

The Effect of the Covid-19 Pandemic on the Number of Cultures Sent to the Microbiology Laboratory

Covid-19 Pandemisinin Mikrobiyoloji Laboratuvarına Gönderilen Kültür Sayısına Etkisi

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Abstract

Background: We evaluated the number of ear, nose, throat, phlegm, and wound-site culture samples sent to the Medical Microbiological Laboratory at a University Hospital in Turkey before and during the coronavirus disease 2019 (COVID-19) pandemic.

Materials and Methods: In this study, 2662 cultures sent to the Laboratory in 2019, 2020, and 2021 were evaluated. The culture samples were categorised by type and year, and the changes over time were assessed.

Results: Of the patients, 1277 (48%) and 1385 (52%) were female and male, respectively. The average of age of the female and male patients was 58.06 and 57.71 years, respectively. The number of cultures differed significantly among 2019, 2020, and 2021 ($p < 0.05$). The numbers of phlegm, wound site, nose, ear, and throat cultures differed significantly among the years ($p < 0.05$). The numbers of wound, sputum, and ear cultures decreased after 2019, and those of nasal and throat cultures increased in 2020 and 2021.

Conclusions: The COVID-19 pandemic altered the number of cultures being sent to the Laboratory.

Key Words: COVID-19, pandemic, culture, laboratory

Öz.

Amaç: Bu çalışmanın amacı Covid-19 pandemisi sürecinde Türkiye’de bir Üniversite Hastanesi Tıbbi Mikrobiyoloji laboratuvarına gönderilen kulak, burun, boğaz, balgam, yara yeri kültürü numunelerindeki değişikliği pandemi öncesi dönem, pandeminin ilk tespit edildiği yıl ve takip eden süredeki sayısal değişikliğini saptayıp, bu yılları karşılaştırmaktır.

Materyal ve Metod: Bu amaçla 2019,2020 ve 2021 yıllarında Mikrobiyoloji laboratuvarına gönderilen 2662 kültür değerlendirildi. Bu kültürler, numune çeşitliliğine ve yıllara göre katagorize edilerek yıllar arasındaki değişim karşılaştırıldı.

Bulgular: Bunların 1277’si (%48) kadın, 1385’i (%52) erkek hastaydı. Kadın hastaların yaş ortalamaları 58,06 erkek hastaların yaş ortalamaları 57,71 idi. Kültür sayısal veri olarak 2019 yılı ile 2020 ve 2021 yılları arasında karşılaştırıldığında istatistiksel açıdan anlamlı bulundu ($p < 0.05$). Balgam, yara yeri, burun, kulak, boğaz kültüründe de yıllar arasında istatistiksel olarak anlamlı farklılık bulundu ($p < 0.05$). 2019 yılından sonra yara, balgam ve kulak kültürleri azalmış, pandemi yıllarında ise burun ve boğaz kültürlerinde artış olmuştur (2020,2021).

Sonuç: Çalışmamız Covid-19 pandemisinin hastalıkların insidansında dolaylı olarak değişikliğe neden olduğunu laboratuvara gelen kültür sayılarındaki anlamlı değişiklik ile saptanmıştır.

Anahtar kelimeler: Covid-19, Pandemi, Kültür, Laboratuvar

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Introduction

The World Health Organization (WHO) defines *pandemic* as the worldwide spread of a new disease. In December 2019, an increase in pneumonia cases of unknown aetiology was detected in Wuhan, People's Republic of China. On January 7, 2020, those cases were found to be caused by a new coronavirus, which was subsequently designated severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). The WHO named the disease *coronavirus disease 2019* (COVID-19) on February 11, 2020. COVID-19 started to spread in Europe in January and a pandemic was declared by the WHO on March 11, 2020 (1).

Clinical, laboratory, and radiological findings can trigger suspicion of COVID-19, but the final diagnosis is made by polymerase chain reaction (PCR) detection of SARS-CoV-2 RNA (2,3).

The pandemic changed the normal course of life. Although the number of patients presenting to hospital was increased by COVID-19, postponement of non-urgent elective procedures decreased the number of patients in some departments. Because COVID-19 first affects the upper respiratory tract and subsequently the lower respiratory tract, the Otorhinolaryngology Department saw an increasing number of patients during the COVID-19 pandemic (4,5). We evaluated the effect of the COVID-19 pandemic on the number of ear, nose, throat, phlegm, and wound site culture samples sent to our Medical Microbiology Laboratory (Adiyaman University, Adiyaman, Turkey).

Materials and Methods

We evaluated the effect of masking, social distancing, and movement restrictions on the incidence of other diseases transmitted via droplets, according to the number of laboratory samples. The study was approved by the Local Ethics Committee of Adiyaman University (Date: 16/02/2022, decision number 2022/19).

Patients from whom phlegm, nose, ear, throat, and wound culture samples were taken in 2019, 2020, and 2021 were identified in the database of the University Training and Research Hospital. The clinical and demographic data of the patients were recorded according to age and sex.

Statistical methods

A statistical analysis was performed using SPSS v. 21 software (IBM Corp., Armonk, NY, USA). Continuous data are presented as minima, maxima, medians, and means; categorical variables are given as frequencies and percentages. The chi-squared test was used as appropriate. A value of $p < 0.05$ was taken to indicate statistical significance.

Results

The Medical Microbiology Laboratory of our hospital received 2662 wound site, phlegm, nose, ear, and throat culture samples from 2019 to 2021. Of them, 1277 (48%) and 1385 (52%) were from female and male patients, respectively. The average of age of those female and male patients was 58.06 and

57.71 years, respectively. The numbers of culture samples are listed in Table 1. The number of wound site cultures was 855 in 2019, 53 in 2020, and 82 in 2021. The number in 2019 was significantly higher than in 2020 and 2021. Similarly, the number of phlegm cultures was 678 in 2019, 377 in 2020, and 367 in 2021. The number in 2019 was significantly higher than in 2020 and 2021. The number of nose cultures was 4 in 2019, 36 in 2020, and 26 in 2021. The number in 2019 was significantly smaller than in 2020 and 2021 ($p < 0.05$). The number of ear cultures was 21 in 2019, 1 in 2020, and 3 in 2021. The number in 2019 was significantly higher than in 2020 and 2021 ($p < 0.05$). The number of throat cultures was 30 in 2019, 90 in 2020, and 39 in 2021. The number in 2019 was significantly smaller than in 2020 and 2021 ($p < 0.05$).

Table 1. Distribution of wound site, sputum, ear, nose, throat culture numbers and percentage by years

	2019 n (%)	2020 n (%)	2021 n (%)	P value
Wound culture	855 (53.84%)	53 (9.51%)	82 (15.86%)	p<0.05
Sputum culture	678 (42.69%)	377 (67.68%)	367 (70.98%)	p<0.05
Nasal culture	4 (0.25%)	36 (6.46%)	26 (5.02%)	p<0.05
Ear culture	21 (1.32%)	1 (0.17%)	3 (0.58%)	p<0.05
Throat culture	30 (1.88%)	90 (16.15%)	39 (7.54%)	p<0.05
Total	1588	557	517	

Discussion

Researchers have investigated the laboratory parameters useful for follow-up and risk classification for mortality due to COVID-19, including nose, throat, and phlegm cultures (6). However, the number of samples being sent to microbiological laboratories for the diagnosis and follow-up of Covid-19 patients is large.

Most wound infections are hospital-acquired (7). Culture and antibiogram evaluations increase the success rate and decrease the cost of treating wound-site infections. By controlling antibiotic use, these procedures can also prevent the spread of resistant bacteria.

Microbiological examinations are hampered by difficulty in identifying the causative microorganisms in infected wounds. Clinical samples should be obtained as aseptically as possible because the report of the microbiological laboratory is important for treatment decision-making (8,9). During the COVID-19 pandemic, patients receiving long-term intensive care unit treatment and patients with oxygen saturation problems often experienced adverse events such as pressure sores. Yu *et al.* (10) evaluated 16 studies with 7696 participants from seven countries. There were two main types of pressure injuries related to COVID-19: pressure injuries caused by protective equipment (masks, goggles, or face shields) and those caused by being in the prone position during pressure therapy. Nonetheless, the number of nosocomial

wound infections has decreased during the pandemic, as indicated by the decrease in the number of elective surgeries and postoperative hospitalisation duration, and the decrease in the number of patients hospitalised in intensive care units for conditions other than COVID-19. Indeed, the number of wound site cultures decreased during the COVID-19 pandemic. Phlegm culture is important for diagnosis and follow-up for monitoring the airway flora of patients with lower respiratory tract infections and detecting potentially pathogenic microorganisms.

The use of antibiotics active against the causative agent decreases the annual number of attacks and the hospitalisation frequency and duration in bronchiectasis and chronic obstructive pulmonary disease, and it increases the quality of life and respiratory function of patients (11,12). Shafran *et al.* (13) evaluated the causes of bacterial infection secondary to COVID-19. Patients with COVID-19 had a higher bacterial infection rate (12.6% vs. 8.7%), a longer interval from admission to detection of a bacterial infection (4 [1–8] and 1 [1–3] days), and a higher rate of late (48 h after admission) infection with Gram-positive bacteria (28% vs. 9.5%) than those with influenza. However, we believe that social distancing, mask wearing, suspension of schools, and following hygiene rules decreased the risk of infection, reducing the number of intensive care unit admissions due to respiratory diseases. Postponing elective operations decreased the number of postoperative hospitalisations and so also the number of nosocomial infections. The result was a smaller number of samples received by the Medical Microbiology Laboratory. There was a significant decrease in the number of phlegm cultures during the pandemic. Graciano *et al.* (14) reported an approximately 70% decrease in admissions to intensive care units during the pandemic.

COVID-19 primarily affects the upper respiratory tract, explaining the significant increase in the number of nose and throat cultures during the pandemic (15,16). The significant decrease in the number of ear cultures during the pandemic was a result of avoidance of ear infection risks (*e.g.*, swimming pools).

Conclusion

COVID-19 does not only affect the respiratory system; it indirectly affects other organs. The number of culture samples sent to our Medical Microbiology Laboratory changed significantly during the COVID-19 pandemic, suggesting effects on the incidence rates of other infectious diseases.

Limitations

This study was limited by being restricted geographically. For this reason, a larger multicentre study is needed.

Ethical Approval: This study was approved by the Non-interventional Ethics Committee of Adiyaman University (Date: 16/02/2022, Decision number: 2022/19).

Author Contributions:

Concept: M.K., S.A.

Literature Review: M.K.

Design : M.K., S.A.

Data acquisition: S.A.

Analysis and interpretation: M.K., S.A.

Writing manuscript: M.K.

Critical revision of manuscript: M.K., S.A.

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