Original article

UNCOVERING CLINICAL INSIGHTS: A COMPREHENSIVE ANALYSIS OF COVID-19 CASES IN ORAN FROM MAY TO SEPTEMBER 2021

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ABSTRACT

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has become a public health concern. While clinical investigations on coronavirus disease 2019 (COVID-19) have been conducted worldwide, Algeria has been absent from such studies. This research aims to identify factors contributing to the virus's spread. This marks the inaugural descriptive Algerian study on COVID-19. It involved a review of 3,698 medical records of diagnosed COVID-19 patients. The patient's average age was 45.79 ± 17.05 years. Females constituted the majority (53.7%, P=0.000). The AstraZeneca vaccine demonstrated a significant protective effect (P=0.001) and a strong association was identified between the blood group, the rhesus group, and the occurrence of COVID-19 (P=0.000). Rhesus groups and female sex emerged as highly associated clinical factors with SARS-CoV-2 infection in the Algerian context. These results, divergent from the existing literature, are intriguing and warrant further exploration. More extensive studies are essential to elucidate and contextualize these findings.

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1. Introduction

COVID-19, a disease caused by the SARS-CoV-2 virus, was first identified in late December 2019 in Wuhan, China. Months later, the World Health Organization (WHO) officially declared it a global public health emergency on March 11, 2020 [1,2]. The virus transmission primarily occurs through respiratory droplets and direct or indirect contact during medical procedures. Recognized symptoms of the infection include flu-like manifestations, fever, cough, difficulty breathing, fatigue, and alterations in smell and taste [3].

Algeria reported its first COVID-19 case on February 25, 2020. Subsequently, on March 15, 2020, the Algerian government imposed a confinement measure in response to the virus's spread. By this time, numerous deaths had been reported globally, affecting regions such as China, Europe, and North America. Given the ongoing pandemic, Algerian health authorities face the imperative of comprehending the pathophysiological mechanisms, determining the epidemiological profile, and understanding the clinical and paraclinical aspects of COVID-19 at a national and regional level.

While numerous studies have explored the clinical and epidemiological characteristics, risk factors, case management, and outcomes of COVID-19 globally [6-8], limited information is available regarding the clinical characteristics of COVID-19 in African patients. This study represents the first comprehensive examination of COVID-19 in Algeria, providing crucial epidemiological data derived from hospitalized patients. The primary aim is to elucidate the

2. Material and methods

Study Design and Participants
This retrospective study focused on COVID-19 patients admitted to the Oran City hospital establishment in Algeria from May 1st to September 31st, 2021, coinciding with the outbreak of the delta variant of COVID-19. The inclusion criteria involved patients with confirmed positive COVID-19 through real-time polymerase chain reaction (RT-PCR) tests, resulting in 3698 enrolled patients. Individuals with negative RT-PCR tests were excluded from the study.

Data Collection

Demographic information, such as age, sex, and comorbidities, was extracted from digitalized patient medical charts. The mode of presentation, categorized as asymptomatic or symptomatic (fever, respiratory symptoms, headache, loss of taste, etc.), was also documented.

Laboratory Procedures

All diagnoses were confirmed using the reverse transcriptase-polymerase chain reaction (RT-PCR) test for COVID-19. The PCR tests were conducted at the virology laboratory in the Oran City Hospital establishment. Viral RNA extraction from nasopharyngeal swabs was performed according to the "Berlin protocol," developed by Professor Christian Drosten in mid-January 2020.

Statistical Analysis

Baseline clinical characteristics were analyzed and presented as frequencies and percentages. Categorical variables with a normal distribution were reported as frequencies and percentages, and the chi-square test was employed for comparisons. Statistical analysis utilized SPSS version 20.0 for Windows (SPSS Inc., Chicago, USA), with a significance level set at greater than 0.05.

Ethics Statement

This study did not require institutional review board approval, as it did not involve any interaction or intervention with human subjects and did not access identifiable private information.

3. Results

The study delineates the demographic and health characteristics of 3698 patients afflicted by COVID-19. Figure 1 depicts the distribution of participants across admission months, showcasing a peak in July (35.86%), followed by incremental percentages in May (14.73%) and June (19.29%). Subsequently, August and September exhibit consistently lower percentages (22.12% and 8%, respectively). Of the reviewed cases, 53.7% (1,874) were female, with 39 being pregnant, and 46.3% (1,616) were male, resulting in a female-to-male ratio of 1:1.16. The presence of COVID-19 exhibited a significant association with female sex (p=0.000).
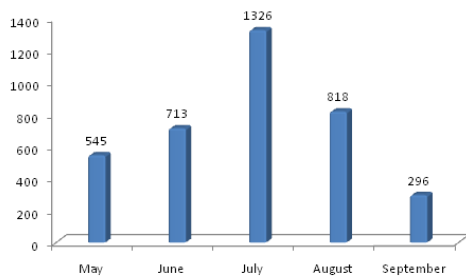
Figure 1. Distribution of COVID 19 patients by months

Among 3415 medical records with patient age information, the highest incidence rate (22.69%, n = 775) occurred in the 31 to 40 age group, followed by those aged 41–50 years (19.38%, n = 662). The lowest incidence rate was observed in the group aged 20 years or younger (3.07%, n = 105), as depicted in Figure 2.
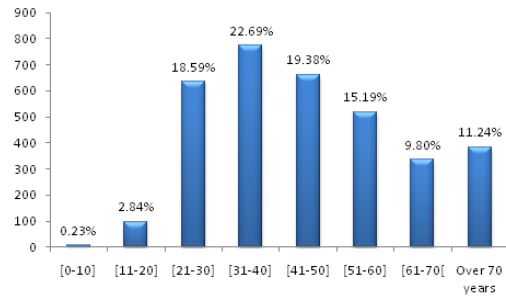
Figure 2. Distribution of COVID-19 patients according to age groups

Table 1 emphasizes the ABO and Rhesus blood groups in 484 COVID-19-positive patients. The proportion with Rh-negative status was 8.06%. The distribution of blood groups is as follows: 35.12%, 16.95%, 6.61%, and 41.32% for A, B, AB, and O, respectively, with a highly significant association (p=0.000).

		Number of Covid-19 cases (%)	*P-value*
Blood group	A	170 (35.12%)	**0.000**
	B	82 (16.94%)	
	AB	32 (6.61%)	
	O	200 (41.32%)	
Rhesus group (Rh)	Rh-	36 (8.06%)	**0.000**
	Rh+	445 (91.94%)	

Table 1. ABO and Rh blood groups distribution in patients with COVID-19

Within this cohort, 53.8% (1,989) of patients reported cough accompanied by fever, 6.68% (139) presented with only fever, 38.2% (1,413) exhibited ageusia and anosmia, and 9.98% (141) experienced only ageusia. Additionally, 7.62% (282) of patients reported digestive disorders, while only 0.38% (14) suffered from desaturation.

Among the 3698 COVID-19 patients, 961 had comorbidities, with hypertension being the most prevalent (31.95%), followed by diabetes (28.93%), respiratory pathologies (11.97%), and cardiac diseases (8.11%), as illustrated in Figure 3. A significant association was also identified between vaccine type and patients with COVID-19 (p=0.001). Of the total study population, 59 patients were vaccinated, and Table 2 elucidates the distribution of patients based on their vaccination mode.
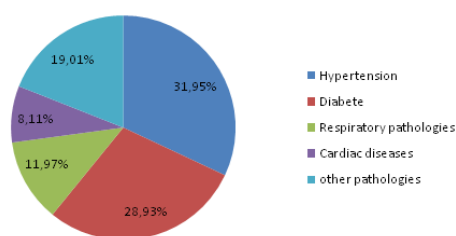
Figure 3. COVID-19 Patient Comorbidities Profile

Vaccine type	Number of Covid-19 cases (%)	p-value
AstraZeneca ®	09 (15%)	
Sinopharm ®	21 (35%)	
Sputnik V ®	17 (28,33%)	0.001
Sinovac ®	12 (20%)	
Pfizer ®	01 (1,6%)	

Table 2. Vaccine types distribution among COVID-19 patients

4. Discussion

The unfolding global pandemic of COVID-19 has prompted an urgent need for comprehensive investigations into the demographic and clinical landscape of affected populations. In this study, the first of its kind in Algeria, delves into the demographic and clinical characteristics of patients with SARS-CoV-2 infection, offering crucial insights, where we examine the unique characteristics of 3698 COVID-19 patients in Algeria, offering a crucial lens into the multifaceted nature of the disease within this region.

Unlike many clinical feature studies primarily from China focusing on severe or hospitalized cases, our study mirrors that of Wu et al [9], with relatively younger patients (average age: 45.79 years ±17.05). The lowest frequency of COVID-19 was observed in the 1-year to 20-year age group (3.07%), aligning with Lee et al [10]'s conclusion that children have a lower susceptibility to COVID-19 due to a less intense immune response, potentially related to cytokine release syndrome.

Gender distribution in COVID-19 cases remains varied. Our study reveals a predominantly female population (with a significant association), while Wan et al [11] reported 53.3% male patients, and Zhang et al [12] aligned with our findings. Pregnant women, physiologically more susceptible to infectious pulmonary diseases, recorded 39 cases, constituting a small proportion of COVID-19 cases. Chen et al [13] documented nine cases in the third trimester, showcasing clinical comparability to the general population.

COVID-19's clinical presentation is diverse, primarily manifesting in respiratory deficiency. Notably, anosmia/ageusia without nasal obstruction has been reported, resembling olfactory impairment in SARS-CoV-1. Recent research by Eliezer et al [14] using MRI suggests bilateral inflammatory obstruction of olfactory slits caused by SARS-CoV-2 infection. Commonly observed symptoms in confirmed COVID-19 cases include cough, fever, and less frequently, shortness of breath, sore throat, or gastrointestinal symptoms, consistent with our findings.

Regarding comorbidities, our study highlights a slight dominance of hypertension and diabetes compared to other studied comorbidities. Similar results were found in Wuhan, China [15]. Chronic diseases like diabetes, cardiovascular disease (CVD), and chronic obstructive pulmonary disease (COPD) pose an increased risk of COVID-19 morbidity and mortality [16]. Myocardial involvement is observed in 10-20% of patients, and myocarditis cases have been reported. Our study identifies a significant association between the ABO blood group and COVID-19 pathology (P=0.000), with a higher risk for blood group O individuals and lower for blood group AB, contradicting other findings [17-18]. The negative Rh- blood group is also significantly associated with COVID-19 (p=0.000). Our study aligns with Ray et al [19]'s discovery of the Rh-blood group associated with a lower risk for SARS-CoV-2 infection.

In the realm of vaccines, vital to curbing the pandemic, all are safe and effective [20] and Pfizer and AstraZeneca are identified as the most effective in our study. Fully vaccinated individuals with BNT162b2 (Pfizer-BioNTech) demonstrated substantial effectiveness against SARS-CoV-2 infections, including the delta variant, confirming findings by other researchers [21-22].

5. Conclusions

Despite limitations tied to single-center data and missing variables, this study is pivotal, offering crucial baseline insights into the clinicopathological correlations of COVID-19 patients in Algeria. Further studies are warranted to investigate underlying mechanisms influencing patient health status and specific characteristics.

References

1. Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, Wang W, Song H, Huang B, Zhu N, Bi Y, Ma X, Zhan F, Wang L, Hu T, Zhou H, Hu Z, Zhou W, Zhao L, Chen J, Meng Y, Wang J, Lin Y, Yuan J, Xie Z, Ma J, Liu WJ, Wang D, Xu W, Holmes EC, Gao GF, Wu G, Chen W, Shi W, Tan W. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. Lancet. 2020 Feb; (10224):565-574.

2. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, Iosifidis C, Agha R. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). Int J Surg. 2020 Apr;76:71-76. doi: 10.1016/j.ijsu.2020.02.034. Epub 2020 Feb 26. Erratum in: Int J Surg. 2020 May;77:217.

3. Beig Parikhani A, Bazaz M, Bamehr H, Fereshteh S, Amiri S, Salehi-Vaziri M, Arashkia A, Azadmanesh K. The Inclusive Review on SARS-CoV-2 Biology, Epidemiology, Diagnosis, and Potential Management Options. Curr Microbiol. 2021 Apr;78(4):1099-1114.

4. Cabore JW, Karamagi HC, Kipruto H, Asamani JA, Droti B, Seydi ABW, Titi-Ofei R, Impouma B, Yao M, Yoti Z, Zawaira F, Tumusiime P, Talisuna A, Kasolo FC, Moeti MR. The potential effects of widespread community transmission of SARS-CoV-2 infection in the World Health Organization African Region: a predictive model. BMJ Glob Health. 2020 May;5(5):e002647.

5. El Sadr WM, Justman J. Africa in the path of COVID-19. N Engl J Med 2020;383(3):e11.

6. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, Liu L, Shan H, Lei CL, Hui DSC, Du B, Li LJ, Zeng G, Yuen KY, Chen RC, Tang CL, Wang T, Chen PY, Xiang J, Li SY, Wang JL, Liang ZJ, Peng YX, Wei L, Liu Y, Hu YH, Peng P, Wang JM, Liu JY, Chen Z, Li G, Zheng ZJ, Qiu SQ, Luo J, Ye CJ, Zhu SY, Zhong NS; China Medical Treatment Expert Group for Covid-19. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020 Apr 30;382(18):1708-1720.

7. Almazeedi S, Al-Youha S, Jamal MH, Al-Haddad M, Al-Muhaini A, Al-Ghimlas F, Al-Sabah S. Characteristics, risk factors and outcomes among the first consecutive 1096 patients diagnosed with COVID-19 in Kuwait. EClinicalMedicine. 2020 Jul 4;24:100448.

8. Otuonye NM, Olumade TJ, Ojetunde MM, Holdbrooke SA, Ayoola JB, Nyam IY, Iwalokun B, Onwuamah C, Uwandu M, Abayomi A, Osibogun A, Bowale A, Osikomaiya B, Thomas B, Mutiu B, Odunukwe NN. Clinical and Demographic Characteristics of COVID-19 patients in Lagos, Nigeria: A Descriptive Study. J Natl Med Assoc. 2021 Jun;113(3):301-306.

9. Wu F, Zhao S, Yu B, Chen YM, Wang W, Song ZG, Hu Y, Tao ZW, Tian JH, Pei YY, Yuan ML, Zhang YL, Dai FH, Liu Y, Wang QM, Zheng JJ, Xu L, Holmes EC, Zhang YZ. A new coronavirus associated with human respiratory disease in China. Nature. 2020 Mar;579(7798):265-269.

10. Lee PI, Hu YL, Chen PY, Huang YC, Hsueh PR. Are children less susceptible to COVID-19?. J Microbiol Immunol Infect 2020; 53(3): 371-2.

11. Wan S, Xiang Y, Fang W, Zheng Y, Li B, Hu Y, Lang C, Huang D, Sun Q, Xiong Y, Huang X, Lv J, Luo Y, Shen L, Yang H, Huang G, Yang R. Clinical features and treatment of COVID-19 patients in northeast Chongqing. J Med Virol. 2020 Jul;92(7):797-806.

12. Zhang G, Hu C, Luo L, Fang F, Chen Y, Li J, Peng Z, Pan H. Clinical features and short-term outcomes of 221 patients with COVID-19 in Wuhan, China. J Clin Virol. 2020 Jun;127:104364.

13. Chen H., Guo J., Wang C., Luo F., YU X., Zhang W. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. Lancet 2020;395(10226):809–815.

14. Eliezer M, Hautefort C, Hamel AL, Verillaud B, Herman P, Houdart E, Eloit C. Sudden and Complete Olfactory Loss of Function as a Possible Symptom of COVID-19. JAMA Otolaryngol Head Neck Surg. 2020 Jul 1;(7):674-675

15. Du Y, Tu L, Zhu P, Mu M, Wang R, Yang P, Wang X, Hu C, Ping R, Hu P, Li T, Cao F, Chang C, Hu Q, Jin Y, Xu G. Clinical Features of 85 Fatal Cases of COVID-19 from Wuhan. A Retrospective Observational Study. Am J Respir Crit Care Med. 2020 Jun 1;201(11):1372-1379.

16. Zhang JY, Shang T, Ahn D, Chen K, Coté G, Espinoza J, Mendez CE, Spanakis EK, Thompson B, Wallia A, Wisk LE, Kerr D, Klonoff DC. How to Best Protect People With Diabetes From the Impact of SARS-CoV-2: Report of the International COVID-19 and Diabetes Summit. J Diabetes Sci Technol. 2021 Mar;15(2):478-514.

17. AL-Khikani FH. The role of blood group in COVID-19 infection: More information is needed. J Nat Sci Med 2020; 3(3): 225-6. https:// doi.org/10.4103/JNSM.JNSM_24_20

18. Li J, Wang X, Chen J, Cai Y, Deng A, Yang M. Association between ABO blood groups and risk of SARS-CoV-2 pneumonia. Br J Haematol 2020; 190(1): 24-7.

19. Ray JG, Schull MJ, Vermeulen MJ, Park AL. Association between ABO and Rh blood groups and SARS-CoV-2 infection or severe COVID-19 illness: A population-based cohort study. Ann Intern Med 2021; 174(3): 308-15. https:// doi.org/10.7326/M20-4511.

20. Zatla I, Boublenza L, Zair S, Diab N. Vaccination in the time of COVID-19: Survey study at the university of Tlemcen in the spring of 2022

21. Chang S, Liu H, Wu J, Xiao W, Chen S, Qiu S, Duan G, Song H, Zhang R. Effectiveness of BNT162b2 and mRNA-1273 Vaccines against COVID-19 Infection: A Meta-Analysis of Test-Negative Design Studies. Vaccines (Basel). 2022 Mar 18;10(3):469.

22. LopezBernal J, Andrews N, Gower C, Robertson C, Stowe J, Tessier E et al. Effectiveness of the Pfizer-BioNTech and Oxford-AstraZeneca vaccines on covid-19 related symptoms, hospital admissions, and mortality in older adults in England: test negative case-control study BMJ 2021; 373 :n1088