Jurnal Teknologi Laboratorium
Vol.9, No.1, *Special Edition* 2020, pp. 41 – 48
ISSN 2580-0191(Online), ISSN 2338 – 5634(Print)
DOI: 10.29238/teknolabjournal.v9i1.220
Journal homepage: https://www.teknolabjournal.com/index.php/Jtl/index

Original Research

Investigation of revers-transcriptase polymerase chain reaction values of patients with COVID-19 findings in lung computed tomography results

Ozüdogru Osman[1a*], Gunes Bolatli[2b*], Fatih Tas[3c]

[1] Department of Internal Medicine, Siirt State Hospital, Turkey
[2] Department of Anatomy, Faculty of Medicine Siirt University, Siirt, Turkey
[3] Department of Histology and Embryology, Faculty of Medicine, Siirt University, Siirt, Turkey

[a]E-mail address : osmanozudogru2@gmail.com
[b]E-mail address : gunesbolatli83@gmail.com
[c]E-mail address : ftas85@yahoo.com

HIGHLIGHTS

Evaluating chest CT results with RT-PCR can be an appropriate alternative approach in the diagnosis and treatment of disease.

ARTICLE INFO

Article history

Received Date: Apr 27, 2020
Revised Date: May 27, 2020
Accepted Date: Jun 4, 2020

Keywords:

Covid-19
Chest CT
Coronavirus
RT-PCR
Pandemic

ABSTRACT

It turned out that the cause of pneumonia cases that occurred in China was due to SARS-CoV-2. The aim is to compare chest computer tomography and Revers-Transcriptase Polymerase Chain Reaction methods used in the diagnosis of COVID-19 disease with each other and to evaluate this disease with risk factors.
The study was carried out on 66 patients. Epidemiological history, clinical symptoms, chest CT and RT-PCR results of the cases were examined. RT-PCR results of 1, 4, and 7 days were evaluated for each case with positive chest CT results. Thirty-seven of them were found to be positive on day 1, 5 of them were found to be positive on day 4, and 2 of them were found to be positive on day seven from 52 patients whose RT-PCR results were examined. In the remaining 8 cases, no positive findings were found. The most common findings are; cough (78.8%), fever (55.8%), and shortness of breath (28.8%). It was observed that 51.9% of the cases had chronic disease history and 50% of the patients using cigarettes had bilateral lung involvement in their CT results. Seven cases received intensive care support, 3 cases were intubated. Two of the intubated cases were exitus (3,8%). The positive results of RT-PCR were found to be negative in most of the cases which have positive chest CT; suggests that chest CT is more reliable in making a diagnosis. Therefore, evaluating chest CT results with RT-PCR can be an appropriate alternative approach in the diagnosis and treatment of disease. However, in order to be fully diagnosed, the patient's history, chronic diseases, age, symptoms, imaging, blood, and test findings must all be considered as a whole.

Corresponding Author:
Gunes BOLATLI,
Siirt University, Faculty of Medicine, Department of Anatomy, Siirt, Turkey
Email: gunesbolatli83@gmail.com
Phone: +505 761 13 24

1. INTRODUCTION

Coronaviruses are enveloped, positive-polarized, single-stranded RNA viruses from the Coronoviridia family and their etiological agent is SARS-CoV, which previously appeared in China.[1] It was revealed that the cause of pneumonia cases occurring in Wuhan city of Hubei province of China in December 2019 was caused by SARS-CoV-2, a new species belonging to the SARS-CoV family.[2] The World Health Organization (WHO) has declared this disease called COVID-19 and originating from SARS-CoV-2 as "International Public Health Emergency".[2] Later, WHO declared the COVID-19 outbreak on Mar 11, 2020, as a pandemic due to its alarming spread around the world.[3] COVID-19 still maintains its effect in 202 countries with serious mortality rates.[4]

Coronaviruses (CoV) are a large family of viruses that lead to symptoms that can progress from the common cold to severe illnesses leading up to death.[5] This new coronavirus, called SARS-CoV-2, is a new strain that has not been previously identified in humans and is thought to be due to bat.[6] Common symptoms of COVID-19 disease caused by this zoonotic virus include fever, cough, and shortness of breath.[7] In addition, symptoms such as weakness, muscle aches, sputum, hemoptysis, anorexia, nausea, vomiting, diarrhoea, and abdominal pain are also encountered.[8,9] In recent studies, it is stated that symptoms such as taste, smell loss[10] and conjunctivitis may be due to this virus.[11]

There is no protective and therapeutic vaccine or specific antiviral drug for COVID-19 disease yet. The treatments are symptomatic, and oxygen therapy is applied to patients with severe signs of infection. While mechanical ventilation may be necessary in cases of resistant respiratory insufficiency, hemodynamic support is essential in the cases with septic shock. Although any antiviral therapy has not been approved; Various medications such as lopinavir/ritonavir (400/100 mg in 12 hours), chloroquine (500 mg in 12 hours), and hydroxychloroquine (200 mg in 12 hours) are recommended. Alpha-interferon (for example, 5 million units with aerosol inhalation, twice a day) is also used in treatment.[12] In addition, vitamin C,[13] vitamin D,[14] plasmapheresis, immunotherapy,[15] and even stem cells are considered among the treatment options.[16]

COVID-19 is more severe in chronic patients such as old age, cardiovascular disease, diabetes mellitus, chronic respiratory diseases, hypertension, and cancer.[6] In addition, obesity and smoking affect the course of the disease negatively.[17] Smoking cessation is thought to be important in reducing viral contamination and the severity of the disease.[18]

The SARS-Cov-2 virus, which is a COVID-19 agent, is transmitted from person to person through respiratory droplets, close contact, and touching the infected surfaces. Among the methods of protection from this disease, which the incubation period ranges from 2 days to 14 days, are avoiding non-compulsory travel, early diagnosis, and isolation of patients, attention to social distance, attention to hand, respiratory and environmental hygiene.[19] Viruses can be found in any environment, so it is difficult to keep our environment clean at all times. In recent studies, researchers are working on ultraviolet devices to solve this problem. In this respect, researchers think that these rays will inactivate the SARS-Cov-2 virus, based on the past literature data and the effect of UV rays on similar viruses.[20]

The current method recommended by WHO in the diagnosis of Covid-19 disease is RT-PCR. The detection of SARS-Cov-2 nucleic acid by RT-PCR test from the throat swab sample taken constitutes the standard diagnostic test. In addition, chest CT is used to diagnose COVID-19 disease in the early stages as a supporter.[21] Abnormal lung tissue (83%), ground-glass opacity (73%), lung consolidation (27%), and pleural effusion (11%) are among the most common chest CT findings.[9] The aim of this study is to compare the results of chest computer CT and RT-PCR methods used in the diagnosis of COVID-19 disease and to evaluate this disease together with risk factors.

2. MATERIAL AND METHOD

This is a retrospective study performed with 66 cases diagnosed with COVID-19 in Siirt state hospital and whose treatment was completed. Fourteen cases of these cases with negative Computerized Tomography results were excluded from the study. Epidemiological

history, clinical symptoms, Computed Tomography (CT), and Revers-Transcriptase Polymerase Chain Reaction (RT-PCR) results were evaluated.

All Chest CT images were examined by the radiologist, and the decision was made based on positive or negative CT findings. Positive CT results were grouped as unilateral lung involvement (mild involvement), bilateral lung involvement (moderate involvement), and bilateral severe lung involvement (severe involvement). RT-PCR results of the patients, who have COVID-19 findings at their Chest CT results, were evaluated at regular intervals, and the cases were grouped (Figure 1). The data obtained in the study were analyzed using SPSS (Statistical Package for Social Sciences for Windows 22.0) program. Number, percentage, average, and standard deviation were used as descriptive statistical methods in the evaluation of the data.

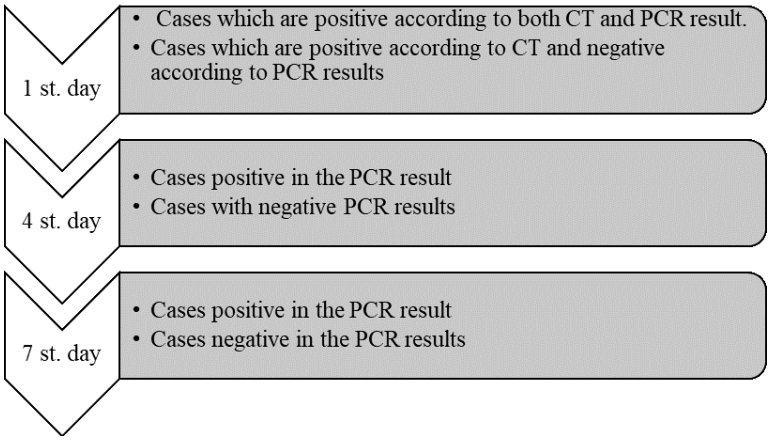

Figure 1. CT and RT-PCR results of cases

3. RESULTS AND DISCUSSION

In the study, a total of 52 cases, 27 males and 25 females diagnosed with COVID-19, were examined. The cases were divided by gender and age group (Table 1). There were Cough in 41 cases (78.8%), fever in 29 cases (55.8%), shortness of breath in 15 cases (28.8%), headache in 9 cases (17.3%), muscle pain in 9 cases (17.3 %), there were symptoms of nausea and vomiting in 1 female case.

Table 1. Distribution of cases by age and gender

Age	Male	Female	Total (%)
20-29	4	8	12 (23.1)
30-39	4	3	7 (13.5)
40-49	8	6	14 (28.8)
50-59	5	2	7 (13.5)
60-69	3	5	8 (15.4)
70-79	3	1	4 (5.7)
Total	27 (51.9%)	25 (48.1%)	52 (100)

It was found that all cases with diabetes mellitus (DM), hypertension (HT), pulmonary disease (PD) were over 40 years old, and all cases with cardiovascular disease (CVD) were over 50 years old. In addition, two females had both DM and HT, and one female had DM, HT, and PH (Table 2). It was determined that 20 cases (38.4%) had no chronic illness and did not smoke. Considering the CT results of these cases, 3 cases had bilateral lung involvement (moderate involvement), and 17 cases had unilateral lung involvement (mild involvement). Two of the cases with moderate involvement were male (21 and 41 years old), and 1 was female (43 years old). It was found that these patients generally applied to the hospital late. It was observed that 18 male cases (34.6%) were smokers (7 cases using for 1-9 years, 7 cases

using for 10-19 years, 4 cases using for more than 20 years). Considering the CT results of these cases, 6 cases (33.3%) were unilateral lung involvement (mild involvement), 9 cases (50%) were bilateral lung involvement (moderate involvement), and 3 cases (16.7%) were bilateral severe lung involvement (severe involvement).

Table 2. Chronic cases in cases

Gender	Diabetes mellitus	Hypertension	Pulmonary disease	Cardiovascular disease	Total
Male	5	3	2	2	12
Female	3	6	5	1	15
Total	8 (15.4%)	9 (17.3%)	7 (13.5%)	3 (5.8%)	27(51.9%)

Unilateral lung involvement (mild involvement) in the CT of 25 cases (11 males 14 females), bilateral lung involvement (moderate involvement), in CT of 20 cases (11 males nine females), bilateral severe lung involvement in 7 cases (five males two females) was present. It was observed that cases with bilateral severe lung involvement in their CT had either smoking or chronic disease, and all were over the age of 40.

It was determined that RT-PCR results in 52 cases were positive in 37 cases and negative in 15 cases on Day 1, positive in 5 cases and negative in 10 cases on day 4, positive in 2 cases, and the remaining 8 cases were negative on day 7. It has seemed that 6 cases with negative results were mild involvement, and 2 cases with moderate involvement in the result of CT of the cases which are determined as negative (Table 3). 7 cases of 52 cases (13.4%) received intensive care support, and 3 cases (5.8%) were intubated. Two of the intubated cases were exitus (3.8%), and one was extubated. The other 4 cases were referred to the service after the intensive care treatments were finished. The first exitus case is a 49-year-old male with pulmonary disease and smoking. The second exitus 42-year-old male did not have a chronic disease, was a smoker.

Table 3. RT-PCR results

RT-PCR	CT			Total (%)
	Mild (Patient)	Moderate (Patient)	Severe (Patient)	
Positive on first day	16	16	5	37 (71.2)
Positive on fourth day	3	2	0	5 (9.6)
Positive on seventh day	0	1	1	2 (3.8)
Negative	6	2	0	8 (15.4)

Since December 2019, a new outbreak of coronavirus (COVID-19; previously known as 2019-nCoV) has appeared in the world.[1,6] The rapidly increasing number of cases suggests that the virus is transmitted from person to person and is more contagious than SARS-CoV and MERS-CoV. It was reported that this disease, which caused a pandemic, caused advanced alveolar damage and respiratory insufficiency.[1,22]

It was stated in the studies conducted that the majority of the cases were male in the 30-69 age group,[23,24,25] and in a different study, they were male again between the ages of 39-55.[21,26] We found that the majority of cases were in the 20-29, 40-49 age groups, and men. Although it is stated in the literature studies that the average age is high, it was seen that the average age was lower in our study. It is known that asymptomatic children and adolescents make it difficult to control the outbreak.[27] For this reason, we think that children and adolescents should be evaluated among risk factors.

The most common symptom of the disease is indicated as fever; the most important symptoms after fever are cough, shortness of breath, sputum removal, myalgia, headache, hemoptysis, diarrhoea, and nausea.[1,24,25,28] Although similar symptoms were observed in our study, as different, the most common symptom was cough.

It is stated in the cases where the virus is severe and has a high mortality rate, that the average age is older, and most of them are chronic patients.[23,28,29] DM, HT, CVD, and PD are the most common chronic diseases[2,24,25,26,30,31] (Table 4). In our study, it was seen that most patients were with HT that support the literature. We think that this virus, which is pandemic nowadays, where chronic diseases are common, will increase the morbidity and mortality rates. In addition, it was observed that 20 cases (38.4%) had no chronic illnesses and did not smoke, and their CT results were positive. It is known that these patients were late for admission to the hospital. Early diagnosis and treatment, as with any disease, will reduce possible complications in the COVID-19 outbreak.

Table 4. Chronic disease distribution

	Diabetes mellitus (%)	Hypertension (%)	Pulmonary disease (%)	Cardiovascular disease (%)	Smoking (%)
Yang et all	22	17	8	5	2
Guan et all	16	23.7	-	8	15
Zhang et all	12	30	-	3	27
Zhou et all	18	30	-	8	-
Yen et all	14	14	-	-	-
This Research*	15.4	17.3	13.5	5.8	34.6

Cigarette exposure, inflammatory processes in the lung, increased mucosal inflammation, expression of inflammatory cytokines and tumour necrosis factor α (TNF-α), increased permeability of epithelial cells, excessive mucous release and impaired mucociliary clearance.[32] Besides, it is known that cigarette exposure is a major risk factor for lung diseases,[32] and bacterial and viral infections are more common in smokers.[33] Studies have reported that chest CT findings and prognosis in COVID-19 patients who smoke are more severe than non-smoking patients.[34] In a similar study, the rate of smoking was found to be significantly higher in the group with the progressive disease compared to the stable group ($p < 0.05$).[4] In our study, it was observed that smoking was higher than the literature[2,24,31] (Table 4), and 33.3% of them were mild involvement, 50% were moderate involvement, and 16.7% were heavy involvement when the CT findings of the cases were analyzed. In addition, two of the ex-patients were smoking. Consequently, the prognosis of the disease and chest CT findings are affected negatively in COVID-19 patients who smoke.

Since there is no vaccine and a specific drug developed for COVID-19 disease yet, early diagnosis and rapid isolation of patients from the community is very important. The main methods to diagnose the disease are RT-PCR, and chest CT could be to be an alternative. Several studies have also indicated that chest CT is more effective than RT-PCR test in the diagnosis of COVID-19.[21,35] In a study that is made on 1014 patients who admitted to the hospital with suspicion of COVID-19, the diagnosis rates were found to be 59% reliable for RT-PCR and 88% reliable for CT.[35] In our study, the first RT-PCR tests performed in 71.2% of patients whose chest CT findings were compatible with COVID-19 were positive. This result suggests that CT is more reliable than RT-PCR in the diagnosis of COVID-19.

In this study, as of the 7th day, the RT-PCR negativity rate of patients admitted to the hospital with suspicion of COVID-19 was 15.4%. 75% of these cases were evaluated as a mild involvement of CT. Negative results of RT-PCR may be caused by low sensitivity, improper sample intake from throat swabs, disruptions during transport, and poor performance of kits. This situation leads to delay in diagnosis and treatment, infection of a large number of people, deterioration of the prognosis of the disease, an increase in mortality, and morbidity. Therefore, evaluating chest CT results with RT-PCR can be an appropriate alternative approach in the diagnosis and treatment of disease.

Another important issue in the effective fight against epidemics such as COVID-19 is the protection of health workers from the illness at the highest level. As a matter of fact, in the COVID-19 outbreak, which we are in, health workers and other personnel working in the health

sector face the risk of disease.[36] This situation creates life-threatening risks for healthcare professionals and their families, as well as other healthy individuals who apply to hospitals. Therefore, the contamination risks that may arise during the application and transportation process of RT-PCR tests should also be taken into consideration. The problems that have been experienced recently during the Ebola epidemic 'sampling and transfer' process can be shown as an example of this.[37] To prevent these problems; it may be useful to use the CT method in diagnosis.

4. CONCLUSION

In the diagnosis of COVID-19, it is difficult to say that a single method is sufficient. For this reason, we think that it is more accurate to evaluate the patient's history, chronic diseases, age, symptoms, CT images, laboratory and RT-PCR test results as a whole.

DISCLOSURE STATEMENT

The authors declare that they have no conflict of interest.

ACKNOWLEDGEMENT

Thank you very much for people who are helping to write this paper, especially to university.

FUNDING INFORMATION

The authors declared that this case has received no financial support.

REFERENCES

1. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. Feb 15 2020;395(10223):497-506. https://doi.org/10.1016/S0140-6736(20)30183-5
2. Guan WJ, Ni ZY, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*. Feb 28 2020. DOI: 10.1056/NEJMoa2002032
3. Ebrahim S, Ahmed QA, Gozzer E, Schlagenhauf P, Memish ZA. Covid-19 and community mitigation strategies in a pandemic. *BJM*. 2020;368:1-2. https://doi.org/10.1136/bmj.m1066
4. Liu B, Li M, Zhou Z, Guan X, Xiang Y. Can we use interleukin-6 (IL-6) blockade for coronavirus disease 2019 (COVID-19)-induced cytokine release syndrome. *Journal of Autoimmunity*. 2020;10(2):2-5. https://doi.org/10.1016/j.jaut.2020.102452
5. Paules CI, Marston HD, Fauci AS. Coronavirus Infections-More Than Just the Common Cold. *JAMA*. Jan 23 2020. https://doi.org/10.1001/jama.2020.0757
6. Wu F, Zhao S, Yu B, et al. A new coronavirus associated with human respiratory disease in China. *Nature*. Mar 2020;579(7798):265-269. https://doi.org/10.1038/s41586-020-2008-3
7. Carlos WG, Dela Cruz CS, Cao B, Pasnick S, Jamil S. Novel Wuhan (2019-nCoV) Coronavirus. *Am J Respir Crit Care Med*. Feb 15 2020;201(4):P7-P8. https://doi.org/10.1164/rccm.2014p7
8. Jiang F, Deng L, Zhang L, Cai Y, Cheung CW, Xia Z. Review of the Clinical Characteristics of Coronavirus Disease 2019 (COVID-19). *J Gen Intern Med*. Mar 4 2020. https://doi.org/10.1007/s11606-020-05762-w
9. Luo S, Zhang X, Xu H. Don't Overlook Digestive Symptoms in Patients With 2019 Novel Coronavirus Disease (COVID-19). *Clin Gastroenterol Hepatol*. Mar 20 2020. https://doi.org/10.1016/j.cgh.2020.03.043

10. Lovato A, de Filippis C, Marioni G. Upper airway symptoms in coronavirus disease 2019 (COVID-19). *Am J Otolaryngol*. Apr 4 2020:102474. https://doi.org/10.1016/j.amjoto.2020.102474
11. Guo D, Xia J, Shen Y, Tong J. SARS-CoV-2 may be related to conjunctivitis but not necessarily spread through the conjunctiva SARS-CoV-2 and conjunctiva. *Medical Virology*. 2020;4(1):15-19. https://doi.org/10.1002/jmv.25856
12. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Di Napoli R. Features, Evaluation and Treatment Coronavirus (COVID-19). *StatPearls*. Treasure Island (FL); 2020. https://www.ncbi.nlm.nih.gov/books/NBK554776/
13. Erol A. High-dose intravenous vitamin C treatment for COVID-19. Accessed Mar 12, 2020. https://doi.org/10.31219/osf.io/p7ex8
14. Grant WB, Lahore H, McDonnell SL, et al. Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19. *Infections and Deaths Nutrients*. 2020;12(4):988. https://doi.org/10.3390/nu12061620
15. Yang, S., Zhang, M., Yin, L., Wang, K., Zhou, Y., Zhou, M., & Lu, Y. COVID-19 Treatment: Close to a Cure?–A Rapid Review of Pharmacotherapies for the Novel Coronavirus. *Preprints*. 2020. doi: 10.20944/preprints202003.0378.v1
16. Shetty AK. Mesenchymal Stem Cell Infusion Shows Promise for Combating Coronavirus (COVID-19). *Induced Pneumonia Aging and disease*. 2020;11(2):462. https://doi.org/10.14336/ad.2020.0301
17. Jordan RE, Adab P, Cheng KK. Covid-19: risk factors for severe disease and death. *BMJ*. Mar 26 2020;368:m1198. https://doi.org/10.1136/bmj.m1198
18. Berlin I, Thomas D, Le Faou AL, Cornuz J. COVID-19 and smoking. Nicotine. Tobacco Research. 2020;4(1):5-7. https://doi.org/10.1093/ntr/ntaa059
19. Ramesh N, Siddaiah A, Joseph B. Tackling coronavirus disease 2019 (COVID 19) in workplaces. *Indian Journal of Occupational and Environmental Medicine*. 2020;24(1):16. https://doi.org/10.4103/ijoem.ijoem_49_20
20. Shirbandi K, Barghandan S, Mobinfar O, Rahim F. Inactivation of Coronavirus with Ultraviolet Irradiation: What? How? Why? *SSRN*. 2020. https://doi.org/10.2139/ssrn.3571418
21. Fang Y, Zhang H, Xie J, et al. Sensitivity of Chest CT for COVID-19: Comparison to RT-PCR. *Radiology*. Feb 19 2020:200432. https://doi.org/10.1148/radiol.2020200432
22. Chan JF, Yuan S, Kok KH, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*. Feb 15 2020;395(10223):514-523. https://doi.org/10.1016/s0140-6736(20)30154-9
23. Zhonghua Liu Xing Bing Xue Za Zhi. Novel Coronavirus Pneumonia Emergency Response Epidemiology T. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. Feb 17 2020;41(2):145-151. https://doi.org/10.46234/ccdcw2020.032
24. 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. *Lancet*. Mar 28 2020;395(10229):1054-1062. https://doi.org/10.1016/s0140-6736(20)30566-3
25. Yen N, Lee E, Yang J, et al. Imaging Profile of the COVID-19 Infection: Radiologic Findings and Literature Review. *Radiology: Cardiothoracic Imaging*. 2020;2(1):11-15. https://doi.org/10.1148/ryct.2020200034
26. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centred, retrospective, observational study. *Lancet Respir Med*. Feb 24 2020. https://doi.org/10.1016/s2213-2600(20)30079-5
27. Bai Y, Yao L, Wei T, et al. Presumed Asymptomatic Carrier Transmission of COVID-19. *JAMA*. Feb 21 2020. doi:10.1001/jama.2020.2565
28. Qin C, Zhou L, Hu Z, et al. Dysregulation of immune response in patients with COVID-19 in Wuhan, China. *Clin Infect Dis*. Mar 12 2020. https://doi.org/10.1093/cid/ciaa248

29. Ruan Q, Yang K, Wang W, Jiang L, Song J. Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China. *Intensive Care Medicine*. 2020;2(3):10-12. https://doi.org/10.1007/s00134-020-06028-z
30. Fu L, Wang B, Yuan T, et al. Clinical characteristics of coronavirus disease 2019 (COVID-19) in China: a systematic review and meta-analysis. *J Infect*. Apr 10 2020. https://doi.org/10.1016/j.jinf.2020.03.041
31. Zhang JJ, Dong X, Cao YY, et al. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. *Allergy*. Feb 19 2020. https://doi.org/10.1111/all.14238
32. Strzelak A, Ratajczak A, Adamiec A, Feleszko W. Tobacco Smoke Induces and Alters Immune Responses in the Lung Triggering Inflammation, Allergy, Asthma and Other Lung Diseases: A Mechanistic Review. *Int J Environ Res Public Health*. May 21 2018;15(5). https://doi.org/10.3390/ijerph15051033
33. Arcavi L, Benowitz NL. Cigarette smoking and infection. Arch Intern Med. Nov 8 2004;164(20):2206-2216. https://doi.org/10.1001/archinte.164.20.2206
34. Vardavas CI, Nikitara K. COVID-19 and smoking: A systematic review of the evidence. *Tob Induc Dis*. 2020;18:20. https://doi.org/10.18332/tid/119324
35. Ai T, Yang Z, Hou H, et al. Correlation of Chest CT and RT-PCR Testing in Coronavirus Disease 2019 (COVID-19) in China: A Report of 1014 Cases. *Radiology*. Feb 26 2020:200642. https://doi.org/10.1148/radiol.2020200642
36. Greenhalgh T, Koh GCH, Car J. Covid-19: a remote assessment in primary care. *BMJ*. Mar 25 2020;368:m1182. https://doi.org/10.1136/bmj.m1182
37. de La Vega MA, Bello A, Chaillet P, Kobinger GP. Diagnosis and management of Ebola samples in the laboratory. *Expert Rev Anti Infect Ther*. Jun 2016;14(6):557-567. https://doi.org/10.1080/14787210.2016.1176912

SHORT BIOGRAPHY

***Osman OZUDOGRU**. He graduated from Istanbul University Istanbul Medical Faculty in 2011. He worked in Erzincan Public Hospital Emergency Department between 2011-2013. Between 2013 and 2018, he worked as a Research Assistant at Internal Medicine of Çukurova University Faculty of Medicine. He has been working as an Internal Medicine specialist at Siirt State Hospital since 2018.*

***Gunes BOLATLI.** She was born in Söke in 1983. Selçuk University Medical Faculty Anatomy (Doctorate) graduated in 2018. She is currently working as an assistant professor in the Department of Anatomy, Faculty of Medicine, Siirt University.*
She has articles published in international and national journals and works presented in congresses

***Fatih TAS.** He was born in Sacramento, California, USA in 1985. He graduated from Selcuk University Faculty of Medicine in 2010 and from the Department of Histology and Embryology in 2017. He is still working as an assistant professor at the Department of Histology and Embryology, Faculty of Medicine, Siirt University. He has articles published in international and national journals and works presented in congresses.*