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Research Article

Demographic data in COVID-19 Patients

Alaa Khalid Mohammed[1], Esmat Abd EL Aziz Mohammed El sharkawy[1], Manal Mohamed Saber[1] and Zaki Mohammed Zaki[1]

[1] Department of Clinical Pathology, Faculty of Medicine, Minia University, Minia, Egypt.

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Abstract

COVID-19 illness has become a serious health issue that is harming healthcare systems around the globe. It is crucial to examine the epidemiological traits of COVID-19. The study aimed to show the demographic data and their associations with the laboratory and clinical data in COVID-19 patients. 46 COVID-19 patients and 20 normal controls were involved in this study. The subjects were submitted to routine laboratory investigations, including CBC, Random glucose level, renal function test, liver profile, CRP, Ferritin, and D dimer. The study indicated no significant difference in the demographic data between COVID-19 patients and healthy controls. Covid-19 subjects' age was positively associated with blood urea and direct bilirubin levels. Increased Covid-19 patients' age was linked to ferritin and D-dimer levels ($p = 0.009$ *and* $p = 0.012$). Covid-19 patients' gender correlated positively with hemoglobin levels. Age was a risk factor for the severity and clinical progression of the illness.

Keywords: COVID-19, Demographic data

Introduction

Since December 2019, the emergence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has presented alarming challenges to global public health. (Salian et al., 2021). Respiratory symptoms are the most frequent symptoms in COVID-19 patients. Most SARS-CoV-2 infected individuals experience mild to moderate disease, with viral replication primarily confined to the upper airways, while some develop a severe variant. (Huang et al., 2020).

The population's demographic criteria, particularly the distribution of ages within it, has a significant bearing on the spread and effects of the pandemic. Demographic research can offer fresh perspectives on the pandemic's potential course as well as the scope and nature of the interventions required to contain it. The mortality of COVID-19 is disproportionately concentrated in older age groups, especially those 80 and older (Shoaib et al., 2021).

While few studies have evaluated variations in clinical characteristics and laboratory findings in patients of different ages, older, critically sick COVID-19 patients are at a greater risk for death (Wu C et al., 2020). Given the significant variety of COVID-19 around the world, especially in Egypt, it is important to establish the demographic characteristics of patients. This study analyses the demographic traits, initial laboratory results, clinical trajectory, and outcomes among COVID-19 patients hospitalized at a north Indian hospital with a focus on the disease.

Subjects and methods

Study Population

From March 2021 to January 2022, 46 COVID-19 participants participated in the trial. Additionally, twenty healthy controls were involved. The Minia Chest University Hospital and Minia Liver University Hospital Egypt participated in this prospective study. The clinical symptoms and COVID-19 infection indications were confirmed by a physician.

RNA Extraction and qRT-PCR

Individual nasopharyngeal swabs from COVID-19 patients were used to isolate Covid-19 RNA. qRT-PCR was used to analyze nasopharyngeal samples in compliance with WHO standards (WHO laboratory Testing 2020). Nasopharyngeal samples were collected with sterile polyester-tipped swabs and then placed in a tube that contained a universal medium. The sample manipulation was performed in a biosafety class II laboratory.

COVID-19 RNA extraction was performed utilizing the RNA extraction kit (Qiagen, Hilden, Germany) following the manufacturer's recommendations. RNA extraction was performed using the QIAcube fully automated instrument (Qiagen, Hilden, Germany). RNA was set at 20°C up to the analysis of RT-PCR.

The qRT-PCR was performed utilizing a COVID-19 kit (Qiagen, Hilden, Germany). The conditions of thermal cycling were carried out as follows: Reverse transcription for ten minutes at 55°C for one cycle and initial denaturation at 95°C for two minutes for one cycle; 45 cycles of 10 s at 95°C, and 60 s at 60°C. Negative controls (nuclease-free water), negative extraction controls, and positive controls were included in every run. If the COVID-19 gene's amplification curve crossed the cutoff line in fewer than 40 cycles, the sample was considered positive. The COVID-19 gene's cycle threshold (Ct) value was utilized to assess the expression of COVID-19. The number of amplification cycles needed for a target gene to cross the threshold line is known as the Ct value, and it was used to express the results of the qRT-PCR test (Rao et al., 2020).

Laboratory tests

Peripheral blood was drawn from each individual under strictly sterile circumstances. Two millimeters of blood were placed in an EDTA tube for a complete blood count (CBC), which was then determined utilizing an automatic hematology analyzer, Celltac (G Nihon Kohden Corporation, Tokyo, Japan). 1.8 millimeters of blood was placed in a tube containing 0.2 ml of Tri-Sodium Citrate for measurement of D-dimer. 4 millimeters of blood was placed in a plain tube and then centrifuged for serum isolation at room temperature. The serum samples were then divided and used. Serum levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), total bilirubin, direct bilirubin, creatinine, albumin, sugar, and blood urea were assessed utilizing the Selectra Pro Xl chemistry auto-analyzer [Eli Tech clinical system, Puteaux, France]. The latex agglutination test was used to determine C-reactive protein (CRP) semi-quantitatively. serum ferritin levels and D-dimers were assessed utilizing the automated immunoassay analyzer Aia 360 (Tosoh Biosciences, South San Francisco, CA, USA).

Statistical analysis:

Data analysis was performed utilizing the IBM SPSS version 22.0 (IBM; Armonk, New York, USA). Data normality was performed utilizing the Shapiro-Wilk and Kolmogorov-Smirnov analysis. For quantitative parametric (normally distributed) data, descriptive statistics were calculated utilizing the mean, standard deviation (SD), and maximum and minimum ranges. The parametric quantitative data of the two groups were compared using an independent-sample t-test. Correlations between the variables was investigated. p-values less than 0.05 were regarded as significant.

Results

Demographic criteria

The criteria of the subjects involved in the study are enumerated in Table 1. Newly diagnosed Covid-19 had a subjects age of 60.7 ± 7.8 years, ranging from 48 to 71, with 23 males and 23 females. The thirty

healthy controls had a mean age of 57.4 ± 3.4 years, ranging from 48 to 61, with thirteen males and seven females. No significant differences were observed regards gender and age between the different subject groups ($p > 0.05$).

Table (I): Comparison between COVID-19 patients and normal controls regarding demographic data.

Demographic data		Patients N= 46	Control N= 20	p-value
Age (Years)	**Mean ± SD (Range)**	60.7 ± 7.8 (48.0 – 71.0)	57.4 ± 3.4 (48.0 – 61.0)	0.148
Gender:	**N%**			
Males		23 (50%)	13 (65%)	0.261
Females		23 (50%)	7 (35%)	

clinical criteria

The clinical criteria of the COVID-19 subjects are enumerated in Table 2. Regarding cough, it was reported in 87% of COVID-19 patients, while 84.8% of patients experienced fever. Dyspnea was recorded in 71.7% of COVID-19 patients, while sore throat was noticed in 63% of patients.

Table (2): Clinical picture in the COVID-19 patient group

Clinical Picture	patients N= 46 N %
Cough:	
Positive	40 (87%)
Negative	6 (13%)
Fever:	
Positive	39 (84.8%)
Negative	7 (15.2%)
Dyspnea:	
Positive	33 (71.7%)
Negative	13 (28.3%)
Sore throat:	
Positive	29 (63%)
Negative	17 (37%)

Study of demographic criteria and laboratory features

The relationship between the age and laboratory data in the COVID-19 patients was evaluated (Table 3). In COVID-19 patients, age was positively associated with blood urea (r = 0.307 and P = 0.03). Moreover, age had a significant positive association with direct bilirubin (r = *0.396* and P = 0.01). Furthermore, patients' age had positive associations with D Dimer (r = 0.366 and P = 0.012). Patients' age was positively associated with ferritin levels (r = 0.379 and P= 0.009). No significant differences were observed regards other laboratory variables (Table 3). The relationship between age and clinical data was also evaluated. No significant difference was revealed regards the clinical criteria Table 3.

In Covid-19, patients' gender displayed positive correlations with hemoglobin *(r = 0.323, p = 0.2).* Meanwhile, there was no significant difference between patients' gender and other laboratory and clinical markers (Table 4).

Table (3): Correlations between age and studied clinical and laboratory parameters. * Significant level at p-value < 0.05.

	Age	
	r	**p-value**
Cough	0.102	0.490
Fever	0.185	0.216
Dyspnea	0.077	0.610
Sore throat	0.029	0.847
Hemoglobin (g/dl)	0.132	0.380
Total leukocytic count ($x10^3$/µl)	0.286	0.05
Platelets ($x10^3$/µl)	0.197	0.185
Lymphocytes (%)	0.090	0.547
C-Reactive protein (mg/L)	0.227	0.127
Ferritin (ng/ml)	0.379	**0.009***
D-dimer (µg/ml)	0.366	**0.012***
Random blood sugar (mg/dl)	0.03	0.811
Urea (mg/dl)	0.307	**0.03***
Creatinine (mg/dl)	0.036	0.807
ALT (U/L)	0.063	0.676
AST (U/L)	0.02	0.270
Albumin (g/dl)	0.246	0.099
Total bilirubin (mg/dl)	0.07	0.622
Direct bilirubin (mg/dl)	0.396	**0.01***

Table (4): Correlations between gender and studied clinical laboratory parameters.
*** Significant level at p-value < 0.05.**

	Gender	
	r	**p value**
Cough	0.258	0.083
Fever	0.060	0.689
Dyspnea	0.048	0.750
Sore throat	0.045	0.766
Hemoglobin (g/dl)	0.323	**0.02***
Total leukocytic count (x10^3/µl)	0.166	0.268
Platelets (x10^3/µl)	0.175	0.242
Lymphocytes (%)	0.090	0.547
C-Reactive protein (mg/L)	0.07	0.634
Ferritin (ng/ml)	0.124	0.406
D-dimer (µg/ml)	0.127	0.399
Random blood sugar (mg/dl)	0.03	0.811
Urea (mg/dl)	0.06	0.659
Creatinine (mg/dl)	0.04	0.773
ALT (U/L)	0.198	0.207
AST (U/L)	0.038	0.798
Albumin (g/dl)	0.148	0.326
Total bilirubin (mg/dl)	0.129	0.391
Direct bilirubin (mg/dl)	0.02	0.877

Discussion

In the current study, we presented 46 COVID-19 individuals and set a mean of 60 years. Epidemiological and clinical criteria of COVID-19 patients have been reported, but few reports have assessed the demographic findings. The impact of age and gender was assessed in this study. The results might highlight the clinical significance of the demographic data in COVID-19 patients and their associations with laboratory and clinical criteria.

This study showed no statistical difference in age and sex among COVID-19 patients and controls (p =0.567 and p = 0.261, respectively). This was in agreement with Li et al., (2020), who showed that infection of SARS-CoV-2 may have no significant association with gender. But this was in disagreement with Liu et al., (2021), who reported that women are more vulnerable to SARS-CoV-2 because of the high expression of ACE2 in their reproductive system.

The current study also showed that a link between aging and SARS-COV-2 infection exists. According to Wei et al., (2020), older patients were more likely to contract SARS-CoV-2 because they were more likely to have systemic inflammation, pulmonary and extrapulmonary organ damage, and increased mortality. This finding was in line with their findings.

The study indicated that fever, cough and dyspnea were present in 84.8 %, 87%, and 71.7% of COVID-19 patients group respectively. According to Cascella et al., (2022), the majority of symptomatic patients frequently exhibit fever, coughing, and shortness of breath. Sore throat was found in 63% of covid-19 patients. According to Weng et al., (2021), a sore throat is characterized by pain brought on by inflammation of tissues behind the throat. It's probable that the symptoms of fever, coughing, and dyspnea are directly related to the location of the ACE virus receptor (Choudhury et al., 2020).

The findings indicated that COVID-19 patients' age correlated with inflammatory mediators like D-dimer and ferritin levels. The findings were consistent with the

earlier study's finding that older individuals had higher levels of D-dimer (Khan et al., 2020, Zhao et al., 2020). These results might also explain the significant correlation between the poor clinical outcome with COVID-19 patient's age (Wang et al., 2020).

This study confirmed a significant association between increased blood urea and COVID-19 patient's age which was in alignment with a previous report (Zhao et al., 2020). The data imply that a patient's age is linked to the prognosis and severity of the disease. A possible scenario is that COVID-19 patients might have antigenic mimicry and the possible development of glomerulonephritis. Moreover, the age of COVID-19 patients positively correlated with direct bilirubin (Zhao et al., 2020). On the other hand, other liver functions tests exhibited no significant associations with patient's age. COVID-19 patients rarely have an underlying liver injury (Wu J et al., 2020).

On the other hand, the gender of COVID-19 patients has been positively associated with hemoglobin, however, no significant difference in other laboratory data was revealed, consistent with prior studies (Statsenko et al., 2022).
The current study has certain limitations. First, the small sample size, which could lead to reducing the validity of our findings. Second, some laboratory and clinical information were lacking or unable to be included.

Conclusion

The study investigated the implications of demographic factors linked to COVID-19 patients. According to our research, COVID-19 patients mostly experienced severe symptoms. Age was a risk factor for severity and clinical progression of the illness. Healthcare practitioners may be able to create better clinical management strategies based on risk stratification with an understanding of these risk variables. Additionally, it might aid in directing neighborhood health organizations toward more effective resource allocation.

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