The Egyptian Journal of Hospital Medicine (January 2023) Vol. 90 (2), Page 3562-3565

Medical and Biochemical Characteristics Predictors for Severe COVID-19

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ABSTRACT

Background: Coronavirus disorder 2019 (COVID-19) has been a unique virus due to the severe acute respiratory syndrome coronavirus 2 that initially appeared in Wuhan and is subsequently extended globally. In severely affected cases, COVID-19 has a high fatality rate. **Objective:** The aim of the current study was to identify the medical and biochemical characteristics predictors for severe COVID-19.

Patients and methods: A total of 150 admitted patients at Marjan Hospital, Babylon were enrolled in the current study. The recruited patients were divided into 3 groups: Health control with no COVID-19 (n=50), non-diabetic patients with COVID-19 (n=50), and diabetic patients with COVID-19 (n=50). Laboratory investigation for all participants included ALT, AST, CRP, D-dimer, glucose, and serum albumin. The diagnosis and severity of COVID-19 was confirmed by CT scan. **Results:** The mean age of the healthy control was 55.31 (SD 0.32) years, meanwhile the mean age of non-diabetic patients with COVID-19 was 54.23 (SD 0.21) years, with no statistical significant difference. Non-diabetic patients with COVID-19 had higher levels of AST, ALT, total bilirubin, ALP and CRP compared with the health control groups with P-value <0.001. Compared with the health control, diabetic COVID-19 patients had statistical significant increase in serum urea, serum creatinine, serum glucose and CRP.

Conclusion: Age >52 years and high C-reactive protein, AST, ALT, ALP, D-dimer, or albumin are predictors for the development of COVID-19 to severe state.

Keywords: COVID-19, CT, Diabetic, Biochemical tests, Comparative study, University of Babylon.

INTRODUCTION

The present day pneumonia outbreak, which started in early December 2019 near Wuhan, has been because of a singular coronavirus (CoV) called '2019-nCoV' or '2019 novel coronavirus' or 'COVID-19' through the World Health Organization (WHO) City, in Hubei Province, China, COVID-19 is an epidemic that may cause disorder [(1)]. Phylogenetic analysis Bats have been discovered to have a complete genome sequence, in accordance to investigate completed with available entire genome sequences. The COVID-19 virus reservoir is identified, but, the intermediate host(s) has yet to be diagnosed [(2)]. The number one regions of labor to other marketplaces within the vicinity, in addition to the collection of thorough info at the origins and varieties of natural world species advertised on the Huanan marketplace, and the animals' final vacation spot after the market are completed [(3)].

Gammacoronavirus, Deltacoronavirus, Betacoronavirus, then Alphacoronavirus had been the 4 forms of coronaviruses that reason gastrointestinal then respiration diseases [(4)]. Birds had been mainly laid low with the first two kinds, whilst mammals were broadly speaking affected by the third and fourth kinds. CoVs in people is split into six organizations. These encompass the Betacoronaviruses HCoVHKU1, HCoV-OC43, MERS-CoV, SARS-CoV, HCoV229E, and HCoV-NL63, as well as the Alphacoronaviruses HCoV229E and HCoV-NL63. Coronaviruses have no longer normally recognized until the 2003 SARS pandemic [(5)], which has been accompanied by means of the MERS outbreaks in 2012 [(6)] and the COVID-19 outbreaks maximum currently. SARS-CoV and MERS-CoV have been extraordinarily hazardous viruses that unfold from bats to palm civets then dromedary camels earlier than attaining human beings

COVID-19 has been spread through dust particles then fomites when people come into close contact with them between the infector and the infected person. The airborne dispersal of COVID-19 is documented, and it is not known to be a significant transmission engine based on empirical evidence; nonetheless, such aerosol-producing organisms could be a significant transmission engine. The treatments have been carried out in medical facilities. In a small number of clinical cases, the transmission of feces is detected, and the active virus is recorded in a small number of instances [(7)].

The new coronavirus, on the other hand, is already causing a lot of concern. Even though it appears to be transferred to humans by animals, it is crucial to distinguish between specific animals and other sources, as well as the mode of transmission, incubation period, sensitive population characteristics, and survival rate [(8)]. Despite this, there has been currently very little clinical knowledge about COVID-19 disease, with details on the age range, animal origin of the virus, incubation time, outbreak curve, viral spectroscopy, dissemination pathogenesis, autopsy observations, and any clinical responses to antivirals lacking among the serious cases.

The clinical characteristics and biochemical data of mild/moderate then severe/critical patients have been examined retrospectively in this study. The aim of the current study was to identify the medical and biochemical characteristics predictors for severe COVID-19, in order to implement appropriate interventions as soon as possible.

Received: 23/10/2022
Accepted: 26/12/2022

PATIENTS AND METHODS

A total of 150 admitted patients at Marjan Hospital, Babylon from January 30, 2021, to March 27, 2021, were enrolled in the current study.

The recruited patients were divided into 3 groups: Health control with no COVID-19 (n=50), non-diabetic patients with COVID-19 (n=50), and diabetic patients with COVID-19 (n=50).

Patients with symptoms for covid -19 has been assigned to the slight/mild institution, even as those with intense or critical signs and symptoms had been assigned to the intense/critical group in this observe. Before remedy, the severity of the circumstance has been assessed and laboratory tests have been finished on the same time at the day of inpatient admission.

The series of records affected person with COVID-19 changed into detected in all probably inflamed sufferers' blood samples, which have been despatched to recognized authoritative laboratories. Bacterial and different laboratory trying out turned into achieved in the Marjan health center's scientific laboratory in Babylon.

Laboratory investigation for all participants included C-reactive protein (CRP), alanine aminotransferase (ALT), alkaline phosphatase (ALP), aspartate aminotransferase (AST), total bilirubin (T. Bil.), urea, and creatinine using a biochemical analyzer.

The diagnosis and severity of COVID-19 was confirmed by Computed Tomography CT) Scan (Philips Brilliance CT sixty four slice).

Doctors and different healthcare specialists have years of education of their discipline, but there are nevertheless many things they are able to diagnose in reality with the aid of searching at or being attentive to your body. Certain medical conditions require a deeper appearance, normally on the tissues, blood vessels, and bones inside your body. X-rays and ultrasounds can offer some records, but while a more specific view is required, a computed tomography (CT) experiment is commonly the subsequent step. In this article, we take a closer study how a CT experiment works, what it's typically used for, and what the manner is like.

Ethical Consideration:

This study was ethically approved by the Institutional Review Board of the College of Education, University of Babylon, Iraq. Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical analysis

The collected data were introduced and statistically analyzed by utilizing the Statistical Package for Social Sciences (SPSS) version 20 for windows. Qualitative data were defined as numbers and percentages. Chi-square test and Fisher's exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as mean and standard deviation, and independent sample t-test was used for comparison between groups. P value ≤ 0.05 was considered to be statistically significant.

RESULTS

Table 1 shows that the mean age of the healthy control was 55.31 (SD 0.32) years, meanwhile the mean age of non-diabetic patients with COVID-19 was 54.23 (SD 0.21) years, with no statistical significant difference. Non-diabetic patients with COVID-19 had higher levels of AST, ALT, total bilirubin, ALP and CRP compared with the health control groups with P-value <0.001.

Table (1): Comparison between the healthy control and severe/critical COVID-19 patients regarding age and biochemical tests

Parameter	Healthy control	Patient with COVID-19 (severe/ critical)	P-value
Age (years)	**55.31 ± 0.32**	**54.23 ± 0.21**	**0.16**
Urea (mgL/ml)	**43.24 ± 2.1**	**46.32 ± 3.2**	**0.87**
Creatinine (mg/ml)	**0.5 ± 0.02**	**0.55 ± 0.03**	**0.21**
AST (UN/L)	**37.11 ± 2.3**	**82.21 ± 4.1**	**0.001**
ALT (UN/L)	**34.31 ± 2.4**	**84.11 ± 1.6**	**0.001**
T. Bil ((UN/L)	**1.03 ± 0.1**	**4.25 ± 0.34**	**0.001**
ALP ((UN/L)	**95.31 ± 5.1**	**120.25 ± 5.3**	**0.001**
CRP((UN/L)	**7.11 ± 0.16**	**0.34 ± 0.011**	**0.001**

Table 2 shows that compared with the health control, diabetic COVID-19 patients had statistical significant increase in serum urea, serum creatinine, serum glucose and CRP.

Table (2): Comparison between the healthy control and diabetic COVID-19 patients regarding age and biochemical tests.

Parameter	Healthy control	Diabetic COVID-19 patients (n=50)	P-value
Age	**46.13 (36-55)**	**53.68 (48-67)**	**0.14**
Mortality rate (n, %)	**3 (7.74%)**	**11(26.21%)**	**0.16**
Urea mg/ml	**43.24**	**58.36**	**0.00061**
Creatinine (mg/ml)	**0.5**	**0.94**	**0.0021**
AST (UN/L)	**37.11**	**39.31**	**0.28**
ALT (UN/L)	**34.31**	**38.61**	**0.32**
T. Bil (UN/L)	**1.03**	**1.12**	**0.73**
ALP (UN/L)	**95.31**	**107.16**	**0.21**
CRP (UN/L)	**7.11**	**14.43**	**0.0001**
Glucose (mg/ml)	**80.24**	**435.12**	**0.0001**

DISCUSSION

The affected person of COVID -19, which emerged on the stop of 2019 and has infected over 80,000 human beings at the Chinese mainland, is extraordinarily contagious [10, 11]. The total range of showed cases has expanded with the aid of 7499 to 132,758, with about 28,900 cases recorded in Europe. The majority of sufferers are slight to moderately ill, with a better diagnosis [12]. The mortality charge changed into notably better for individuals who progressed to a excessive or essential state. To reduce mortality and decorate healing quotes, it's far crucial to discover significantly sick patients even earlier. The hyperlink among contamination severity and clinical and biochemical symptoms turned into very well tested in this examine. The majority of critically unwell sufferers have been older and had greater comorbid illnesses than those with mild to moderate illness [13]. This was consistent with a look at in which 138 individuals with COVID-19 had been protected prospectively, and the researcher concluded that diabetes and comorbidities can be risk elements for terrible results. The severity of COVID-19 become also related to lymphocyte depend, neutrophil count number, and CRP levels, in step with this take a look at.

The D-dimer has been also linked to the severity of the circumstance and the PCT inside the blood upward push while someone has an extreme bacterial, fungal, or systemic inflammatory reaction syndrome, however they do no longer upward thrust whilst someone has an endemic infection [14].

When PCT changed into much <0.04 ng/mL in our examination the PCT attention in severe/crucial patients became significantly more than in the mild/moderate group. It advised that seriously sick humans should have severe infections. Furthermore, we discovered that AST and ALT ranges had been positively linked with the severity of COVID-19 [15]. In community-acquired pneumonia, serum ALP degrees upward push and ALT ranges upward thrust proportionately. Covid 19-spike protein binds to HDL, and HDL receptor-Scavenger receptor elegance B kind I antagonists prevent covid-19 contamination. The lipids switch feature of Scavenger receptor class B kind I changed into required for this inhibition, explaining why people with COVID-19 had decrease serum HDL degrees.

The biochemical check increasing in has been founded to be useful in predicting the shift of COVID-19 from slight to intense infection in retrospective research [16]. regarding 97 people with laboratory-confirmed COVID-19. In our studies, we determined comparable outcomes [17]. Other aberrant signs, such as plasma glucose, TBIL, AST, and ALT, were proven to have sizable variations among the mild/moderate and severe/important agencies on this observe and the infection with COVID -19 has been related to myocardial injury, hepatic damage, and other organ damage, in step with those findings [18].

The affected person of COVID-19 associated brief-time period mortality may be anticipated the use of a simple mortality danger score made from CRP [19]. Too far, no investigation has indicated that plasma glucose, TBIL, AST, or ALT are unbiased danger elements for COVID-19 development [20]. It's workable that these are complicating factors, however that must be proven in addition. These factors should be investigated in addition and brought into consideration while hazard categorization [21]. COVID-19 evolved fast in several significantly ill patients, in line with our findings. As a end result, for individuals who are at excessive danger, near monitoring and set off remedy

may be essential and might help to improve the analysis [22].

CONCLUSION

The development of COVID-19 to important state has to be constantly monitored and may be stopped if the preceding elements are present: age >52 years, C-reactive protein, AST, ALT, ALP, D-dimer, or albumin. There are a few flaws on this have a look at. First, because of the limitations of experimental occasions, a number of demagogic functions then immunological keys can't be observed then compared. Second, this is a have a look at, and the contributors came from unmarried-center instead of several. It does not indicate a motive-and-impact hyperlink.

Conflict of interests: The authors declared no conflicting interests.

Sources of funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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