

Prevalence of the Clinical Symptoms and PCR Test Results on Patients With COVID-19 in South of Tehran

Microbiology Insights
Volume 15: 1–4
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DOI: 10.1177/11786361221097680



Rahimkhani Monireh¹  and Kazemian Kiana²

¹Faculty of allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran.

²EMROOZ Laboratory, Vice Chancellor of Tehran University of Medical Sciences, Tehran, Iran.

ABSTRACT

BACKGROUND: The first human case of COVID-19 was reported on 19 February 2020 in Iran, since then the number of infected cases has dramatically increased to about 1.800 million and about 62000 deaths, also elderly people have accounted for the largest frequency of mortality.

OBJECTIVE: This study aims to evaluate the prevalence of Covid-19 RT-PCR positive among Iranian patients and to evaluate the most important clinical symptoms of identified patients based on age, gender, and their background diseases to be used as an aid for early diagnosis.

METHODS: During 9 months, swab samples of 11 034 patients' nasopharynx and oropharynx secretions were obtained and were referred to the laboratory for Covid-19 RT-PCR test. In addition, the history of signs and symptoms from patients was recorded.

RESULTS: In total, 11 034 Covid-19 RT-PCR tests that performed, 3358 samples had positive results (30.4%). Headache was the most commonly reported, which was found in 42.5% of our cases. Fever was the second most common symptom among the patients studied, with a prevalence rate of 36.2%.

CONCLUSION: In this study, almost 30% of symptomatic patients had positive Covid-19 RT-PCR test results. Headache was the most common symptom; also diarrhea and nausea were the least common symptoms among patients under this study.

KEYWORDS: COVID-19, symptoms, coronavirus, RT-PCR, prevalence

RECEIVED: February 20, 2022. **ACCEPTED:** April 10, 2022.

TYPE: Original Research

FUNDING: The author(s) received no financial support for the research, authorship, and/or publication of this article.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

CORRESPONDING AUTHOR: Rahimkhani Monireh, Faculty of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran 1416753955, Iran. Email: rrahimkhani@sina.tums.ac.ir

Introduction

Coronaviruses are enveloped, positive single-stranded RNA genome viruses belonging to the *Coronaviridae* family. The coronavirus is a member of a family of viruses that may cause various symptoms such as pneumonia, fever, breathing difficulties, lung infection, fatigue, decreased leukocyte counts, and radiographic evidence of pneumonia. Organ dysfunction and death can occur in severe cases. Infection severity seems to be associated with age, biological sex and comorbidities.¹

The World Health Organization (WHO) used the word 2019 novel coronavirus to name a coronavirus that affected the lower respiratory tract of patients in China on 29 December 2019. This was linked to a local Huanan South China Seafood Market in Wuhan, Hubei Province, China.² The WHO publicized that the official name of the 2019 novel coronavirus is coronavirus disease (COVID-19). And the current nomenclature for the virus is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Coronavirus 2 (SARS-CoV-2) has developed rapidly into a pandemic. COVID-19 is characterized to cause fever, fatigue, and shortness of breath, cough pneumonia, and other respiratory tract symptoms. The most important lethal risk factors for COVID-19 disease are age,

diabetes, hypertension, cardiovascular disease, endocrine, respiratory diseases and increasing serum levels of D-dimer. Moreover, patients with shortness of breath, confusion, chest pain at admission, and older men with underlying disease are also more likely to pass away.³

In Iran, the first case of COVID-19 was recorded in Qom, a close city to Tehran. Therefore, suspected cases in this city were referred to Masih Daneshvari Hospital in Tehran, Iran. This hospital has been designated for suspected cases of COVID-19 since the onset of the outbreak and after.⁴

Early overviews of a developed pathogen provide a unique opportunity to characterize its spread availability, natural history, and the efficiency of screening. Careful checking of cases and low possibility of infection from the general public enable suggestions, key to demonstrating the course of the symptoms that are difficult to make during a commonly spread epidemic.⁵

In order to express the prevalence of symptoms among people, a complete cognition of symptoms and studying the frequency of their prevalence in communities are necessary. Therefore, in our study, we decided to examine the prevalence of symptoms in patients who participated in this study.



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Material and Methods

The present study was done in a 9-month interval (OCT 2020 to Jun 2021). During this time, swab samples of 11 034 patients' nasopharynx and oropharynx secretions were obtained and were referred to the EMROOZ laboratory, under the supervision of the Vice Chancellor of Tehran University of Medical Sciences. Two swabs were taken of each patient and real time PCR tests were performed on both samples. Probe-based RT-PCR has been considered to be the gold standard method for SARS-CoV-2 detection and is currently one of the most widely used tests in many countries for screening the population as recommended by the WHO and CDC.^{6,7} The definitive diagnosis of the disease relies on the identification of viral genomic RNA by using real time PCR tests. The presence of sufficient viral genomes for amplification at the site of sample collection is the precondition for these tests. Therefore, collecting the appropriate specimen from patients at the right time using the appropriate protocol is key in the diagnosis of the infection.⁸ On the earliest days of symptoms, swabs were being collected from the upper respiratory tract on patients.

The patients included 6069 men and 4965 women and ranged in age from 3 years to over 80 years. Patients' clinical

symptoms were headache, fever, weakness, dry cough, body pain, sore throat, losing sense of smell and taste, asthma, anorexia, diarrhea, and nausea.

Model and serial number of The Real time PCR device used in this project were: ViroQ SARS-CoV-2. Lot number: 728250

After sending the patients' nasopharynx and oropharynx secretions to the lab, RNA was isolated by manual "QIAamp Viral RNA Mini Kit" according to manufacturer's instruction.

The reaction volume for each real-time PCR test is 20 µl.

If a premix of ViroQ Enzyme, ViroQ Mix and DEPC H₂O/WFI was prepared for more than 1 sample, it has been allowed because of possessing a reasonable additional amount for pipetting losses.

To perform the positive control (PTC) and a negative control (NTC) prepare a PCR reaction and also the ViroQ Pos Ctrl or water for the NTC instead of RNA were used.

It was done with the sealed reaction tubes and a brief spinning of the liquid. Ensure that no bubbles remained on the wells.

The sensitivity rate and specificity of present RT-PCR Mini Kit were 97.8% and 97.3%, respectively.

The PCR program instructed the following parameters:

STEP	TIME	TEMPERATURE	NO. OF CYCLES
Reverse transcription	20 min	48°C	1 cycle
Polymerase activation	3 min	95°C	1 cycle
Denaturation	15 sec	95°C	45 cycles
Annealing + Extension	30 sec + reading	58°C	

Results

Our patients consisted of 6069 men and 4965 women ranged from age of 3 to over 70 years old.

In total 11 034 RT-PCR tests were performed and 3358 samples had positive RT-PCR test results (30.4%).

The positive and negative RT-PCR test results by different age groups of the patients under study are shown in Table 1. The age group interval was 10 years.

Based on the information in Table 1 it could be suggested that the risk of Covid-19 infection is increased in older ages.

In our study headache was the most common symptom among patients under study. Headache was the most commonly reported and found in 42.5% of our cases. Fever was the second most common symptom among the patients studied with a prevalence of 36.2%.

Other symptoms of patients in order of prevalence were body pain and fatigue (28.9%), dry cough (19%), sore throat (17.3%), diminished senses of smell and taste (16.6%), dyspnea (15.2%), weakness (15%), anorexia (14.9%), diarrhea (14.8%), and nausea (14.8%).

The symptoms of the studied patients are shown in Table 2.

Based on information in Table 2, there is no dramatic difference in sexuality and Covid-19 infection. It also could be seen that headache and fever prevalence percentage, respectively has larger portions of the study.

Discussion

This study found that in covid-19 infection, 2 major symptoms of headache & fever could be considered as main symptoms of the infection in recent pandemic. The clinical signs of Covid-19 disease are very diverse and can range from mild to severe and fatal illnesses. The most common symptoms of Covid-19 are lung infection, and most of the patients have primary symptoms such as fever, cough, dyspnea, sore throat, myalgia, gastrointestinal penetrations, rhinorrhea and loss of taste or smell. The most common symptoms of COVID-19 were non-specific and included fever, cough and myalgia. Other symptoms were sore throat, headache, chills, nausea or vomiting, and diarrhea. According to the results of the present study, most prevalence of the symptoms in our investigated patients was headache and the other symptoms were Fever, Body pain and fatigue, Dry cough, Sore throat, Diminished senses of smell and taste,

Table 1. The incidence of positive and negative PCR tests based on age intervals.

AGE RANGE (YEARS)	TOTAL NUMBER	RT-PCR POSITIVE NUMBER	RT-PCR POSITIVE PERCENT	RT-PCR NEGATIVE NUMBER	RT-PCR NEGATIVE PERCENT
0-10	421	81	19.2	340	80.8
11-20	933	179	19.4	756	80.6
21-30	2251	613	27.2	1638	72.8
31-40	3407	1071	31.4	2336	68.6
41-50	2107	668	31.7	1439	68.3
51-60	967	339	35.05	628	64.9
61-70	607	242	39.8	365	60.2
>70	336	165	48.9	171	51.1

Table 2. The clinical data including sex and symptoms in patients.

PARAMETER	NUMBER	PERCENT (%)
Sex		
Male	6069	55.1
Female	4965	44.9
Symptoms		
Headache	4689	42.5
Fever	3994	36.2
Body pain and fatigue	3188	28.9
Dry cough	2096	19
Sore throat	1909	17.3
Diminished senses of smell and taste	1831	16.6
Dyspnea	1677	15.2
Weakness	1655	15
Anorexia	1644	14.9
Diarrhea	1633	14.8
Nausea	1633	14.8

Dyspnea, weakness, anorexia, diarrhea, respectively. This disease was clinically classified into mild to moderate disease (non-pneumonia and pneumonia), severe disease (dyspnea, high respiratory frequency, low oxygen saturation, lung infiltrates more than 50% of the lung field less than 1 day) and critical (respiratory failure, septic shock, multi-organ dysfunction/failure).⁹ Many of the elderly patients who had severe illness had evidence of chronic underlying illness such as cardiovascular disease, immune deficiency disease, lung disease, kidney disease, or cancers.¹⁰

Based on recent published research in Japan among the 5042 tested individuals, 359 (7.1%) with 194 males and

165 females have SARS-CoV-2 RT-PCR test-positive results and the prevalence of symptoms was Cough (19.3%), fever (31.8%), Dyspnea (13.6%), Fatigability (23.4%), Dysosmia (10.9%). Fever was the most prevalent symptom in this group of patients.¹¹

The other study in the USA showed that between July 2021 to Jan 2022, 1076 hospitalized adults had RT-PCR positive test results. Symptoms of these investigated patients were lower respiratory symptoms (51.9%), abnormal chest radiograph (42%), Hypoxemia (31.3%), fever (29.8%), and Gastrointestinal symptoms (24.4%).¹²

Based on the epidemiological study in south of IRAN, among the 413 patients with RT-PCR test –positive result, 145 (35.10%) were in severe condition and the prevalence of their symptoms were fever (37%), cough (71.2), Shortness of breath (61.2), General weakness(15.8%), Sore throat (6.1%), Diarrhea (5%), Nausea (16.5), Headache (16.7), Chest pain (3%), and Lack of appetite (12.6). Cough was the most prevalent symptom in these patients.¹³

Asymptomatic patients are very important in the Covid-19 disease epidemic. Reviews have shown that symptomatic patients of COVID-19 have higher transmissibility within 1 week of symptoms occurrence than later on.¹⁴ The epidemiologic characteristics of asymptomatic patients are not completely clear yet. A previous study has identified COVID-19 transmission was caused by an asymptomatic carrier who had normal chest CT findings.¹⁵ In addition, the viral load detected in asymptomatic patients was similar to that of the symptomatic patients, suggesting a similar transmission potential. Previous studies showed that COVID-19 transmission caused by symptomatic and also asymptomatic patients.¹⁶

Due to the lack of medical facilities for healthcare system in Iran, the early diagnosis of the COVID-19 could help patients and allow physicians to start treatment immediately.

Therefore, to control and prevent the spread of corona virus infection, understanding the outbreaks and symptoms are critical. This study, to the best of our knowledge, is the largest list

of confirmed COVID-19 cases from Iran that comprehensively reports the clinical symptoms of these patients.

In the present study, 11034 patients with symptoms of Covid-19 infection were studied. Our patients included 6069 men and 4945 women. Most of our patients were in the age group of 31 to 40 years old and 421 patients were less than 10. While 23 patients were over the age of 70, indicating that younger age group were more likely to develop Covid-19 disease than the elderly in our patients. Of the total 11034 patients investigated in the present study, in total, 30.4% had positive RT-PCR test results; this percentage is almost identical to the statistics published in other articles.

RT-PCR is the most powerful tool to amplify small amounts of mRNA. The current gold standard for diagnosing COVID-19 is based on a molecular test of the reverse transcription polymerase chain reaction (RT-PCR), aimed at detecting the RNA of the virus in respiratory samples such as nasopharyngeal swabs or bronchial aspirates.^{8,17} The incidence of positive RT-PCR tests in different societies depends on the stage of the disease outbreak in that society. During the peak stage of the disease, positive cases are much higher than when the disease is in the descending stage of the infection incidence curve. In 9 months duration of this study there were 2 peaks of Covid-19 infections in our country and the percentage of positive cases (30.4%) was moderate percentage in this duration time of study. In most studies, fever has been seen as the most common symptom among patients with Covid-19 disease^{18,19} but unlike other studies, in our study headache was the most common one (42.5%) and diarrhea and nausea were the least common (14.8%) symptoms among patients.

Conclusion

In this study, almost 30% of symptomatic patients had RT-PCR test-positive. Headache was the most common symptom; also diarrhea and nausea were the least common symptoms among patients under study.

Author Contribution

RM conceived and designed the study. K. K performed the research. All authors approved the paper.

Availability of Data and Material

The data and materials that support the findings of this research are available from the corresponding author upon reasonable request.

Consent for Publication

Not applicable

Ethical Approval

This study was approved by the local conventional manner and by the ethical committee of Tehran University of Medical Sciences.

ORCID iD

Rahimkhani Monireh  <https://orcid.org/0000-0002-8663-7402>

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