Baloch ZW, Bellevicine C, et al. Global impact of the COVID-19 pandemic on cytopathology practice: Results from an international survey of laboratories in 23 countries. *Cancer Cytopathol.* 2020;128:885-94.
- Rana C, Kumar S, Babu S, Kushwaha R, Singh US, Ramakant P, et al. Impact of ongoing COVID-19 pandemic on cytology: An institutional experience. *Diagn Cytopathol.* 2021;49:311-5.
- Kurtulan O, Önder Çelik S. Cytopathology Practice in the Covid-19 Pandemic, During the Lockdown and Post-lockdown Period: A Tertiary-Care Center Experience. *Acta Medica.* 2022;53:350-5.
- Altındağ SD. The Impact of the COVID-19 Pandemic on the Practice of Pathology: Analysis of Specimen Volumes in the Only Pathology Laboratory in the City. *J DEU Med.* 2022;36:151-7.
- de Pelsemaeker MC, Guiot Y, Vanderveken J, Galant C, Van Bockstal MR. The Impact of the COVID-19 Pandemic and the Associated Belgian Governmental Measures on Cancer Screening, Surgical Pathology and Cytopathology. *Pathobiology.* 2021;88:46-55.
- Vissio E, Falco EC, Collemi G, Borella F, Papotti M, Scarmozzino A, et al. Impact of COVID-19 lockdown measures on oncological surgical activity: Analysis of the surgical pathology caseload of a tertiary referral hospital in Northwestern Italy. *J Surg Oncol.* 2021;123:24-31.
- Hong SA, Jung H, Kim SS, Jin MS, Pyo JS, Jeong JY, et al. Current status of cytopathology practice in Korea: impact of the coronavirus pandemic on cytopathology practice. *J Pathol Transl Med.* 2022;56:361-9.
- Vigliar E, Pisapia P, Dello Iacovo F, Alcaraz-Mateos E, Ali G, Ali SZ, et al. COVID-19 pandemic impact on cytopathology practice in the post-lockdown period: An international, multicenter study. *Cancer Cytopathol.* 2022;130:344-51.
- Wang YH, Bychkov A, Chakrabarti I, Jain D, Liu Z, He S, et al. Impact of the COVID-19 pandemic on cytology practice: an international survey in the Asia-Pacific region. *Cancer Cytopathol.* 2020;128:895-904.
- Meggetto O, Jembere N, Gao J, Walker MJ, Rey M, Rabeneck L, et al. The impact of the COVID-19 pandemic on the Ontario cervical screening program, colposcopy and treatment services in Ontario, Canada: a population-based study *BJOG.* 2021;128:1503-10.
- Gremke N, Griewing S, Felgentreff M, Kostev K, Kalder M. Impact of the Coronavirus Disease 2019 (COVID-19) Pandemic on Cervical Cancer Screening in Gynecological Practices in Germany. *Cancers (Basel).* 2022;14:4820.
- Mitchell EP. Declines in Cancer Screening During COVID-19 Pandemic. *J Natl Med Assoc.* 2020;112:563-4.
- Patt D, Gordan L, Diaz M, Okon T, Grady L, Harmison M, et al. Impact of COVID-19 on Cancer Care: How the Pandemic Is Delaying Cancer Diagnosis and Treatment for American Seniors. *JCO Clin Cancer Inform.* 2020;4:1059-71.
- Pisapia P, Troncone G. The Two Sides of Cytopathology during the COVID-19 Health Emergency: Screening versus Diagnosis. *Pathobiology.* 2020:1-2.