SJIF Impact Factor: 5.464

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 8.
Issue: 1
Page N. 48-54
Year: 2024

Original Article www.wjahr.com

CHARACTERISTICS OF ADMITTED COVID -19 PATIENTS IN BAGHDAD – A COVID HOSPITAL STUDY

***[1]Zina Talib Nejem, [2]Sama Abdalhameed Abdalmajeed and [3]Nadia Aziz Naser**

[1]Aldora Sector for Primary Health Care, Baghdad, Iraq.
[2]Al-Adel Sector for Primary Health Care, Baghdad, Iraq.
[3]College of Medicine, University of Baghdad/ Family and Community Medicine Department. Baghdad, Iraq.

Article Received date: 08 November 2023 **Article Revised date:** 28 November 2023 **Article Accepted date:** 18 December 2023

***Corresponding Author: Zina Talib Nejem**
Aldora Sector for Primary Health Care, Baghdad, Iraq.

ABSTRACT

Background: Corona virus was the worst health hazard since 1918 H1N1. As of July 2021, there are 193 million cases and 4 million fatalities worldwide, including 1.5 million in Iraq and 18,000 deaths. Due of limited epidemiological data on COVID-19 in Iraq, this study aimed to analyse patient characteristics, severity profile, and outcomes. **Methods:** Descriptive cross sectional study was conducted by reviewing the records of COVID patients that retrieved from the AlKarkh hospital - Baghdad. **Results:** a study of 374 case who were tested PCR positive was studied, the mean age as 54, 69 years and standard deviation ±16.36, males was higher than females (68.9% versus 31.1%) with male to female ration 2.21:1. Comorbidities were reported among 60% and the most common comorbidity was HT 55.2%, DM 53.1, and IHD 10.5%. The most laboratory findings were leukocytosis in Outcome was significantly associated with SPO2 percentage, length of stay, and RCU admission, mortality rate was 19%. **Conclusions:** there is a significant association between age, comorbidities like hypertension and DM, Spo2 and length of stay with the outcome of the disease.

KEYWORDS: Covid-19, comorbidities, outcome.

INTRODUCTION

The COVID-19 pandemic, caused by the coronavirus SARS-CoV-2, began in Wuhan, China in December 2019 and rapidly evolved into a global health crisis. As of July 2021, the virus had resulted in over 196.5 million infections and 4.2 million deaths worldwide, with 3.84 billion vaccine doses administered globally.[1] Iraq emerged as one of the high-burden countries, ranking 23rd with 1,552,648 cases and 18,287 deaths.[2] The country faced a significant challenge during the second wave of the pandemic in 2021. By the 14th week of 2021, Iraq reported 327,172 cases, which was 54.7% of the total cases reported in 2020 and 35.4% of all cases since February 2020.[3] The third wave was attributed to mutations in the virus and the presence of a large susceptible population. The response to the pandemic depended on both pharmaceutical and non-pharmaceutical interventions, including social distancing, quarantine, and the use of face masks.[4] Initially, the virus spread through respiratory droplets from coughs or sneezes. By December 2020, new variants of the virus emerged, leading to increased transmissibility. The World Health Organization categorized these variants into Variants of Concern (VOC) and Variants of Interest (VOI). The Alpha, Beta, Gamma, and Delta variants were classified as VOCs, with the Delta variant exhibiting higher transmissibility than other variants. The Eta, Iota, Kappa, and Lambda variants were listed as VOIs. The basic reproduction number (R0) of SARS-CoV-2 was estimated to be between 2 and 4, higher than that of influenza A.[5] To curb the spread, countries implemented measures like lockdowns, closing schools and workplaces, and restricting international travel. In Iraq, the rise in cases in 2021 led to increased pressure on healthcare facilities, particularly Intensive Care Units (ICUs). This surge limited access to healthcare for people with other medical conditions.[6] Vaccination emerged as a crucial tool in combating the spread of COVID-19. By early 2021, Iraq had administered approximately 1,087,866 vaccine doses, covering about 1.4% of its population, assuming a two-dose regimen per person.[7] Overall, the COVID-19 pandemic has underscored the importance of rapid and coordinated global health responses, including widespread vaccination and adherence to public health

guidelines to control the spread of the virus.[8] Objective: Determine the burden and compile a database of epidemiological data pertaining to COVID-19 among hospitalized patients. Comprehending these data is vital for the effective targeting of healthcare interventions.

METHOD

This study was a retrospective, record-based cross-sectional analysis conducted at Al-Karkh Hospital in Baghdad, Iraq, over five months from February to June 2021. It focused on patients admitted with COVID-19 between May 2020 and December 2020. The study population comprised all COVID-19 patients admitted to Al-Karkh Hospital during the study period. Inclusion criteria were a positive PCR-RT test for COVID-19, hospital admission, a hospital stay exceeding one day, and confirmed COVID-19 diagnosis through clinical, laboratory, and CT scan findings. Patients with short hospital stays, lost to follow-up, or missing records were excluded. A convenience sample of 347 COVID-19 patients was selected based on these criteria. Data collection involved a researcher-administered questionnaire, which gathered information on patients' demographics, social characteristics, clinical comorbidities, hospital stay details, clinical features at admission, laboratory findings, ECG results, CT scan findings, and patient outcomes (survival or death). Patients were admitted based on national criteria for severe COVID-19, which included respiratory distress and specific oxygenation and lung infiltration thresholds. Laboratory tests were conducted at Al-Karkh Hospital, while ECGs and CT scans were primarily performed externally. Normal ranges for laboratory findings were established for various metrics, including white blood cell count, hemoglobin levels, blood sugar, and others. The study adhered to ethical considerations, including approval from the Baghdad Medical College's scientific council and agreements with hospital authorities, while maintaining confidentiality of patient records. Data analysis was conducted using SPSS version 25, with results presented as means, standard deviations, ranges, frequencies, and percentages. The Chi-square test assessed associations between provisional diagnosis and specific information, with the Fisher exact test used for small expected frequencies. Statistical significance was set at a P-value of less than 0.05.

RESULTS

Patients' age ranged from 4 to 88 years with a mean of 54.69, median of 55 years and standard deviation (SD) of ± 16.36 years, and about half of the patients 176 (50.6%) aged > 55 years. Regarding gender, proportion of males was higher than females (68.9% versus 31.1%), with male to female ratio of 2.21:1. In this study, 245 (70.6%) of the recruited patients live in urban areas, 121 (34.9%) had a self-employment (Table 4.1). Comorbidities were reported among 211 patients (60.9%), and the most common comorbidities were HT in 117 (55.2%), DM in 112 (53.1), HD in 22 (10.5%), while other comorbidities as brain tumors, CKD, respiratory diseases, and mental retardation were recorded among 30 (14%) of the patients. As shown in table 1.

Table 1: Distribution of the study patients by certain demographic and baseline characteristics.

Socio-demographic Characteristics	No. (n= 347)	Percentage (%)
Gender		
Male	239	68.9
Female	108	31.1
Residence		
Urban	245	70.6
Rural	102	29.4
Occupation		
Unemployed	86	24.7
Self-employee	121	34.9
Government employee	55	15.7
student	7	2.1
Retired	78	22.6
Comorbidity		
Yes	211	60.9
No	136	39.1
Age groups (years)		
<35	41	11.9
36-55	130	37.5
>55	176	50.6

In this study the most frequent duration of staying in hospital was < 7 days in 167 (48.1%) of cases, about half of the patients 174 (50.2%) had SPO2 saturation of (85% - 95%), while 70 (20%) needed admission to RCU (Table 2).

Table 2: Distribution of the study patients by certain information of COVID- 19.

COVID-19 Information	No. (n= 235)	Percentage (%)
Duration of COVID-19		
< 7	167	51.2
7 - 14	148	12.7
> 14	32	9.4
SPO2		
< 85	140	40.4
85 - 95	174	50.2
> 95	33	9.4
Admission to RCU		
Yes	70	20.0
No	277	80.0

Regarding laboratory findings on admission, the highest proportion of the investigated patients were with elevated levels of WBC (51.7%), ESR (84.6%), blood sugar (80.5%), blood urea (61.8%), D-Dimer (69.9%), serum ferritin (85.9%), and LDH (95.5%), while 72.7% had low level of Hemoglobin, and 59.3% had normal LFT. Concerning radiological findings, ECG was done for 123 patients, and abnormal findings were recorded among 92 (74.8%). CT scan was done for 30 patients, and about three quarters of them (76.6%) were with (Ground Glass Appearance) GGA (Table 3).

Table 3: Distribution of the study patients by laboratory and radiological findings.

Laboratory & Radiological Findings	No. (n= 347)	Percentage (%)
WBC	**n= 342**	
Normal	153	44.8
High	177	51.7
Low	12	3.5
HGB	**n= 342**	
Normal	249	72.7
High	19	5.6
Low	74	21.7
ESR	**n= 154**	
Normal	24	15.4
High	130	84.6
Blood Sugar	**n= 281**	
Normal	52	18.4
High	226	80.5
Low	3	1.1
Blood Urea	**n= 282**	
Normal	108	38.2
High	174	61.8
LFT	**n= 214**	
Normal	127	59.3
High	87	40.7
D-Dimer	**n= 123**	
Normal	34	27.7
High	86	69.9
Low	3	2.4
S. Ferritin	**n= 105**	
Normal	15	14.1
High	90	85.9
LDH		**n= 65**
High	62	95.5
Low	3	4.5
Normal	46	25.2
Abnormal	136	74.8
CT		**n= 44**

Normal	4	10.0
GGA	34	76.6
Other Abnormalities	6	13.4

Of the 347 patients included in the study, 66 died during hospitalization and the other 281 were discharged, with mortality rate of 19% (Figure 1).

Figure 1: Distribution of the study patients according to mortality rate of COVID-19

The distribution of the study patients by outcomes of COVID-19 infection and certain demographic and baseline characteristics showed that there was a statistically significant association between in-hospital death and each of age and comorbidity. Patients aged > 55 years and those who had chronic diseases were with a significant high risk of death (25.6%, P= 0.006) and (22.7%, P= 0.027), respectively (Table 4).

Table 4: Distribution of the study patients by outcomes of COVID-19 and certain demographic and baseline characteristics.

Demographic and Baseline Characteristics	Outcome		Total (%) n= 347	P - Value
	Died (%) n= 66	Survived (%) n= 281		
Age (Years)				
< 35	4 (9.8)	37 (90.2)	41 (11.8)	**0.006**
35 - 55	17 (13.1)	113 (86.9)	130 (37.5)	
> 55	45 (25.6)	131 (74.4)	176 (50.7)	
Gender				
Male	49 (20.5)	190 (79.5)	239 (68.9)	**0.295**
Female	17 (15.7)	91 (84.3)	108 (31.1)	
Residence				
Urban	53 (21.6)	192 (78.4)	245 (70.6)	**0.054**
Rural	13 (12.7)	89 (87.3)	102 (29.4)	
Occupation				
Unemployed	22 (25.6)	64 (74.4)	86 (24.8)	**0.112**
Employed	34 (19.3)	142 (80.7)	176 (50.7)	
Student	0 (0)	7 (100.0)	7 (2)	
Retired	10 (12.8)	68 (87.2)	78 (100)	
Comorbidity				
Yes	48 (22.7)	163 (77.3)	211 (60.8)	**0.027**
No	18 (13.2)	118 (86.8)	136 (39.2)	

The study shows that SPO2 saturation, duration of in-hospitalization, and admission to RCU were significantly associated (P < 0.05) with in-hospital death. The patients who had SPO2 of < 85%, duration of disease > 14 days, and those who needed admission to the RCU had a significant high risk of in- hospital death (Table 5).

Table 5: Distribution of the study patients by outcomes of COVID-19 and certain clinical characteristics.

Clinical Characteristics	Outcome		Total (%) n= 347	P - Value
	Died (%) n= 66	Survived (%) n= 281		
In-hospitalization (Days)				
< 7	28 (16.8)	139 (83.2)	167 (48.1)	**0.009**
7 - 14	24 (16.2)	124 (83.8)	148 (42.7)	
> 14	14 (43.8)	18 (56.3)	32 (9.2)	
SPO2				
< 85	39 (27.9)	101 (72.1)	140 (40.3)	**0.002**
85 - 95	22 (12.6)	152 (87.4)	174 (50.1)	
> 95	5 (15.2)	28 (84.8)	33 (9.5)	
Admission to RCU				
Yes	45 (64.3)	25 (35.7)	70 (20.2)	**0.001**
No	21 (7.6)	256 (92.4)	277 (79.8)	

In the current study, there was a significant association between outcomes of COVID-19 and levels of WBC, blood sugar, blood urea, D-Dimer, serum ferritin, and LDH. The proportion of death was significantly higher among the patients with high levels of WBC (24.3%, P= 0.002), blood sugar (23%, P= 0.012), blood urea (22.4%, P= 0.014), D- Dimer (33.7%, P= 0.028), serum ferritin (32.2%, P= 0.042), and LDH (69.4%, P= 0.013). Other laboratory parameters showed no significant association with outcomes of COVID-19. A significant association was found between outcomes of COVID-19 and CT findings. The proportion of death was significantly higher among the patients with abnormal findings of CT scan (57.5%, P= 0.028) (Table 6).

Table 6: Distribution of the study patients by outcomes of COVID-19 and laboratory and radiological findings.

Laboratory & Radiological Findings	Outcome		Total (%) n= 347	P - Value
	Died (%) n= 66	Survived (%) n= 281		
Normal	19 (12.4)	134 (87.6)	153 (44.7)	**0.002**
High	43 (24.3)	134 (75.7)	177 (51.8)	
Low	1 (8.3)	11 (91.7)	12 (3.5)	
HGB				
Normal	45 (18.1)	204 (81.9)	249 (72.8)	**0.293**
High	6 (31.6)	13 (68.4)	19 (5.6)	
Low	12 (16.2)	62 (83.8)	74 (21.6)	
ESR				
Normal	10 (41.7)	14 (58.3)	24 (15.6)	**0.069**
High	31 (23.8)	99 (76.2)	130 (84.4)	
Blood Sugar				
Normal	3 (5.8)	49 (94.2)	52 (18.5)	**0.012**
High	52 (23.0)	174 (77.0)	226 (80.4)	
Low	0 (0)	3 (100.0)	3 (1.1)	
Blood Urea				
Normal	9 (8.3)	99 (91.7)	108 (38.3)	**0.022**
High	39 (22.4)	135 (77.6)	174 (61.7)	
LFT				
Normal	35 (27.6)	92 (72.4)	127 (59.3)	**0.581**
High	27 (31)	60 (69)	87 (40.7)	
D-Dimer				
Normal	4 (11.8)	30 (88.2)	34 (27.6)	**0.028**
High	29 (33.7)	57 (66.3)	86 (69.9)	
Low	0 (0)	3 (100.0)	3 (2.4)	
Serum Ferritin				
Normal	1 (6.7)	14 (93.3)	15 (14.3)	**0.042**
High	29 (32.2)	61 (67.8)	90 (85.7)	
LDH				
High	43 (69.4)	19 (30.6)	62 (95.4)	**0.013**
Low	0 (0)	3 (100.0)	3 (4.6)	
ECG				
Normal	11 (23.9)	35 (76.1)	46 (25.3)	**0.713**
Abnormal	29 (21.3)	107 (78.7)	136 (74.7)	
CT				
Normal	0 (0)	4 (100.0)	4 (9.1)	**0.028**
Abnormal	23 (57.5)	17 (42.5)	40 (90.9)	

DISCUSSION

The study analyzed various aspects of COVID-19 patient outcomes, noting a 19% hospital mortality rate. This rate was higher than the 13.5% observed by Abbas et al.[9] in Iraq but lower than the 27.78% reported by Mohammed et al.[10] Variations could be due to different study periods, infection rates, hospital admission rates, and healthcare infrastructures.[1] Patients' average age was 54.69 years, aligning with Al-Wafi et al.,[11] indicating a prevalence among the elderly. However, Monod et al.[12] found a shift in transmission to younger groups in the USA. Elderly patients were found to have a higher mortality risk (p=0.006), a finding echoed by Al Hijaj et al.[13] The study observed a majority of male patients, similar to Marik et al.[14], but found no significant gender difference in mortality. Urban residents were more affected than rural, possibly due to denser populations in

cities, as noted by Huang et al.[15] Self-employed individuals were the most affected occupation group, reflecting findings by Kuwahara et al.[16]

More than half of the patients had comorbidities like hypertension and diabetes, impacting incidence and mortality of COVID-19, as supported by Sanyaolu et al.[17] and Cho et al.[18] Albadawy et al.[19] also found that comorbidities led to severe symptoms and complications. Regarding hospitalization, about half of the patients had stays under seven days. Longer stays were associated with higher mortality (p=0.009), as seen in studies by Jang et al.[20] and Rieg et al.[21] Low SPO2 levels were significantly linked to higher mortality (p=0.002), a finding supported by Mejía et al.[22] Admission to respiratory care units was also associated with higher mortality (p=0.001), consistent with Ouyang et al.[23] Common symptoms included dyspnea, fever, cough, and sore throat, similar to findings by Abbas et al.[9] Elevated white blood cell count, high blood sugar, blood urea, D-dimer, serum ferritin, and LDH levels were significantly associated with mortality ($p<0.05$), in line with studies by Selim,[24] Carrasco-Sánchez et al.,[25] Cheng et al.,[26] Lino et al.,[27] and Bartziokas and Kostikas.[28] Abnormal CT scans were common and significantly linked to higher mortality (p=0.02), as reported by Li et al.[29] and Al-Ghazali et al.[30] recommended CT scans for all COVID-19 patients for better diagnosis and severity assessment.

CONCLUSION

Elderly age, male gender, urban location, self-employment, and clinical co-morbidity define COVID-19. Dyspnea, fever, cough, and sore throat are common COVID-19 hospital symptoms. Hospitalised COVID-19 patients had inadequate blood oxygenation, high blood urea, D-dimer, and abnormal computerised tomography. This hospital has a significant COVID-19 fatality rate. Elderly age, clinical co-morbidity, long hospital stay, low blood oxygenation, RCU admission, high WBC count, blood sugar, blood urea, D-dimer, serum ferritin, LDH, and abnormal CT scan changes are common COVID-19 mortality predictors.

REFERENCES

1. Hu B, Guo H, Zhou P, Shi ZL. Characteristics of SARS-CoV-2 and COVID-19. Nat Rev Microbiol, 2021 Mar; 19(3): 141-154. doi: 10.1038/s41579-020-00459-7. Epub 2020 Oct 6. Erratum in: Nat Rev Microbiol, 2022 May; 20(5): 315. PMID: 33024307; PMCID: PMC7537588.
2. Chen Y, Li L. SARS-CoV-2: virus dynamics and host response. Lancet Infect Dis., 2020; 20(5): 515-516.
3. Na W, Moon H, Song D. A comprehensive review of SARS-CoV-2 genetic mutations and lessons from animal coronavirus recombination in one health perspective. J Microbiol, 2021 Mar; 59(3): 332-340. doi: 10.1007/s12275-021-0660-4. Epub, 2021 Feb 23. PMID: 33624270; PMCID: PMC7901680.
4. Tabibzadeh A, Esghaei M, Soltani S, Yousefi P, Taherizadeh M, Safarnezhad Tameshkel F, Golahdooz M, Panahi M, Ajdarkosh H, Zamani F, Karbalaie Niya MH. Evolutionary study of COVID-19, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as an emerging coronavirus: Phylogenetic analysis and literature review. Vet Med Sci., 2021 Mar; 7(2): 559-571. doi: 10.1002/vms3.394. Epub 2020 Nov 18. PMID: 33210477; PMCID: PMC7753621.
5. Obajuluwa AO, Okiki PA, Obajuluwa TM, Afolabi OB. In-silico nucleotide and protein analyses of S-gene region in selected zoonotic coronaviruses reveal conserved domains and evolutionary emergence with trajectory course of viral entry from SARS-CoV-2 genomic data. Pan Afr Med J., 2020 Nov 30; 37: 285. doi: 10.11604/pamj.2020. 37.285. 24663. PMID: 33654512; PMCID: PMC7896521.
6. Fung TS, Liu DX. Similarities and Dissimilarities of COVID-19 and Other Coronavirus Diseases. Annu Rev Microbiol, 2021 Oct 8; 75: 19-47. doi: 10.1146/annurev-micro-110520-023212. Epub 2021 Jan 25. PMID: 33492978.
7. Rahman B, Sadraddin E, Porreca A. The basic reproduction number of SARS-CoV-2 in Wuhan is about to die out, how about the rest of the World? Rev Med Virol, 2020 Jul; 30(4): e2111. doi: 10.1002/rmv.2111. Epub 2020 May 19. PMID: 32431085; PMCID: PMC7267092.
8. Karia R, Gupta I, Khandait H, Yadav A, Yadav A. COVID-19 and its Modes of Transmission. SN Compr Clin Med, 2020; 2(10): 1798-1801. doi: 10.1007/s42399-020-00498-4. Epub, 2020 Sep 1. PMID: 32904860; PMCID: PMC7461745.
9. Abbas HM, Al-Jumaili AA, Nassir KF, Al-Obaidy MW, Al Jubouri AM, Dakhil BD, et al. Assessment of COVID-19 Treatment containing both Hydroxychloroquine and Azithromycin: A natural clinical trial. Int J Clin Pract, 2021; 75(4): e13856.
10. Mohammed SAK, Ahmed SH, Al- Saadawi AIO, Mohammed MM. An Observational Study of Coronavirus (Covid-19) In Iraqi Patients at Al-Shifa Medical Center In Baghdad's Capital, Al-Rusafa. Sys Rev Pharm, 2020; 11(11): 404-411.
11. Alwafi H, Naser AY, Qanash S, Brinji AS, Ghazawi MA, Alotaibi B, et al. Predictors of Length of Hospital Stay, Mortality, and Outcomes Among Hospitalised COVID-19 Patients in Saudi Arabia: A CrossSectional Study. J Multidiscip Healthc, 2021; 14: 839-852.
12. Monod M, Blenkinsop A, Xi X, Hebert D, Bershan S, Tietze S, et al; Imperial College COVID-19 Response Team. Age groups that sustain resurging COVID-19 epidemics in the United States. Science, 2021; 371(6536): eabe8372.
13. Al Hijaj BAA, Al-Rubaye AK, Al-Hashim ZT, Mohammed MA, Habib OS. A Study on 696 COVID-19 Cases in Basrah-Southern Iraq: Severity and Outcome Indicators. Iraqi National journal of

Medicine, 2020; 2(3): 19-26.
14. Marik PE, DePerrior SE, Ahmad Q, Dodani S. Gender-based disparities in COVID-19 patient outcomes. J Investig Med, 2021: jim2020-001641.
15. Huang Q, Jackson S, Derakhshan S, Lee L, Pham E, Jackson A, et al. Urban-rural differences in COVID-19 exposures and outcomes in the South: A preliminary analysis of South Carolina. PLoS ONE, 2021; 16(2): e0246548.
16. Kuwahara K, Hori A, Ohmagari N, Mizoue T. Early cases of COVID19 in Tokyo and occupational health. Glob Health Med, 2020; 2(2): 118-122.
17. Sanyaolu A, Okorie C, Marinkovic A, Patidar R, Younis K, Desai P, et al. Comorbidity and its Impact on Patients with COVID-19. SN Compr Clin Med, 2020; 1-8.
18. Cho SI, Yoon S, Lee HJ. Impact of comorbidity burden on mortality in patients with COVID-19 using the Korean health insurance database. Sci Rep, 2021; 11(1): 6375.
19. Albadawy RM, Jadoon BA, Mogahed MM, Ibrahim ME, Essawy TS, Amin AMA, et al. The Impact of Comorbidities on the Outcomes of Egyptian COVID-19 Patients: A Follow-Up Study. J Environ Public Health, 2021; 2021: 6662476.
20. Jang SY, Seon JY, Yoon SJ, Park SY, Lee SH, Oh IH. Comorbidities and Factors Determining Medical Expenses and Length of Stay for Admitted COVID-19 Patients in Korea. Risk Manag Healthc Policy, 2021; 14: 2021-2033.
21. Rieg S, von Cube M, Kalbhenn J, Utzolino S, Pernice K, Bechet L, et al; COVID UKF Study Group. COVID-19 in-hospital mortality and mode of death in a dynamic and non-restricted tertiary care model in Germany. PLoS One, 2020; 15(11): e0242127.
22. Mejía F, Medina C, Cornejo E, Morello E, Vásquez S, Alave J, et al. Oxygen saturation as a predictor of mortality in hospitalized adult patients with COVID-19 in a public hospital in Lima, Peru. PLoS One, 2020; 15(12): e0244171.
23. Ouyang L, Yu M, Zhu Y, Gong J. Respiratory supports of COVID-19 patients in intensive care unit: A systematic review. Heliyon, 2021; 7(4): e06813.
24. Selim S. Leukocyte count in COVID-19: an important consideration. The Egyptian Journal of Bronchology, 2020; 14(1).
25. Carrasco-Sánchez FJ, López-Carmona MD, Martínez-Marcos FJ, Pérez-Belmonte LM, Hidalgo-Jiménez A, Buonaiuto V, et al; SEMICOVID-19 Network. Admission hyperglycaemia as a predictor of mortality in patients hospitalized with COVID-19 regardless of diabetes status: data from the Spanish SEMI-COVID-19 Registry. Ann Med, 2021; 53(1): 103-116.
26. Cheng A, Hu L, Wang Y, Huang L, Zhao L, Zhang Cet al. Diagnostic performance of initial blood urea nitrogen combined with D-dimer levels for predicting in-hospital mortality in COVID-19 patients. Int J Antimicrob Agents, 2020; 56(3): 106110.
27. Lino K, Guimarães GMC, Alves LS, Oliveira AC, Faustino R, Fernandes CS, et al. Serum ferritin at admission in hospitalized COVID-19 patients as a predictor of mortality. Braz J Infect Dis, 2021; 25(2): 101569.
28. Bartziokas K, Kostikas K. Lactate dehydrogenase, COVID-19 and mortality. Med Clin (Barc), 2021; 156(1): 37.
29. Li X, Zeng W, Li X, Chen H, Shi L, Li X, et al. CT imaging changes of corona virus disease 2019(COVID-19): a multi-center study in Southwest China. J Transl Med, 2020; 18(1): 154.
30. Alghazali DM, Maamera MA, ALmutairy TM, AlKabbi MS, Talal NO, Alkazraji HF, et al. Chest CT findings of COVID-19 Patients in Kerbala, Iraq. Annals of Tropical Medicine & Public Health, 2021; 24(2): 1-12.