



Retrospective Evaluation of Laboratory, Radiological and Clinical Findings of COVID-19 Suspected Cases with a Public Health Perspective in Adiyaman Training and Research Hospital

Adiyaman Eğitim Araştırma Hastanesine Başvuran COVID-19 Şüpheli Vakaların Laboratuvar, Radyolojik ve Klinik Bulgularının Halk Sağlığı Bakışıyla Retrospektif Değerlendirilmesi

Ferit Kaya¹, Gülnur Tarhan², Sadık Akgün², Hakan Sezgin Sayiner³, Ercan Cil⁴, Uğur Lok⁵, Safiye Kafadar⁶, Furkan Bakirhan¹

¹Adiyaman Üniversitesi, Tıp Fakültesi, Halk Sağlığı Anabilim Dalı, Adiyaman, Türkiye

²Adiyaman Üniversitesi Tıp Fakültesi, Mikrobiyoloji Anabilim Dalı, Adiyaman, Türkiye

³Adiyaman Üniversitesi Tıp Fakültesi, Enfeksiyon Hastalıkları Anabilim Dalı, Adiyaman, Türkiye

⁴Adiyaman Üniversitesi Tıp Fakültesi, Göğüs Hastalıkları Anabilim Dalı, Adiyaman, Türkiye

⁵Adiyaman Üniversitesi Tıp Fakültesi, Acil Tıp Anabilim Dalı, Adiyaman, Türkiye

⁶Adiyaman Üniversitesi Tıp Fakültesi, Radyasyon Fizyolojisi Anabilim Dalı, Adiyaman, Türkiye

Abstract

Aim: The purpose of this study is to evaluate SARS-CoV-2 cases based on clinical evidence from the perspective of public health.

Material and Method: This study is a retrospective study. The data of 354 people were analyzed which were among the patients admitted to the pandemic hospital in Adiyaman in the study.

Results: 70.6% of those admitted to the hospital with suspected COVID-19, 60% of those received inpatient treatment and 61.3% of those who were PCR-positive were male. The median age of those admitted to the hospital was 37 years. 90% were in a good general condition. The median length of hospitalization was 7 days. 14.8% PCR-positive patients required mechanical ventilation. Generally, D-dimer, CRP and WBC levels were poor, which were higher in those receiving intensive care ($p < 0.05$). 19.5% of the cases were diagnosed with pneumonia as a result of the CT. COVID 19 was the most common diagnosis as a result of CT (11.0%).

Conclusion: The disease seems to be more common among men. CT abnormalities are common. D-Dimer, CRP and WBC levels are associated with severe disease.

Keywords: Communicable diseases, public health, COVID-19

Öz

Amaç: Bu çalışmanın amacı, SARS-CoV-2 vakalarını halk sağlığı perspektifinden klinik kanıtlara dayalı olarak değerlendirmektir.

Gereç ve Yöntem: Bu çalışma retrospektif tiptedir. Araştırmada Adiyaman pandemi hastanesine başvuran hastalardan 354 kişinin verileri incelendi.

Bulgular: Hastaneye COVID-19 şüphesi ile başvuranların %70,6'sı, yatarak tedavi görenlerin %60'ı ve PCR pozitif olanların %61,3'si erkekti. Hastaneye başvuranların ortalama yaşı 37 idi. %90'ı genel olarak iyi durumdaydı. Ortanca hastanede kalış süresi 7 gündü. PCR pozitif hastaların %14,8'i mekanik ventilasyona ihtiyaç duydu. Genel olarak D-dimer, CRP ve WBC seviyeleri zayıftı ve yoğun bakım alanlarda daha yüksekti ($p < 0.05$) BT sonucunda vakaların %19,5'i pnömoni tanısı aldı. BT sonucuna göre COVID 19 en yaygın tanıydı (%11.0).

Sonuç: Hastalık erkekler arasında daha yaygın görünmektedir. BT anormallikleri yaygındır. D-Dimer, CRP ve WBC seviyeleri ciddi hastalıkla ilişkilidir.

Anahtar Kelimeler: Bulaşıcı hastalıklar, halk sağlığı, COVID-19



INTRODUCTION

The COVID-19 outbreak emerged in late 2019 and has spread to all over the world very rapidly and has become a pandemic.^[1] The infection has transmitted from human to human and spread from China to the continents of Asia, Europe and Africa infecting millions and killing tens of thousands of people. The 2019 n-CoV has impacted many countries and it presents a major public health issue. The index case in Turkey was identified on March 11, 2020 and the index case in the study region was identified on March 14, 2020. The average incubation period is 2 to 4 days.^[2] In their study, Lauer et al.^[3] found that less than 2.5% of infected people develop symptoms in 2.2 days while 97.5% in 11.5 days. The median incubation period was found to be 5.1 days

According to the joint report of WHO and China, the majority of the cases were between the ages of 30 and 69 and the median age was 51.^[4] In terms of clinical course, the disease can cause as far as multi organ failure.^[5] In severe disease, clinical signs such as fever, shortness of breath, tachypnea and hypoxia present. In addition to clinical signs, radiological signs also help support the diagnosis.^[5] The study of Pan et al.^[6] showed that 48% of the cases had mild disease, 29.9% moderate, 19.1% severe and 3% critical. 41.3% of the severe and critical cases was people over the age of 80.

Various immunological tests and Polymerase Chain Reaction (PCR) test, which targets specific genes, are performed to diagnose the infection. The most ideal diagnostic method for COVID-19 is quantitative real-time polymerase chain reaction (qRT-PCR) along with nasopharyngeal swab. Symptoms, risk factors, pneumonia findings and thorax CT images should also be taken into consideration when diagnosing the infection. Although PCR tests have high sensitivity, the fact that results are obtained 4 to 6 hours (reduced to 2-4 hours in recent kits) and experienced staff is required for application has led to the production of rapid antibody (immunoassay) tests. These tests can detect IgM and IgG antibodies, which are produced against SARS-CoV-2, in 15 minutes.^[2] The purpose of this study is to evaluate SARS-CoV-2 cases based on clinical evidence from the perspective of public health. The purpose was to analyze cases admitted to the hospital and collect data on the COVID-19 infection, compile and interpret the data and contribute to the literature.

Pandemics affect men and women differently. The exposure risk and biological sensitivity may be different due to the other social factors as well as infections, social and economic results and the gender of an individual. Different sample groups or underreporting may be the reasons behind these differences

It is aimed to examine the suspected COVID-19 cases admitted to the Adiyaman Training and Research Hospital in terms of clinical, radiological and laboratory findings.

MATERIAL AND METHOD

Research type

This study is a retrospective study.

The universe and sample of the research

3064 individuals, who registered to Adiyaman Training and Research Hospital during the course of 3 months starting with

the first case admitted on March 14, 2020, formed the universe of the study. The formula $n = Nt2pq/d2(N-1)+t2pq$ was used to determine the sample size, which was calculated to be 354 with a confidence interval of 95%, prevalence of 50% and deviation of 5%. The stratified sampling method was made use of. Using the open epi program, random numbers were generated and the cases to be included in the study were identified. Averages were provided with standard deviation.

Data collection tools

The records of patients admitted to Adiyaman Training and Research Hospital with suspected COVID-19 were analyzed. During the analysis, demographic information laboratory, radiological and clinical findings were taken into consideration.

Data analysis

COVID-19-related laboratory (sedimentation, CRP, lymphocyte, white blood cell) and radiological findings and socio-demographic information (age, gender) of registered patients were made use of. The data obtained from the data collection form was performed using SPSS 22. Descriptive statistics were identified using figures and percentages. Relationship between categorical variables were analyzed using the Chi-square and Fischer's exact Chi-square test. Kruskal wallis and mann whitney u tests were used in comparing the averages. Correlation analysis was performed to determine the between some variables. The results were evaluated in a confidence interval of 95% and $p < 0.05$ was considered significant.

Ethical aspect of the research

The ethical approval was received from the non-clinical research ethics committee of Adiyaman University (approval no: 2020/7-44).

RESULTS

70.6% of the cases in the study were male and their average age was 41.07 ± 18.79 . 60% of hospitalized patients were men which were significantly higher than women ($p < 0.05$). The rate of those who were in an overall good condition was 90%. CT was performed on 30.8% of the cases. 19.5% of the cases were diagnosed with pneumonia as a result of the CT. COVID 19 was the most common diagnosis as a result of CT (11.0%).

The median age of the cases covered by the study was 37. The median age of PCR-positive patients was 44.5, and the median age of those receiving intensive care was 65. 61.3% of PCR-positive cases were male and 59% were inpatient (**Table 1, Table 2**).

The duration of hospital stay of PCR-positive patients was significantly higher for those diagnosed with pneumonia, those with poor general condition and those who are intubated (**Table 2**). The median hospital stay was 7 days, and the median hospital stay for intensive care patients was 8.5 days.

The mean values of CRP, WBC and D-dimer of the cases were 3.79 ± 5.92 , 9.47 ± 4.92 , 1084.96 ± 1526.19 , respectively (**Table 3**). A correlation was found between the duration of hospital stay and age, CRP, WBC, D-dimer and lymphocyte (**Table 4**).

Table 1. Examination of the first PCR result by some variables.

	PCR +		PCR -		Total n	p
	n	%	n	%		
Gender						
Male	38	61.3	212	72.6	250	p>0.05 X ² =3.154
Female	24	38.7	80	27.4	104	
Hospitalization						
Outpatient	8	12.9	246	84.2	254	p<0.01 X ² =134.498
Ward patient	46	74.2	32	11	78	
Intensive care	8	12.9	14	4.8	22	
Age						
0-14 years	7	11.3	1	0.3	8	p<0.01 X ² =33.242
15-49 years	29	46.8	202	69.2	231	
50-64 years	14	22.6	51	17.5	65	
65+	12	19.3	38	13	50	
CT						
N/Ab	15	24.2	230	78.8	245	p<0.01 X ² =73.608 fisher
Covid	18	29.0	21	7.2	39	
Viral	10	16.1	10	3.4	20	
Normal	14	22.6	21	7.2	35	
Other	5	8.1	10	3.4	15	
Pneumonia						
Yes	31	50	38	13	69	p<0.01 X ² =44.583
No	31	50	254	87	285	
Total	62		292			

^bthe reason for the difference

Table 2. Comparison of average duration of stay at the hospital of PCR-positive patients with certain conditions.

	Mean	p
Ward		
Outpatient	0±0	p<0.001 U:302 (outpatient were excluded)
Ward patient	9.24±6.40	
Intensive care	22±9,25	
Gender		
Male	10.55±9.65	U=411.500 p>0.05
Female	7.50±5.31	
According to CT		
Yes	12.48±9.74	U=411.500 p>0.05
No	7.07±3.87	
Pneumonia		
Yes	13.13±9.68	p<0.01 U=239.0
No	5.61±4.27	
General condition		
Good	6.90±4.62	p<0.001 X ² =14.548 KW
Moderate	13.17±5.19	
Poor	26.17±13.92	
Intubation		
Yes	26.17±13.92	p<0.001 U: 50.0
No	7.57±5.03	
Age groups		
0-14	8.86±1.57	p>0.05 X ² =4.411 KW
15-49	6.83±4.85	
50-64	12.79±13.33	
65 and over	11.83±8.65	

Table 3. Comparison of some laboratory averages with certain conditions.

	CRP	WBC	Lymphocyte	D-dimer
Gender				
Male	3.57±5.51	9.22±4.50	2.05±1.00	925.8±1360.40
Female	4.13±6.57	9.87±5.52	2.28±1.28	1354.78±8149.04
	p>0.05 U: 74.500	p>0.05 U: 4338.000	p>0.05 U: 4115.500	p>0.05 U: 2089.000
Type of treatment				
Outpatient	3.26±6.02c	10.68±4.92c	2.44±1.06b	1003.01±1744.71c
*Ward patient	2.99±3.67c	7.18±2.95b	1.98±1.16c	932.72±1246.81b
*Intensive care patient	9.57±9.15b	12.10±7.09c	1.31±0.69d	1957.94±1585.58c
	p<0.01 X ² =19.744 KW	p<0.01 X ² =34.078 KW	p<0.01 X ² =29.936 KW	p<0.01 X ² =16.294 KW
CT				
*CT not performed	3.04±5.99	10.73±5.15	2.61±1.25	1166.74±1852.88
*Consistent with COVID	3.99±4.34	6.90±2.68	1.66±0.63	1218.05±1714.23
*Consistent with viral	6.32±7.51	8.97±6.20	1.41±0.72	832.29±645.79
Normal	3.30±6.24	8.15±3.25	1.99±0.96	740.28±1015.89
Other (mix. bacterial. non-infectious)	5.38±5.92	11.59±5.72	1.77±0.73	1343.15±951.96
	p<0.01 X ² =24.648 KW	p<0.01 X ² =28.730 KW	p<0.01 X ² =37.804 KW	p<0.05(0.01) X ² =13.373 KW
General condition				
aGood	2.85±4.99 b	9.21±4.78	2.28±1.53 b	943.08±1498.43 b
Moderate	7.11±5.52 c	10.26±5.76	1.52±0.64 c	1631.25±1849.88 c
Poor	10.50±10.13 c	11.47±5.10	1.40±0.67 c	1711.30±1074.38 c
	p<0.01 X ² =29.836 KW	p>0.05 X ² =4.870 KW	p<0.01 X ² =18.197 KW	p<0.01 X ² =17.953 KW
Intubation				
Yes	10.50±10.13	12.25±5.78	1.36±0.68	1711.31±1074.39
No	3.29±5.19	9.26±4.80	2.21±1.31	1024.64±1522.46
	p<0.01 U: 493.000	p<0.05 U: 787.000	p<0.01 U: 587.000	p<0.01 U: 406.500
Total	3.79±5.92	9.47±4.92	2.15±1.13	1084.96±1526.19

* A significant difference was found according to Tamhane test.
aA significant difference was found using the Mann Whitney-U test.

Table 4. The examination of the correlation of hospitalization status with age and some laboratory findings

	r	p
Age	r=0.25	p<0.01
CRP	r=0.243	p<0.01
D-Dimer	r=0.141	p<0.01
WBC	r= -0.343	p<0.01
Lymphocyte	r= -0.323	p<0.01

DISCUSSION

In our study, 61.3% of the PCR-positive cases were men. It was found that 75% of COVID-19 patients to be men;^[8] while another study stated the rate of men to be 49%.^[9] Although these studies support our finding that COVID-19 is more common among men than women, another study found the number male and female cases to be similar.^[10] In our study, the number of men receiving inpatient treatment was considerably higher than women ($p<0.05$). A study analyzed the rates of hospitalization and reported that men was affected disproportionately.^[9] 58% of deaths were men.^[10] Another study showed that death cases was increasing among men.^[10] Although these studies support our finding that men require more hospital care, a study found the rate of hospitalized female patients to be higher than men.^[11] Pandemics affect men and women differently. The exposure risk and biological sensitivity may be different due to the other social factors as well as infections, social and economic results and the gender of an individual.^[10] Different sample groups or underreporting may be the reasons behind these differences.

In our study, 17.5% of patients admitted to the hospital with suspected COVID-19 tested positive with PCR. A study conducted with suspected COVID-19 cases, the rate of PCR-positivity was 35%. 5.5% of COVID-19 patients required hospital care. 20% of the hospitalized patients required intensive care. 70% of intensive care patients required ventilation.

In our study, the median duration of hospital stay was 7 days. A study found the median value to be 21 days^[9] while another study 13 days.^[12] Another study found this to be 10 days.^[13] In different studies, the duration of hospital stay varies. This duration depends on living conditions in countries, socio-demographic features and healthcare services.

The duration of hospital stay of PCR-positive patients was significantly higher for those diagnosed with pneumonia, those with poor general condition and those who are intubated. This is an expected outcome.^[9]

In our study, 14.8% of inpatient PCR-positive patients required mechanical ventilation. In a study conducted at Chicago University, 28.4% of the patients were intubated.^[10] A study found that approximately 10% of the patients required mechanical ventilation.^[11] According to a study in Colombia University, 4.4% of the patients were intubated.^[7] The same study noted that 2.3% of lab-confirmed cases were intubated.

In our study, 46.7% of PCR-positive patients had CT abnormalities, 62% of them which were found to be consistent with COVID-19. A study found that CT images of 65% of patients, who were being followed-up due to COVID-19, had abnormalities and multifocal ground glass opacities were observed in 74% of these patients.^[14]

In our study, it was found that D-dimer and CRP averages of patients, who are intubated, have poor general condition and receive intensive care, were significantly higher ($p<0.05$). A study found high D-dimer to be a risk factor for hospital mortality.^[15] Another study found a correlation between high D-dimer and disease severity.^[16] A study found CRP levels of severe patients to be significantly higher and CRP levels to be associated with mortality.^[17] A study found a correlation between mortality and D-dimer, WBC and CRP.^[18] Another study found an association between high CRP and disease severity. This is an expected result as CRP is an acute phase reactant.^[19] Another study found that lymphocyte was low while age, CRP, WBC and D-dimer were high in patients who lost their lives.^[20]

In our study, it was found that WBC was significantly higher in those who were in poor general condition, received intensive care, and whose CT results were consistent with mixed infection ($p<0.05$). In a study, high WBC was found to be a risk factor in hospital mortality.^[15] WBC and D-dimer were significantly higher in patients who lost their lives. In addition, lymphopenia was detected.^[15]

Our study showed that the duration of stay at hospital increased with increasing age. Another study showed that the disease became more severe with increasing age.^[17] With the increase in age, the severity of the disease also increases.^[15]

A correlation was found between the duration of hospital stay and age, CRP, WBC, D-Dimer and lymphocyte. In various studies, mortality was found to be associated with advanced age, comorbidity, high D-Dimer and CRP and lymphopenia.^[15]

This study has some limitations. The first limitation is that it was conducted in a single center. Another limitation is the study was conducted based on records.

ETHICAL DECLARATIONS

Ethics Committee Approval: The ethical approval was received from the non-clinical research ethics committee of Adiyaman University (approval no: 2020/7-44). Necessary permission was obtained from the Ministry of Health and Adiyaman Training and Research Hospital

Informed Consent: Written consent was obtained from all patients who participated in the study and their relatives.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. İtil O, Altınışık Ergur G, Köktürk N, Havlucu Y, Akgün M, Aykaç N, eds. COVID-19 Pandemisi ve Sağlığın Sosyal Bileşenleri, Türk Toraks Derneği COVID-19 E-Kitapları Serisi, Haziran.; 2020
2. Seker M, Özer A, Tosun Z, Korkut C, Doğrul M. Covid-19 Pandemi Değerlendirme Raporu.; 2020. Accessed September 16, 2020.
3. Lauer SA, Grantz KH, Bi Q, et al. The incubation period of coronavirus disease 2019 (CoVID-19) from publicly reported confirmed cases: Estimation and application. *Annals of Internal Medicine*. 2020;172(9):577-582.
4. Pérez A, Santamaria EK, Operario D, et al. World Health Organization (2020). Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). Vol 5.; 2017. Accessed October 14, 2020.
5. Karaca B. Clinical Findings of the COVID-19 in the Adult Group. *J Biotechnol and Strategic Health Res*. 2020;1:85-90.
6. Pan A, Liu L, Wang C, et al. Association of Public Health Interventions with the Epidemiology of the COVID-19 Outbreak in Wuhan, China. *JAMA*. 2020;323(19):1915-1923.
7. Argenzian MG, Bruc SL, Slate CL, et al. Characterization and clinical course of 1000 patients with coronavirus disease 2019 in New York: Retrospective case series. *The BMJ*. 2020;369.
8. Mardani R, Ahmadi Vasmehjani A, Zali F, et al. Laboratory Parameters in Detection of COVID-19 Patients with Positive RT-PCR; a Diagnostic Accuracy Study. *Archives of academic emergency medicine*. 2020;8(1):e43.
9. Thai PQ, Toan DTT, Dinh TS, et al. Factors associated with the duration of hospitalization among COVID-19 patients in Vietnam: A survival analysis. *Epidemiology and Infection*. 2020;148.
10. Hur K, Price CPE, Gray EL, et al. Factors Associated With Intubation and Prolonged Intubation in Hospitalized Patients With COVID-19. *Otolaryngology - Head and Neck Surgery (United States)*. 2020;163(1):170-178. doi:10.1177/0194599820929640
11. Halaçlı B, Kaya A, Topeli A. Critically ill COVID-19 patient. *Turkish Journal of Medical Sciences*. 2020;50(S1-1):585-591.
12. Wu Y, Hou B, Liu J, Chen Y, Zhong P. Risk Factors Associated With Long-Term Hospitalization in Patients With COVID-19: A Single-Centered, Retrospective Study. *Frontiers in Medicine*. 2020;7:315.
13. Karagiannidis C, Mostert C, Hentschker C, et al. Case characteristics, resource use, and outcomes of 10 021 patients with COVID-19 admitted to 920 German hospitals: an observational study. *The Lancet Respiratory Medicine*. 2020;8(9):853-862.
14. To KKW, Tsang OTY, Leung WS, et al. Temporal profiles of viral load in posterior oropharyngeal saliva samples and serum antibody responses during infection by SARS-CoV-2: an observational cohort study. *The Lancet Infectious Diseases*. 2020;20(5):565-574.
15. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*. 2020;395(10229):1054-1062.
16. Petrilli C, Jones S, Yang J, et al. Factors associated with hospitalization and critical illness among 4,103 patients with COVID-19 disease in New York City. *BMJ*. Published online April 11, 2020:2020.04.08.20057794.
17. Wang L. C-reactive protein levels in the early stage of COVID-19. *Medecine et Maladies Infectieuses*. 2020;50(4):332-334.
18. Zhang L, Yan X, Fan Q, et al. D-dimer levels on admission to predict in-hospital mortality in patients with Covid-19. *Journal of Thrombosis and Haemostasis*. 2020;18(6):1324-1329.
19. Mooiweer E, Luijk B, Bonten MJM, Ekkelenkamp MB. C-Reactive protein levels but not CRP dynamics predict mortality in patients with pneumococcal pneumonia. *Journal of Infection*. 2011;62(4):314-316.
20. Satici C, Demirkol MA, Sargin Altunok E, et al. Performance of pneumonia severity index and CURB-65 in predicting 30-day mortality in patients with COVID-19. *Int J Infect Dis* 2020;98:84-89.