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Evaluation of COVID-19 cases detected positive by RT-PCR

RT-PCR ile pozitif saptanan COVID-19 vakalarının değerlendirilmesi

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ABSTRACT

Objective: In this study, it was aimed to examine samples sent to Antalya Public Health Laboratory (AHSL) with the suspicion of COVID-19 by RT-PCR and to investigate the epidemiological and clinical characteristics of the cases.

Methods: This study, conducted between 18 March 2020 and 18 May 2020, retrospectively analyzed on 6404 respiratory tract samples that came to AHSL with suspected COVID-19. SARS CoV-2 specific N and Orf1ab gene regions were analyzed with Real Time PCR test in respiratory tract samples. Medical, epidemiological and demographic information of the people who were tested were obtained retrospectively. Chi-square test was used to compare the proportional differences between groups.

Results: In this study 6.2% (n=398) of 6,404 respiratory tract samples were found to be positive. There was a significant difference between the month of the test and the PCR positivity rate (p<0.05). While the rate of being between the ages of 13-44 was lower in PCR positive cases, the rate of being between the ages of 45-64 was higher (p<0.05). In cases where PCR was studied, the positivity rate in women was higher than in

ÖZET

Amaç: Bu çalışmada Antalya Halk Sağlığı Laboratuvarı (AHSL)'na COVID-19 şüphesi ile gönderilen örneklerin RT-PCR ile incelenmesi ve vakaların epidemiyolojik ve klinik özelliklerinin araştırılması amaçlanmıştır.

Yöntem: Bu çalışma, 18 Mart 2020 ile 18 Mayıs 2020 tarihleri arasında AHSL'na COVID-19 şüphesi ile gelen 6404 solunum yolu örneği üzerinde yapıldı. Solunum yolu örneklerinde Real Time PCR testi ile SARS CoV-2 spesifik N ve Orf1ab gen bölgeleri analiz edildi. Test yapılan kişilerin tıbbi, epidemiyolojik ve demografik bilgilerine retrospektif olarak ulaşıldı. Gruplar arası oransal farklılıkları karşılaştırmak için ki-kare testi kullanıldı.

Bulgular: 6.404 solunum yolu örneğinin %6,2'si (n=398) pozitif saptandı. Testin yapıldığı ay ile PCR pozitiflik oranı arasında anlamlı farklılık görüldü (p<0,05). PCR pozitif hastalarda 13-44 yaş aralığında olma oranı daha düşük iken 45-64 yaş arasında olma oranı daha yüksekti (p<0,05). PCR çalışılan olgularda kadınlarda pozitiflik oranı erkeklere göre daha yüksekti (p<0,05). PCR pozitif hastaların işçi olma oranı daha

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men (p<0.05). While the rate of being employed in PCR positive cases was lower, the rate of being in the non-working group was higher (p<0.05). PCR positive cases had less risk factors (p<0.05). PCR positive cases had a lower smoking rate (p<0.05). A statistically significant difference was found between the travel history and especially the travel history abroad and the test results. PCR positive cases had a higher travel history (p<0.05). PCR positive cases had a higher contact history (p<0.05). 98.8% (n=6326) of the samples included in the study were nasopharyngeal swap samples. There was no statistically significant difference between the presence of symptoms and test results. Although there was no difference with the presence of general symptoms, when individual symptoms were considered, cough, respiratory distress and malaise were proportionally higher in PCR positive cases than PCR negative (p<0.05). There was no significant difference between test results and outpatient follow-up or hospitalization.

Conclusion: Since COVID-19 infection is a complex situation with asymptomatic cases, RT-PCR test should be used in community screenings in order to evaluate the epidemic potential in a realistic way. Control mechanisms should be made more effective for people in closed environments and especially in the 45-64 age group.

Key Words: COVID-19, epidemiology, mass screening, asymptomatic infections, real-time polymerase chain reaction

düşük iken çalışmayan grupta olma oranı daha yüksekti (p<0,05). PCR pozitif hastalar daha az oranda risk faktörüne sahipti (p<0,05). PCR pozitif hastaların sigara kullanma oranı daha düşüktü (p<0,05). Seyahat öyküsü ve özellikle yurtdışı seyahat öyküsü ile test sonuçları arasında istatistiksel olarak anlamlı farklılık bulundu. PCR pozitif hastaların seyahat öyküsü daha yüksekti (p<0,05). PCR pozitif hastaların temas öyküsü daha yüksekti (p<0,05). Çalışmaya alınan örneklerin %98,8'i (n=6326) nazofarengeal swap örnekleriydi. Semptom varlığı ile test sonuçları arasında istatistiksel olarak anlamlı farklılık saptanmadı. Genel semptom varlığı ile fark olmasa da tek tek semptomlar ele alındığında öksürük, solunum sıkıntısı ve kırgınlık PCR pozitif olgularda PCR negatiflerden oransal olarak daha yüksekti (p<0,05). Test sonuçları ile hastanın ayaktan takip edilmesi veya hastaneye yatışı arasında anlamlı bir farklılık saptanmadı.

Sonuç: COVID-19 enfeksiyonu asemptomatik vakalarla karmaşık bir durum olduğundan salgın potansiyelinin gerçekçi bir şekilde değerlendirilebilmesi için RT-PCR testi toplum taramalarında kullanılmalıdır. Kapalı ortamlarda bulunan kişiler ve özellikle 45-64 yaş grubunda kontrol mekanizmaları daha etkin yapılmalıdır.

Anahtar Kelimeler: COVID-19, epidemiyoloji, kitle taraması, asemptomatik enfeksiyonlar, gerçek zamanlı polimeraz zincir reaksiyonu

INTRODUCTION

With the first COVID-19 (Coronavirus Disease 2019) cases started to appear in China's Hubei province in December 2019, the World Health Organization (WHO) named the infectious agent as 2019 novel Coronavirus (2019-nCoV) (1). Diseases caused by 2019-nCoV can range from simple cold to severe respiratory failure syndrome (2). Major respiratory symptoms are fever, cough and dyspnea. The incubation period of the virus is usually 3-7 days, but it can reach up to 24 days (3). The virus is a single stranded, positive polarity, enveloped and zoonotic RNA virus. It can be found in bats, pigs, cats, dogs, rodents and poultry. The first cases are thought to result from animal transmission. Later, in

the epidemic period, human-to-human transmission became prominent (3). It is one of the RNA viruses with the longest genome in nature (4). Following the clinical applications in Hubei Province, Real Time-Polymerase Chain Reaction (RT-PCR) analysis started to be used to detect the virus from the respiratory secretions of patients diagnosed with pneumonia due to 2019-nCoV (5, 6). After the pneumonia cases of unknown etiology were reported from Wuhan, Hubei province in China, the situation rapidly turned into a pandemic (7). WHO has reported this new coronavirus explosion as an internationally alarming public health emergency (2). In order to overcome the pandemic period as soon as possible and to control the transmission and spread of the disease, the epidemiological, clinical and genetic characteristics of the virus should be revealed quickly (8). There is very limited information about the epidemiological, clinical and genetic characteristics of the disease caused by 2019-nCoV. Scientists and doctors continue their studies to control the disease and spread as soon as possible (9). Studies on COVID-19 in Turkey were launched on 10 January 2020, and on 22 January 2020 the first meeting of the Scientific Advisory Board of the Ministry of Health, Republic of Turkey was held. Covidien-19 first case was seen on 11 March 2020 in Turkey (10). Since this date, the number of studies have increased exponentially. Antalya Public Health Laboratory (AHSL) was among the first of the ten laboratories authorized for COVID-19 testing in Turkey, and COVID-19 RT-PCR started to be studied in this laboratory on 18 March 2020. The present study aimed to examine the samples sent to AHSL with the suspicion of COVID-19 between 18 March 2020 and 18 May 2020 by RT-PCR and to investigate the epidemiological and clinical characteristics of the subjects.

MATERIAL and METHOD

6,404 respiratory tract samples submitted to Antalya Public Health Laboratory with suspected COVID-19 between 18 March 2020 and 18 May 2020 were included in the study. The respiratory samples included in the study consisted of nasopharyngeal swab, sputum and tracheal aspirate types. All collected respiratory samples of the patients were stored in viral transport medium (VTM/ Bioeksen R&D Technologies) (Preparation of viral transport medium, Centers for Disease Control and Prevention, SOP). Samples were studied with Real Time PCR in terms of 2019nCoV at AHSL. In the study, Bioeksen kits provided by Bioeksen Ar-Ge Technologies were used. Nucleic acid extraction from respiratory tract specimens were obtained with the RINA-M14 nucleic acid extraction apparatus and Bio-Speedy-nucleic acid isolation kits (Bioeksen Ar-Ge Technologies, Istanbul, Turkey). Nucleic acid isolates were studied with the Bio-Speedy SARS CoV-2 Double Gene RT-qPCR kit. Nucleic acid isolates were tested on the Roche LightCycler-96 Real Time PCR System (Roche Diagnostics Corporation, Indiana, United States) with one-step reverse transcription (RT) and real-time PCR (qPCR) amplification test targeting the SARS-CoV-2 specific N and Orf1ab gene region. The kit targeted the human RNaseP gene for sampling, nucleic acid extraction and inhibition control. The amplification test conditions were programmed as 5 minutes 52°C, 10 seconds 95°C, 1 second 95°C, 30 seconds 55°C. The threshold number of cycles (Cq) up to a value of 38 was considered as a positive result.

Medical, epidemiological and demographic information of the patients were obtained from the Public Health Management System (HSYS) database, which included demographic characteristics, exposure histories, clinical symptoms, and pre-existing diseases. The samples included in the study were evaluated as samples of the ones who were followed up as outpatients and the ones hospitalized. Statistical analyses were performed using SPSS (Statistical Package for Social Science, Chicago, Il, USA) 18.0 software. Chi-square test was used to compare the proportional differences between groups. Statistical significance was defined as $p<0.05$.

This study was carried out in accordance with the Declaration of Helsinki, with the approval of the Antalya Training and Research Hospital Clinical Research Ethics Committee (Date: 03.06.2020, No: 7/13).

RESULTS

In the study 6.2% (n=398) of the 6404 respiratory tract samples included in the study were found to be positive by RT-PCR-based Nucleic Acid Test (NAT). More than half of the patient samples included in the study 52.7% were collected in April (n=3375). PCR positivity rate was 12.0% (n=182) in March, 5.9% (n=199) in April, and 1.1% (n=17) in May. There was a statistically significant difference between the month of the test and the PCR positivity rate (p<0.05). It can be seen that the percentage of PCR positivity was gradually decreasing from March to May (Table 1).

The mean ± SD age of the people tested was 44,6 ±21,4 years in all patients; 49,8 ± 19,5 years in PCR positive subjects and 44,3 ± 21,5 years in PCR negative subjects. It was seen that the age of the participants in the study were 0 years with 0.4% (n=25), 1-12 years with 4.8% (n=305), 13-44 years with 49.0% (n=3138), 45-64 years with 25.0% (n=1604) and 65 years and older with 20.8% (n=1332). Statistically significant differences were found between age and test results (p<0.05). While the rate of PCR positivity for the 13-44 age range was lower, the rate for the group 45-64 ages was higher in PCR positive patients. 40.8% (n=2610) of those included in the study were female and 59.2% (n=3794) were male. On the other hand, 50.3% (n=200) of the PCR positives were male and 49.7% (n=198) were female. The positivity rate of women was higher than that of men (p<0.05). When the professions of the subjects were examined, it was seen that the most common sample group belonged to those who did not work (n=4323, 67.5%). While the rate of the people presently employed in a certain profession in PCR positive patients was lower, the rate of the people in the non-working group was higher (p<0.05) (Table 2).

When pre-existing diseases and risk factors of the subjects are examined, the rate of having any of the risk factors among PCR positives is 31.9% (n=127). A statistically significant difference was found between test results and having any of the risk factors. PCR positive patients had less risk factors (p<0.05). PCR positive patients had a lower smoking rate (p<0.05). Travel history was present in 28.4% (n=113) of PCR positive patients. Travel abroad among PCR positive patients was 24.9% (n=99). A statistically significant difference was found between the travel history, especially the travel history abroad, and the test results (p<0.05). It was seen that 38.4% (n=153) of PCR positive patients had a history of contact. PCR positive patients had a higher contact history (p<0.05) (Table 3).

Table 1. PCR results by month Antalya HSL

Month	Positive PCR n (%)*	Negative PCR n (%)*	All Subjects n (%)*	*p*
March	182 (12,0)	1331 (88,0)	1513 (100,0)	<0,001
April	199 (5,9)	3176 (94,1)	3375 (100,0)	
May	17 (1,1)	1499 (98,9)	1516 (100,0)	
Result	398 (6,2)	6006 (93,8)	6404 (100,0)	

*Line percentage has been used.

Table 2. Age, gender, occupational characteristics and PCR results of the sampled subjects

Age	PositivePCR n (%)*	NegativePCR n (%)*	All Subjects n (%)*	*p*
0	0 (0,0)	25 (0,4)	25 (0,4)	<0,001
1-12	13 (3,3)	292 (4,9)	305 (4,8)	
13-44**	158 (39,7)	2980 (49,6)	3138 (49,0)	
45-64**	133 (33,4)	1471 (24,5)	1604 (25,0)	
65 and above	94 (23,6)	1238 (20,6)	1332 (20,8)	
Gender				
Women	198 (49,7)	2412 (40,2)	2610 (40,8)	<0,001
Men	200 (50,3)	3594 (59,8)	3794 (59,2)	
Profession				
Officer	7 (1,8)	179 (3,0)	186 (2,9)	0,006
Health employee	32 (8,0)	460 (7,7)	492 (7,7)	
Worker**	34 (8,5)	882 (14,7)	916 (14,3)	
Self-employment	26 (6,5)	371 (6,2)	397 (6,2)	
Agriculturel worker	3 (0,8)	87 (1,4)	90 (1,4)	
Unemployed**	296 (74,4)	4027 (67,0)	4323 (67,5)	

*Column percentage **The group that makes difference

In our study 98.8% (n=6326) of the samples were nasopharyngeal swap samples. 98.7% (n=5928) of those who were PCR negative and 100.0% (n=398) of those who were PCR positive belonged to nasopharyngeal swap samples. No PCR positivity was found in any of the samples received as sputum and tracheal aspirate.

Differences between clinical features and symptoms were also analyzed in this study. 69.5% of the subjects (n=4451) were found to have a symptom. 30.5% (n=1953) of those included in the study had no findings of symptoms, but they constituted 26.9% (n=107) of PCR positives. On the other hand, 73.1% (n=291) of those who were PCR positive had symptoms. There was no statistically significant difference between the presence of symptoms and test results. Although there was no difference with the presence of general symptoms, when symptoms were considered in separate groups cough, respiratory distress, and malaise were found to be proportionally higher in PCR positive cases than the PCR negative ones; $p<0.05$) (Table 3). Chest CT was performed in 4.3% (n=278) of the patients included in this study. CT findings were present in 7.0% (n=28) of PCR positive patients. PCR positive patients had a higher rate of CT findings ($p<0.05$).

59.9% (n=3839) of the patients included in the study were followed up on the outpatient basis. 40.1% (n=2565) of the patients included in the study had hospitalization. 6.2% (n=398) of the 6404 respiratory tract samples included in the study were found to be positive and 93.8% (n=6006) to be negative by RT-PCR-based NAT test. 56% (n=223) of those with positive test results were outpatients. Of those with positive test results, 44% (n=175) had hospitalization. Of those whose test results were negative, 60.2%

(n=3616) were outpatients and 39.8% (n=2390) were hospitalized patients. No significant difference was found between the test results and the out patient follow-up or hospitalization (p=0.1) (Figure 1).

Table 3. Risk factors, symptoms and PCR results of sampled subjects

Variable	PositivePCR n (%)*	NegativePCR n (%)*	All Subjects n (%)*	*p*
Risk Factor	127 (31,9)	2601 (43,3)	2728 (42,6)	<0,001
Cardiovascular Disease	20 (5,0)	527 (8,8)	547 (8,5)	0,010
Respiratory Disease	29 (7,3)	619 (10,3)	648 (10,1)	0,053
Diabetes Mellitus	36 (9,0)	453 (7,5)	489 (7,6)	0,274
Hypertension	42 (10,6)	725 (12,1)	767 (12,0)	0,366
Cancer	9 (2,3)	197 (3,3)	206 (3,2)	0,265
Other Diseases	22 (5,5)	485 (8,1)	507 (7,9)	0,068
Cigarette	24 (6,0)	966 (16,1)	990 (15,6)	<0,001
Travel	113 (28,4)	506 (8,4)	619 (9,7)	<0,001
Domestic Travel	18 (4,5)	221 (3,7)	239 (3,7)	0,390
Abroad Travel	99 (24,9)	301 (5,0)	400 (6,2)	<0,001
Contact	153 (38,4)	1182 (19,7)	1335 (20,8)	<0,001
Symptom	291 (73,1)	4160 (69,3)	4451 (69,5)	0,106
Fever	164 (41,2)	2387 (37,7)	2551 (39,8)	0,564
Cough	213 (53,5)	2729 (45,4)	2942 (45,9)	0,002
Respiratory Distress	80 (20,1)	1495 (24,9)	1575 (24,6)	0,032
Throat Ache	67 (16,8)	810 (13,5)	877 (13,7)	0,060
Lassitude	104 (26,1)	1152 (19,2)	1256 (19,6)	0,001
Head Ache	32 (8,0)	450 (7,5)	482 (7,5)	0,688
Vomiting	14 (3,5)	177 (2,9)	191 (3,0)	0,517
Diarrhea	13 (3,3)	241 (4,0)	254 (4,0)	0,460
Myalgia	43 (10,8)	556 (9,3)	599 (9,4)	0,305
Abdominal Pain	6 (1,5)	139 (2,3)	145 (2,3)	0,295
Other	24 (6,0)	337 (5,6)	361 (5,6)	0,726

* Column percentage

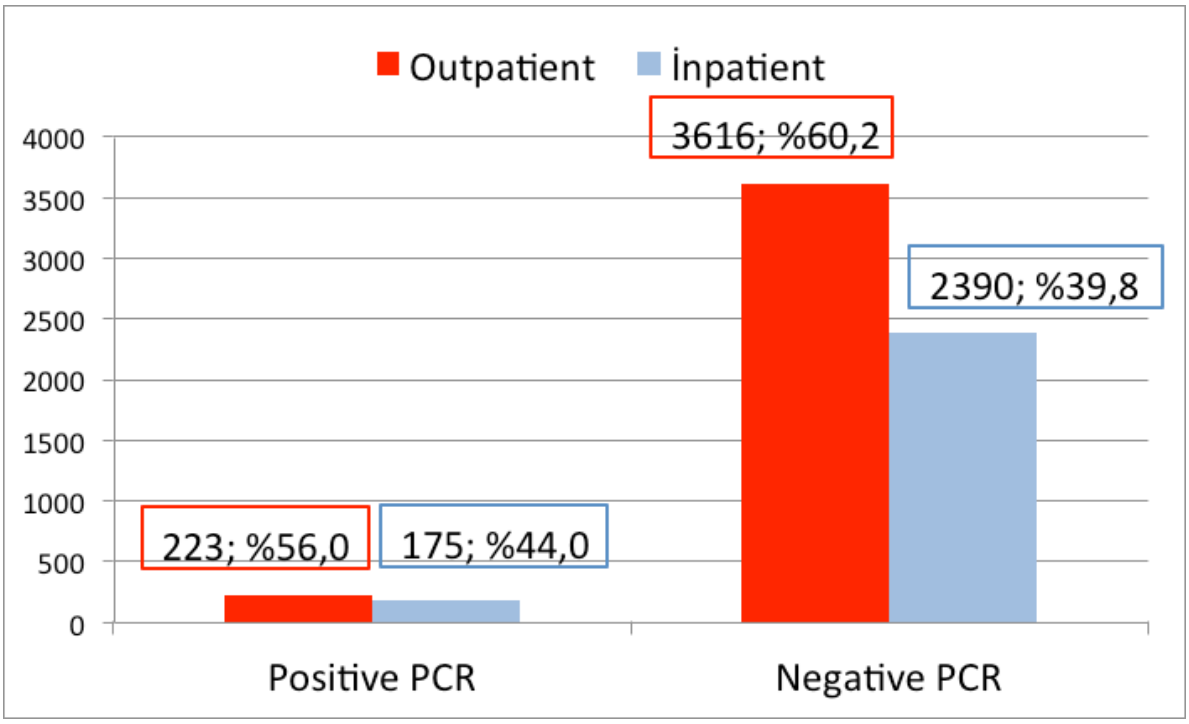

Figure 1. Follow-up processes and PCR positivity

DISCUSSION

In this study, PCR positivity rates of 6,404 samples sent to AHSL with the suspicion of COVID-19, and the relationship of the cases with epidemiological and clinical variables were examined. The data consisted of tests carried out in March, April and May. While the number of tests increased in April, the percentage of positivity decreased. The lowest positivity recorded in May can be interpreted in favor of the control measures taken. The most effective way to prevent virus transmission is to implement several control mechanisms between people. It is important for people to comply with hygiene conditions and reduce social contact (6).

RT-qPCR is used as the gold standard method in the diagnosis of SARS-CoV-2 infection. RT-qPCR results instantly provide information about a specific amount of transcript in a cell or tissue. Some studies have found false negative results of the RT-qPCR test (11). In our study, 6.2% of 2019-nCoV was found to be positive. This result may not show the exact rate of infection. One study states that the PCR test may not adequately reflect the actual results in patients (12).

In this study, a statistically significant difference was found between contact history and test results. PCR positive cases had a higher contact history. The results of our study data show that the most important transmission reduction method during the pandemic period is utilization of contact reduction protection methods. The virus can be transmitted by droplets emitted from the infected individuals through coughing and sneezing and from surfaces contaminated by droplets from the patients (eye, mouth, nasal mucosa contact) (13). There is also the spread of the virus through asymptomatic people. Therefore, it is important to conduct scans to find proactive cases. This allows for earlier clinical management of cases and provides important information about subclinical infections (6). Asymptomatic carriers are difficult to assess as they are unlikely to be tested, and they remain unaware of their infection, and data are limited, but are of great importance because of their potential

to spread the virus in the community. Asymptomatic patients with COVID-19 are a source of spread and pose an important infection control problem (14). Early in the development of any outbreak, increased surveillance is expected to detect severe cases first and then detect less severe (mild or asymptomatic) cases. The emergence of asymptomatic individuals has increased the difficulty of screening, aided the spread of the disease and therefore constituted an important public health problem. Timely diagnosis, isolation and treatment of these asymptomatic patients will help control the further spread of SARS-CoV-2 (15). Our study results have shown the importance of prevention and control of the transmission path between people. In a study conducted during the COVID-19 pandemic, it has been shown that good application of personal protective measures such as maintaining social distance, isolation at home, using surgical masks proportionally improve the results of pandemic control (16,17).

Surface glycoproteins of the virus bind to the host cell's ACE-2 receptors (18). People with underlying diabetes, hypertension, cerebrovascular diseases, malignancies, respiratory diseases, cardiovascular disease and other metabolic disorders are at risk for respiratory failure and mortality in COVID-19 (16). People of all ages are susceptible to 2019-nCoV, but the risk increases for people in older ages as ACE2 receptors to which the virus bind are at a higher rate for these age groups (19). In our study, statistically significant differences were found between test results and age distribution. PCR positive cases were more likely to be encountered between 45-64 years of age. Our results are consistent with the data in the related literature.

In our study, the rate of PCR-positive cases being female was found to be higher. In a study by Sijia et al., no difference was found between men and women, and they reported that the population was generally susceptible (1). In our study, the rate of finding positive individuals in women increased due to the fact that the non-working population mostly consisting of female individuals in Turkey tend to have more social contact in closed environments. In our study, while the rate of employed individuals in PCR positive cases was lower, the rate of being in the non-working group was higher. The decrease in the contamination in the working individuals can be explained by the inability of people to conduct their jobs due to the pandemic and the inability to go to work due to the nationwide restrictions. The higher rate of positivity in the non-working population may be due to the inadequate self-control of these individuals. This situation has also demonstrated the role of domestic contamination in the epidemic. A new era has begun with the onset of the pandemic process. It is a fact that the disease is highly contagious and contagiousness with asymptomatic carriers increases the risk even more in closed environments. It can also be seen from the results that personal protective hygiene is a simple but very effective factor during the pandemic and that transmission can occur very quickly when due attention is not paid.

In our study, when the risk factors in subjects and their relationship with PCR positivity were examined, it was seen that PCR positive cases had less risk factors. Data in the related literature suggest that the majority of COVID-19 patients have mild symptoms and risk factors such as diabetes mellitus or cardiovascular disease which in turn increase mortality. A study emphasized the importance of risk factors in terms of determining patients' requirement critical care and ventilation (19). The samples included in the study were mostly from people in the community screening, and no significant difference was found between our test results and outpatient follow-up or hospitalization. Chen et al. have reported findings from 99 cases of NCIP (novel coronavirus-infected pneumonia), and for groups of people in close contact they suggested that the 2019-nCoV infection was more likely to affect older men with comorbidities and could result in ARDS. However, they also reported that there was no difference in clinical characteristics between severe and non-severe cases (2). The variability between different studies is likely to result from different population segments, infection prevalence rates in this population, and is influenced by the relative number of diagnostic tests performed in these individuals (20). The samples included in our study were generally from outpatients and could reflect the society better. Identifying and isolating cases at the earlier stages of the disease is

crucial during the epidemic process. However, due to the difficulties at this stage, we cannot overcome the pandemic process quickly. Our study results show the importance of general screenings in order to evaluate the epidemic potential in a realistic way.

In this study, PCR positive cases had a lower smoking rate. In some studies, smokers had a lower infection attack rate compared to non-smokers (21). Among epidemiological risk factors, the role of smoking is unclear. Smoking was initially found to be associated with an unfavorable disease prognosis of COVID-19, but this finding remains controversial (22).

In the early stages of COVID-19, fever is frequently observed in patients as a symptom, as well as chills and respiratory distress (23). Fever and respiratory symptoms should be closely monitored in patients infected with 2019-nCoV to prevent further spread. Testing of respiratory samples should be performed immediately when the diagnosis is suspected. In this study, no statistically significant difference was found between the presence of symptoms and test results. The fact that the samples included in the study were generally taken from outpatients may not be able to fully determine the relationship with the presence of general symptoms. However, when symptoms were examined seperately, significant differences were found, especially in the symptoms of cough, respiratory distress and malaise, which can be explained by which symptoms stand out in the course of the epidemic. Since the samples included in our study were generally from outpatients and were sent for public health screening, nasopharyngeal swaps constituted the majority of the sample type. The fact that respiratory distress was detected more in PCR negatives in our study can be explained by the fact that the infection reaches the lower respiratory tract, making it difficult to detect the virus in the PCR test.

Real Time PCR is a test based on the viral genes. In addition, imaging methods and etiology should be used to confirm the diagnosis. In addition to clinical features, imaging methods for diagnosis, etiological history and underlying diseases are also important (24). A statistically significant difference was found between the CT findings and test results of the subjects included in this study. PCR positive subjects had a higher rate of CT findings. In clinical observation of COVID-19 infection in China, some individuals with early infection had no symptoms and had PCR negative results in swab samples. Significant changes were detected in the CT scan (19). Asymptomatic cases complicate our examination of the epidemic response of the virus. The importance of identifying and isolating cases at an earlier stage is seen in the light of literature data and our studies.

Our study findings are particularly important in terms of reflecting the data of the first PCR studies in Turkey early in the pandemic. There are some limitations in our study. First; since we are a Public Health Laboratory, the patients in the study group are generally healthy screenings. Second one is the limited working time. Third one is the fact that the RT-PCR test did not adequately reflect the results in subjects.

In conclusion, we believe that our study will guide the diagnosis in outpatients and healthy community screenings, where Public Health Laboratories provide service. We think that this study may guide the epidemiological studies to be conducted with long-term screening of larger patient groups.

ETHICS COMITTEE APPROVAL

* The study was approved by the Antalya Training and Research Hospital Clinical Research Ethics Committee (Date: 03.06.2020 and Number: 7/13).

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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