



ARAŞTIRMA / RESEARCH

Investigation of asymptomatic COVID-19 carriers among healthcare workers

Sağlık çalışanlarında asemptomatik COVID-19 taşıyıcılığının araştırılması

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Abstract

Purpose: The COVID-19 infection can lead to diverse clinical consequences, ranging from mild symptomatic cases to severe respiratory failure and potential fatality. Asymptomatic cases can also be seen and individuals who are considered to be asymptomatic can spread the disease. This study aims to determine the prevalence of COVID-19 asymptomatic cases among healthcare workers.

Materials and Methods: A total of 320 oropharyngeal samples were collected from individuals who are considered to be asymptomatic. The samples were then subjected to Reverse Transcription Polymerase Chain Reaction (RT-PCR) for SARS-CoV-2 detection.

Results: A total of 320 healthcare workers volunteered to participate. Healthcare workers showing clinical symptoms suggestive of COVID-19 were excluded from participation in this study. Among the participants, 45% were doctors, 13.75% were nurses, and 12.5% were intern doctors. The gender distribution was 60% male and 40% female. Additionally, 52.8% (169 participants) reported a history of prior COVID-19 infection. All of the 320 participant's samples were tested with RT-PCR found to be negative.

Conclusion: During this exit period from strict quarantine measures, it is crucial to prevent silent infection among asymptomatic carriers in addition to identifying and isolating the COVID-19 positive individuals

Keywords: COVID-19, asymptomatic carrier, health worker

Öz

Amaç: COVID-19 enfeksiyonu, hafif semptomatik vakalardan ciddi solunum yetmezliği ve potansiyel ölüme kadar değişen çeşitli klinik sonuçlara yol açabilir. Asemptomatik vakalar da görülebilir ve asemptomatik olduğu düşünülen bireyler hastalığı yayabilir. Bu çalışmada sağlık çalışanları arasında COVID-19 asemptomatik vaka prevalansını belirlemek amaçlanmıştır.

Gereç ve Yöntem: Asemptomatik olduğu düşünülen bireylerden toplam 320 orofaringeal örnek toplanmıştır. Örnekler daha sonra SARS-CoV-2 tespiti için Ters Transkripsiyon Polimeraz Zincir Reaksiyonuna (RT-PCR) tabi tutulmuştur.

Bulgular: Toplam 320 sağlık çalışanı çalışmaya gönüllü olarak katılmıştır. COVID-19'u düşündüren klinik semptomlar gösteren sağlık çalışanları bu çalışmaya katılmamıştır. Katılımcıların %45'i doktor, %13,75'i hemşire ve %12,5'i stajyer doktordur. Cinsiyet dağılımı %60 erkek ve %40 kadın şeklindedir. Ayrıca, katılımcıların %52,8'i (169 katılımcı) daha önce COVID-19 enfeksiyonu geçirdiğini bildirmiştir.

Sonuç: 320 katılımcının tüm numuneleri RT-PCR ile test edilmiş ve negatif bulunmuştur. Sıkı karantina önlemlerinden çıktığımız bu dönemde, COVID-19 pozitif bireylerin belirlenmesi ve izole edilmesinin yanı sıra asemptomatik taşıyıcılar arasında gizli bir enfeksiyon bulaşının önlenmesi de çok önemli olduğu düşünülmektedir.

Anahtar kelimeler: COVID-19, asemptomatik taşıyıcı, sağlık çalışanı

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INTRODUCTION

In late December 2019, a coronavirus outbreak (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) started in Wuhan, China, and quickly turned into a worldwide pandemic¹. The infection can cause a wide range of clinical outcomes such as asymptomatic infection, mild symptomatic infection, severe respiratory failure, and even death². Initial symptoms include fever, cough, dyspnea or diarrhea, which usually occur 2-14 days after exposure to the causative agent. However, asymptomatic carriers without any abnormalities in laboratory and radiologic results can also be seen^{3,4}. Since the beginning of the pandemic, there has been considerable debate about the role of asymptomatic and symptomatic individuals in the spread of SARS-CoV-2 infection. Initially, the World Health Organization (WHO) concluded that the role of asymptomatic individuals in transmission was minimal^{5,6}. However, the WHO later acknowledged that there is a growing body of evidence that even people who are considered asymptomatic can spread the disease⁷. There are studies that have shown that asymptomatic carriers can easily spread COVID-19 to middle-aged and elderly populations, which can lead to new outbreaks⁸.

Healthcare workers are essential workers, defined as people providing services in healthcare settings with the potential for direct or indirect exposure to patients or infectious agents⁹⁻¹⁴. Their work puts them at high risk of contracting infectious diseases, including respiratory viruses spread by droplets¹⁵⁻²³. Ensuring the health and safety of healthcare workers both at work and in the community is crucial¹⁰. The aim of this study is to evaluate the direct transmission of the disease among healthcare workers or from these healthcare workers to the patients they provide care, our protective measures, and to help take measures to protect healthcare workers in the hospital from the infection during this period in which the effects of the COVID-19 pandemic have decreased¹¹.

MATERIALS AND METHODS

The study was conducted prospectively between 28.06.2023 and 28.12.2023. Within the scope of the study, swab samples were taken from the oropharyngeal regions of healthcare workers (doctors, nurses, patient caregivers, technicians, intern doctors, staff) in the services and laboratories

deemed appropriate in Trakya University Hospital. Ethical approval has been obtained from Trakya University Faculty of Medicine Non interventional Scientific Research Ethical Committee (03.07.2023/11-27).

The symptoms, vaccination, and COVID-19 history of the participants from whom swab samples were taken were questioned, and only healthcare workers who were considered asymptomatic were included in the study. The study included 320 healthcare workers from the appropriate services and laboratories of our University Health Research and Application Center who were evaluated to be asymptomatic.

The criteria are listed in Table 1 and participants who did not meet these criteria were considered as asymptomatic. Participants in this study were included on a completely voluntary basis. The informed consent form was presented to the participants and they were assured that they would be notified immediately if they were COVID-19 positive.

Table 1. COVID-19 possible criteria questioned before the test (24)

Fever(>37.8 °C)
Recent persistent cough
Close contact with an active COVID-19 case
Sore throat
Runny nose
Dyspnea
Myalgia
Loss of sense of taste or smell
Non-persistent cough

Procedure

The oropharyngeal swab collection was performed by trained personnel in the unit where the health worker was actively working. The swab samples were transported to the laboratory with viral transport medium (VTM) and stored at +4 degrees until the study period. The collected samples were then subjected to Reverse Transcription Polymerase Chain Reaction (RT-PCR) using DS CORONEX COVID-19 Multiplex Real Time-qPCR Test Kit (DS Bio and Nanotechnology Product Tracing and Tracking Co, Ankara, Turkey) with Qiagen Rotor-Gene Q real-time PCR device. For SARS-CoV-2 detection during

the study period, SARS-CoV-2 specific 'N', 'ORF1ab' and 'human ribonuclease P' genes were targeted with this kit.

Statistical analysis

Data were analyzed in terms of age, gender, unit, and occupational category. Any healthcare worker whose clinical symptoms might indicate COVID-19 was not included in this study.

RESULTS

The study included 320 healthcare workers from the appropriate services and laboratories of our University Health Research and Application Center who were evaluated to be asymptomatic. All 320

samples analyzed by RT-PCR were negative. Of the participants, 45% were doctors, 13.75% were nurses, 12.5% were intern doctors; 60% were male, and 40% were female. 52.8% (169 participants) stated that they had previously had COVID-19 disease.

All of these healthcare workers stated that they took part in the diagnosis, follow-up, and treatment of patients diagnosed with COVID-19 for various¹ periods during the pandemic period and that they used gloves, masks, and face protective barriers during these processes. As a remarkable data, the rate of vaccination with 3 doses or more was 85% (25% with 3 doses, 28% with 4 doses, 29% with 5 doses, and 3% with 6 doses). Personal data and demographic characteristics summarized in Table 2 were obtained verbally from each participant.

Table 2. Data and demographic characteristics of the participants

Number of Participants (n)	Gender n(%)	Age group(years) n(%)	Vaccination Rates n(%)	Unit of Healthcare Worker n(%)	Healthcare Worker's Position n(%)	History of COVID-19 n(%)
320	Female: 195 (60%) Male: 125 (40%)	20-30: 189 (59%) 30-40: 74 (23%) 40-50: 31 (9.6%) >50: 26 (8.1%)	2 doses: 48/320 (15%) 3 doses: 80/320 (25%) 4 doses: 90/320 (28%) 5 doses: 92/320 (29%) 6 doses:10/320 (3%)	Medical Microbiology: 41/320 (13%) Family Medicine: 42/320 (13%) Gynaecology and Obstetrics: 32/320 (10%) Dermatology: 16/320 (5%) Paediatrics. Pharmacology. Physiology. Neurology. Psychiatry. Medical Genetics: 57/320 (18%) Other*: 132/320 (41%)	Doctor: 144/320 (45%) Nurse: 44/320 (13.75%) Intern doctor: 40/320 (12.5%) Laboratory technician: 16/320 (5%) Other: (Lecturer. research assistant. secretary. personnel. patient caregiver. chemist. biologist): (23.75%): 76/320	Positive: 169 (52.8%) Negative: 151 (47.2%)

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DISCUSSION

In the present study we conducted RT-PCR test on total of 320 samples of participants considered to be asymptomatic of COVID-19 who are healthcare

workers in our University Hospital. All of the 320 samples were negative. It is thought as the reasons for this result as follows, a) samples were taken from healthcare workers who did not have the symptoms specified in Table 1 b) decreased effects of the pandemic as stated in the Covid-19 Outbreak

Management and Study Guide dated 04.03.202211 by the General Directorate of Public Health of the Ministry of Health of the Republic of Turkey c) 85% of participants have received at least 3 doses of vaccine d) the period of our study took place in the summer when SARS-CoV-2 virus is less prevalent e) the rate of vaccination with at least 2 doses has reached 85.70% in our country¹² f) since the viral load may be low in oropharyngeal swab samples taken from participants without symptoms, false negativity in RT-PCR test may be increased.

As limitations of our study, it is thought that the prevalence of asymptomatic infection may be higher during the peak or immediately following periods of the pandemic, and that the swab samples were taken only from the oropharyngeal region of the participants and not from the nasopharyngeal region. In a study conducted by Elizabeth Temkin et al. in June 2021, asymptomatic COVID-19 screening was performed among healthcare workers inwards that provide care to patients with COVID-19 and those who do not. Of the 522 healthcare workers included in the study, only 1 participant was found positive,

and the authors considered this result as a very low prevalence¹³. In another study dated May 2020, in which 1032 healthcare workers who were considered to be asymptomatic in the UK were included, the positivity rate was found to be 3%¹⁴. In 2020, in another retrospective study conducted in a University hospital in Jordan, 370 healthcare workers who cared for patients infected with novel coronavirus and were considered asymptomatic were screened for COVID-19 with RT-PCR test and all were found negative. The authors described this result as 'unexpected'¹⁵. Studies conducted in various countries on this subject are shown in Table 3. In light of all these results, we can say that the prevalence of COVID-19 in asymptomatic healthcare workers in studies conducted in different periods is generally low, although variable. It is seen that healthcare workers who are at the forefront of the fight against the outbreak are in compliance with the measures taken by the country's authorities. It is thought that these results should be interpreted cautiously and should not give individuals a false sense of safety.

Table 3. Some of the studies on the frequency of asymptomatic cases in COVID-19 screening among healthcare workers

Study	Number of participants(n)	Positive case(n)	Asymptomatic positive cases (n)	Asymptomatic positive case prevalence (%)
Lahner et al. (2020, Italy) ¹⁷	2057	58	18	18/2057 (0.8%)
Keeley et al. (2020, United Kingdom) ¹⁸	1533	288	0	0/288 (0%)
Khalil et al. (2020, United Kingdom) ¹⁹	266	47	16	16/266 (6%)
Houlihan et al. (2020, United States of America) ²⁰	62	2	2	2/62 (3%)
Fakhim et al. (2021, Iran) ²¹	102	21	14	14/102 (13.7%)
Al-zoubi et al. (2020, Jordan) ¹⁵	370	0	0	0/370 (0%)
Lai et al. (2020, China) ²²	335	3	3	3/335 (0.9%)
Temkin et al. (2021, Israel) ¹³	522	1	1	1/522 (0.19%)
Rivett et al.(2020, England) ¹⁴	1032	61	31	31/1032 (3%)
Guery et al. (2020, France) ²³	136	3	1	1/136 (%0.73)
Current study	320	0	0	0/320 (0%)

In conclusion, WHO (World Health Organization) declared in January 2020 that this definition is no longer necessary as of May 2023 after a 3-year pandemic, which it defined as a 'Global Public Health Emergency', but this does not mean that the pandemic is over¹⁶. In the fight against the pandemic, it is very crucial to prevent silent infection among asymptomatic carriers in addition to

identifying and isolating sick individuals. This study is important in terms of identifying asymptomatic healthcare workers who may be COVID-19 carriers and drawing attention to the significance of this subject. We think that healthcare workers who are considered to be asymptomatic at the time of testing may be in the pre-symptomatic period and isolation in case of a positive test will significantly reduce

nosocomial transmission. In this period when the state of emergency is lifted, we think that the widespread use of this screening among healthcare workers may be useful during the exit period from strict quarantine measures that will prevent the spread of the virus. A healthy workforce, unaffected by COVID-19 and not depleted of energy, will be an important value for long-term response to a possible recurring COVID-19 crisis.

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Ethical Approval: Ethical approval was obtained from the Ethics Committee of Non-Interventional Scientific Research of the Dean's Office of the Faculty of Medicine of Trakya University with the decision dated 03.07.2023 and numbered 11/27.

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