RESEARCH PAPER

The Extra-Pulmonary Manifestations and Complications of COVID-19: An Observational Study from Basrah - Southern Iraq

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Abstract

Background: The coronavirus was first recognised in December 2019 in Wuhan, China as an outbreak of an unidentified health storm. Although the main presenting complaints are respiratory complaints, many patients are presented with multisystem and extrapulmonary manifestations.

Objective: This study aims to assess the extrapulmonary manifestations of COVID-19.

Methods: A cross-sectional observation study was conducted in Basrah teaching hospital, which is a specialised and tertiary centre for COVID-19 management, for a 5-month duration and involving 507 patients with confirmed COVID-19 infection.

Results and Conclusions: The extrapulmonary manifestation was reported in 347 patients (68%), and the clinical manifestations analysis of the enrolled patients showed that most of the neurological manifestations were headaches. Myocardial infarction is the most common cardiovascular manifestation. Moreover, gastrointestinal manifestations showed that nausea and vomiting, followed by abdominal pain and diarrhea, are frequently reported symptoms. Additionally, stroke, new atrial fibrillation, conjunctivitis, macular skin rash, urticaria, acute kidney injury, fatigue, joint pain, deep venous thrombosis, diabetic ketoacidosis, and hyperglycemia were observed also at lower percentages.

Keywords: COVID-19, Extra-pulmonary, non-respiratory, Basrah, Iraq

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Introduction

The coronavirus was first recognised in December 2019 in Wuhan, China as an outbreak of an unidentified health storm.[1] The virus is an RNA virus, which genetically belongs to the SARS virus group identified as (SARS-CoV-2). The WHO declared these cases of severe pneumonia as a pandemic disease that happened in Wuhan.[2] During infection, the SARS-CoV-2 enters into host cells by binding the spike protein (protein S) expressed in the viral envelope with the membrane-bound angiotensin - converting enzyme II (ACE II), the virus receptor present in lung cells. This binding promotes the endocytosis of the SARS-CoV-2 and ACE2 complex, resulting in the viral entry into the cell.[1] The ACE II receptors are highly expressed in the respiratory epithelium, renal parenchyma, gastrointestinal (GI) epithelium, liver tissue, vascular endothelial cells, and arterial smooth muscle cells.[3] Therefore, all of these organs and systems with high expression of ACE II receptors might be targets for SARSCoV2 infection. [4] Clinical issues related to COVID-19 were a concern due to the broad range of clinical features, especially recently. Initially, this triad of fever, cough, and dyspnoea identified the disease. Later on, the Center for Disease Control and Prevention (CDC) added chills, muscle pain, headache,

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sore throat, and loss of taste or smell to this list (neurological indications).[5] Later on, with an increased number of infected individuals, other symptoms began to appear more universally.[6] Furthermore, the following manifestations were listed from the most common to the least common among studied patients: fever, cough, dyspnoea, malaise, fatigue, and sputum/secretion. Neurological symptoms, dermatological manifestations, anorexia, myalgia, sneezing, sore throat, rhinitis, goosebumps, headache, chest pain, and diarrhoea.[7] Multiple neurological manifestations of COVID-19 have been discussed, including headaches, dizziness, anosmia, ageusia, anorexia, myalgia, fatigue, stroke, encephalopathy, encephalitis, Guillain-Barré syndrome, and acute hemorrhagic necrotizing encephalopathy.[8,9] Ocular manifestations, such as conjunctival congestion alone, conjunctivitis, and retinal changes were also reported. [10] Regarding the local evidence of neurological manifestations in Basrah, it is reported that 60.7% of the patients involved in the study were documented to have neurological manifestations.[11] Also, there is some evidence of an increasing incidence of GBS during the COVID-19 pandemic, and this is reported in a survey of the local literature. [12] Regarding the cardiovascular manifestations, COVID-19 can cause both direct and indirect cardiovascular sequelae, including myocardial injury, acute coronary syndromes (ACS), cardiomyopathy, acute heart failure, arrhythmias, and cardiogenic shock, as well as thrombotic complications. In addition, the greater frequency and magnitude of troponin elevations in hospitalised patients has been associated with more severe disease and worse outcomes.[13,14] SARS-CoV-2 may probably cause acute gastritis and enteritis, leading to vomiting, nausea, and diarrhea. Some of the COVID-19 cases may display digestive symptoms without any respiratory symptoms or fever.[15] From the available literature evidence, abdominal pain, anorexia, mesenteric ischemia, and gastrointestinal bleeding with laboratory markers (elevated hepatic transaminases, elevated bilirubin, and low serum albumin) are the commonest gastrointestinal manifestations.[16] Even though dermatological manifestations were rare and had no correlation with disease severity, several cutaneous manifestations were observed, such as erythematous rash, urticaria, chickenpox-like vesicles, maculopapular rash, vesicular lesions, livedoid and/or necrotic lesions, exanthematous rashes, and petechia.[17] The renal manifestations of COVID-19 can vary and can include acute kidney injury, electrolyte abnormalities such as hyperkalemia, hyponatremia, and hypernatremia, in addition to proteinuria, hematuria, metabolic acidosis, and clotting of extracorporeal circuits.[18] In addition, musculoskeletal symptoms such as fatigue, myalgia, and arthralgia are commonly reported symptoms during the COVID-19 pandemic.[19] In spite of the stress-related hyperglycemia that is associated with any major illness, it was reported that patients with COVID-19 infection who had never received glucocorticoids had significantly higher fasting plasma glucose levels as compared to patients with non-COVID-19 pneumonia and ketoacidosis, including that in patients with previously undiagnosed diabetes or no diabetes.[20] Awareness of these symptoms can help doctors make the correct initial suspected diagnosis of COVID-19, facilitating the adoption of necessary measures for early clinical management as well as procedures that reduce the spread of the virus, such as social isolation and / or quarantine. This study was conducted to demonstrate and explore some of the extra-pulmonary manifestations of the coronavirus infection in Basrah, southern Iraq.

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Methods

A descriptive, observational, cross-sectional study took place in a single centre in the Basrah governorate in the south of Iraq (Basrah teaching hospital, which specialises in the treatment of COVID-19 patients) for a period of 5 months from May 1st, 2021, to October 1st, 2021. The study covers 507 hospitalised patients who have been diagnosed with COVID 19 on clinical, radiological, and laboratory markers according to the European CDC criteria[20] and were selected randomly during the study duration.

The information was gathered through direct interviews and examinations of patients who attend the COVID-19 specialised emergency unit, and then plotted on a standardised questionnaire. The variables used in the study include:

- The age is categorised into three groups: less than 40, 40–60, and above 60 years.
- The sex (male and female)
- The comorbidities include "diabetes mellitus, hypertension, cerebrovascular disease, ischemic heart diseases, heart failure, atrial fibrillation, chronic kidney disease, bronchial asthma, or chronic obstructive pulmonary disease, hemoglobinopathies, malignancy, and immunocompromised patients" and are plotted as absent if the patient has no comorbidities or present if the patient has any.
- The COVID-19 severity, which is categorised into mild, moderate, and severe to critical according to the NICE guideline's classification of severity (NICE 2021), as follows

1. ***Mild group:*** a patient with only respiratory symptoms.
2. ***Moderate group:*** a patient with respiratory symptoms, a positive chest CT showing less than 50% lung involvement, a normal respiratory rate, and an oxygen saturation of more than 94%.
3. ***Severe group:*** a patient who has respiratory distress as measured by tachypnea (respiratory rate greater than 30 cycles per minute) or oxygen saturation of less than 94%, or who has a chest CT with more than 50% lung involvement. Patients in this group are usually hospitalized. Also, the critical group includes patients with a history of respiratory failure, cytokine storm, or release syndrome (the body's hyper-inflammatory immune response manifested by severe respiratory distress and suggestive laboratory features such as elevated serum ferritin and interlekin-6 levels)[23]

The extrapulmonary manifestations are sub classed systemically into:

1. Neurological manifestations and/or complications
2. Ocular manifestation and / or complications
3. Cardiovascular manifestations and/or complications
4. Gastrointestinal manifestations and/or complications
5. Renal manifestation and/or complications
6. Musculoskeletal manifestations and/or complications
7. Endocrine manifestation and/or complications
8. Dermatological manifestations and/or complications

The training and human development centre in the Basrah health directorate gave its ethical and scientific permission for study performance as well as that of the ethical approval committee at the college of medicine at the University of Basrah. Additionally, all study participants gave their verbal consent for study participation. The computerised SPSS (statistical package for social science) version 26 programme has been used to analyse the results of the study. The qualitative data will be tabulated as percentages and tested using the

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Chi-square or Fisher exact tests. Additionally, a P value of less than 0.05 was considered statistically significant.

Results

From the total number of patients enrolled in the study, which is equal to 507 confirmed COVID-19 cases, 347 (68.44%) patients were detected to have extrapulmonary manifestations or complications. The classification of COVID-19 manifestation is reported in pie chart below (Figure 1).

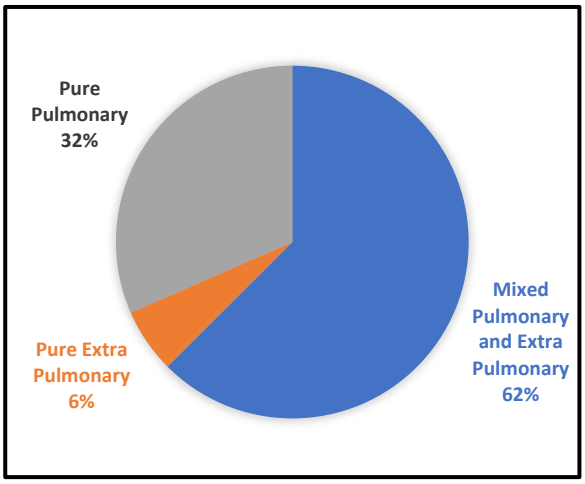

Fig 1. Pie chart shows the classification of COVID-19 manifestation

The demographic and clinical characteristics of the 347 COVID-19 patients who have extrapulmonary manifestations are reported in table-1, which shows an age distribution of less than 40 years (23.9%), 40 to 60 years (44.4%), and more than 60 years (31.7%). The majority of the study population (180) (51.9%) were males, while 167 patients (48.1%) were females. Of the included patients, 169 (48.7%) had a history of chronic diseases. Regarding the COVID-19 severity classification, mild severity contributed to 160 cases (46.1%), while 108 patients (31.1%) had moderate severity, and about 79 patients (22.8%) had a severe type.

Table 1. The demographics and clinical characteristics of the patients

Variables		Frequency (No. 347)	Percentages (100%)
Age / years	Less than 40	83	23.9
	From 40 to 60	154	44.4
	More than 60	110	31.7
Gender	Male	180	51.9
	Female	167	48.1
Chronic diseases	Present	169	48.7
	Absent	178	51.3
COVID-19 Severity	Mild	160	46.1
	Moderate	108	31.1
	Severe to critical	79	22.8 %

The systemic distribution of the extrapulmonary manifestations is demonstrated in figure-2, which shows the predominate systemic features are related to the gastrointestinal tract most commonly (54.17%), followed by musculoskeletal manifestations (31.7%) and nervous system-related features (30.45%).

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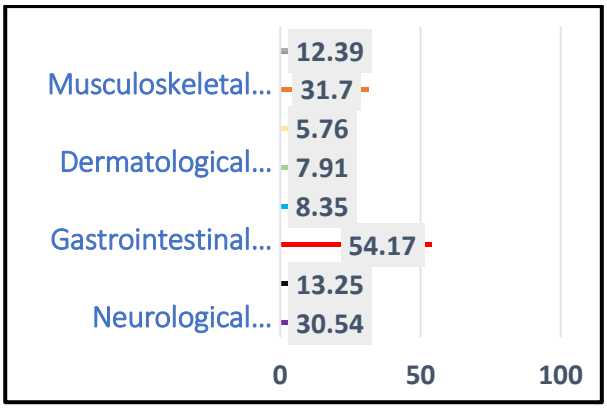

Fig 2. Bar chart shows the systemic distribution of the manifestations

The most commonly reported extrapulmonary manifestations were nausea and vomiting, followed by fatigue and headache. The details of systematic distribution of these symptoms are shown in table 2, which shows that most of the neurological manifestations were headaches, which represented 23.9% of the total, followed by stroke (5.1%), while epilepsy and Guillain-Barré syndrome were observed in only 0.6% and 0.9% of the total, respectively. Furthermore, cardiovascular manifestations were recorded in 6.6% of the patients who presented with myocardial infarction, while 3.2% were observed with atrial fibrillation. In turn, ischemic limbs were observed in only 2.3%, and deep venous thrombosis was detected in 1.1%. Moreover, gastro-intestinal manifestations showed that nausea and vomiting were the most common presented symptoms that had been seen (29.9%), followed by: diarrhoea (25.5%), abdominal pain (23.6%), anorexia (15.3%), disturbed liver function (13.0%) and gastro-intestinal bleeding (2.0%). Consequently, conjunctivitis, macular rash, urticaria, acute kidney injury, fatigue, joint pain, diabetic keto-acidosis, and hyperglycaemia were observed in (8.4%, (2.9%), (4.0%), (5.8%), (28.0%), (11.2%), (1.1%), (4.3%), and (8.1%), respectively.

Table 2. The extra-pulmonary manifestations of the patients

Variables		Frequency (No. 347)	Percentages (100%)
Neurological manifestations	Stroke	18	5.1
	Epilepsy	2	0.6
	Headache	83	23.9
	Guillain-Barré syndrome	3	0.9
Cardiovascular manifestations	Myocardial infarction	23	6.6
	Atrial fibrillation	11	3.2
	Ischemic limb	8	2.3
	Deep venous thrombosis	4	1.1
Gastrointestinal manifestations	Nausea and vomiting	104	29.97
	Abdominal pain	82	23.6
	Diarrhea	88	25.5
	Gastrointestinal bleeding	7	2.0
	Anorexia	53	15.3
	Disturbed liver function	45	13.0
Ocular manifestations	Conjunctivitis	29	8.4
Dermatological manifestations	Rash	10	2.9
	Urticaria	14	4.0
Renal manifestations	Acute kidney injury	20	5.8
Musculoskeletal manifestations	Fatigue	97	28.0
	Joint pain	39	11.2
Endocrine manifestations	Diabetic ketoacidosis	15	4.3
	Hyperglycemia	28	8.1

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Most of the patients who complained of stroke, headache, and Guillain-Barré syndrome were males, while epilepsy was reported only among females. However, neither of these was statistically significant (P-value > 0.05). Regarding the cardiovascular manifestations, myocardial infarction and deep venous thrombosis of the leg were roughly equally distributed between the two genders, while atrial fibrillation and ischemic limbs were mostly reported among females, but none of these differences showed a statistically significant difference except for ischemic limbs, which showed significant gender deference (P-value 0.003).Similar variable figures are shown for those with gastrointestinal manifestations; nausea, vomiting, and diarrhea were mainly observed among males, while abdominal pain, gastrointestinal bleeding, anorexia, and disturbed liver function were mainly reported among females. Again, no significant statistical difference was observed for gender distribution (P value > 0.05). Patients who presented with conjunctivitis, acute kidney injury, and fatigue were mostly males compared to those with urticaria, rash, joint pain, diabetic ketoacidosis, and hyperglycemia, who were predominantly females. Also, these recorded non-significant P-values except for urticaria, which is significantly higher among females (P value 0.022) (Table -3).

Table 3. The relationship between the extrapulmonary manifestations and gender

Variables		Male (No.178) (%)	Female (No.169) (%)	P value
Neurological manifestations	Stroke	10 (5.6)	8 (4.8)	0.524
	Epilepsy	0 (0.0)	2 (1.2)	0.236
	Headache	45 25.3)	38 (22.5)	0.542
	Guillain-Barré syndrome	2 (1.1)	1 (0.6)	0.09
Cardiovascular manifestations	Myocardial infarction	11 (6.2)	12 (7.1)	0.73
	Atrial fibrillation	4 (2.2%)	7 (4.1)	0.314
	Ischemic limb	0 (0.0)	8 (4.7)	0.003
	Deep venous thrombosis	2 (1.1)	2 (1.2)	0.745
Gastrointestinal manifestations	Nausea and vomiting	54 (30.33)	50 (29.6)	0.774
	Abdominal pain	40 (22.47)	42 (24.8)	0.61
	Diarrhea	48 (27.0)	40 (23.7)	0.45
	Gastrointestinal bleeding	2 (1.1)	5 (3.0)	0.273
	Anorexia	23 (12.9)	30 (17.8)	0.211
	Disturbed liver function	20 (11.2)	25 (14.8)	0.20
Ocular manifestations	Conjunctivitis	15 (8.4)	14 (8.3)	0.96
Dermatological manifestations	Rash	5 (2.8)	5 (3.0)	0.92
	Urticaria	3 (1.7)	11 (6.5)	0.022
Renal manifestations	Acute kidney injury	14 (7.9)	6 (3.6)	0.08
Musculoskeletal manifestations	Fatigue	51 (28.7)	46 (27.2)	0.766
	Joint pain	17 (9.6)	22 (13.0)	0.307
Endocrine manifestations	Diabetic keto-acidosis	6 (3.4)	9 (5.3)	0.435
	Hyperglycemia	14 (7.9)	14 (8.4)	0.95

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Regarding the relationship between age and extrapulmonary symptoms, table-4 shows that of the total number of patients with strokes, eight cases (5.2%) were between the ages of 40-60 and 10 cases (9.1%) were more than 60 years old, while no cases were reported among those less than 40 years old. This was statistically significant (P value of 0.035). Moreover, this study recorded 2 cases of epilepsy, one of them less than 40 years old and the other between 40 and 60 years old. Patients who presented with headaches were mostly (27.0%) between the ages of less than 40 and 40-60, with only 16.4% older than 60. Three cases of Guillain-Barre syndrome among those who are less than 40 years old. Except for deep venous thrombosis, which primarily affects those between the ages of 40 and 60, those with cardio-vascular manifestations such as myocardial infarction, atrial fibrillation, and ischemic limb were mostly among those over the age of 60, and to a lesser extent among those between the ages of 40 and 60. these findings have non-significant difference values except for that of atrial fibrillation (P value 0.001), which was significantly higher among the elderly age group, and deep venous thrombosis is also significantly higher among the middle age group. Concerning the gastrointestinal manifestations, including nausea and vomiting, abdominal pain, and diarrhea, they show a predominant distribution among those less than 40 years old, while those with gastro-intestinal bleeding and disturbed liver function mostly occur among those between 40 and 60 years old. Anorexia was present among those with an age group of over 60 years old. Of all the gastrointestinal manifestations, disturbed liver function and anorexia were recorded as significant differences (P value less than 0.05). Consequently, and for the other manifestations, conjunctivitis, rash, urticarial, and hyperglycemia were observed more frequently among those aged 40-60 years old. Furthermore, fatigue, joint pain, and diabetic ketoacidosis were commonly observed among those aged less than 40 years old. Meanwhile, acute kidney injury was seen more often among those aged over 60 years old. Diabetic ketoacidosis is the only manifestation in which there are recorded significant difference values (P value less than 0.05).

Table 4. The relationship between the extrapulmonary manifestations and age

Variables		< 40 Yrs. (82) No. (%)	40-60 Yrs. (154) No. (%)	> 60 Yrs. (111) No. (%)	P-value
Neurological Manifestations	Stroke	0 (0.0)	8 (5.2)	10 (9.1)	0.035
	Epilepsy	1 (1.2)	1 (0.6)	0 (0.0)	0.782
	Headache	23 (27.7)	42 (27.3)	18(16.4)	0.125
	Guillain-Barrésyndrome	3 (3.6)	0 (0.0)	0 (0.0)	0.098
Cardiovascular manifestations	Myocardial infarction	6 (7.2)	8 (5.2)	9 (8.2)	0.45
	Atrial fibrillation	1 (1.2)	2 (1.3)	8 (7.3)	0.001
	Ischemic limb	1 (1.2)	3 (1.9)	4 (3.6)	0.125
	Deep venous thrombosis	1 (1.2)	3 (1.9)	0 (0.0)	0.027
Gastrointestinal manifestations	Nausea and vomiting	28 (33.6)	40(25.97)	36(32.7)	0.177
	Abdominal pain	25 (30.1)	35(22.7)	22(20.0)	0.308
	Diarrhea	27 (32.5)	34(22.1)	27(24.5)	0.497
	Gastrointestinal bleeding	1 (1.2)	4 (2.6)	2 (1.8)	0.333
	Anorexia	14 (16.9)	16(10.4)	23(20.9)	0.043
	Disturbed liver function	3 (3.7)	26(16.9)	16(14.5)	0.001
Ocular Manifestations	Conjunctivitis	8 (9.6)	17 (11.0)	4 (3.6)	0.165
Dermatologicalmanifestations	Rash	2 (2.4)	8 (5.2)	0 (0.0)	0.123
	Urticaria	4 (4.8)	8 (5.2)	2 (1.8)	0.609
Renal manifestations	Acute kidney injury	5 (6.0)	8 (5.2)	7 (6.4)	0.728
Musculoskeletal Manifestations	Fatigue	27 (32.5)	39 (25.3)	31(28.2)	0.54
	Joint pain	11 (13.3)	20 (13.0)	8 (7.3)	0.441
Endocrine manifestations	Diabetic ketoacidosis	9 (10.8)	6 (3.9)	0 (0.0)	0.011
	Hyperglycemia	6 (7.2)	14 (9.1)	8 (7.3)	0.805

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The relationship between the severity of respiratory infection and the extrapulmonary manifestation is reported in table-5, which shows that headache is most commonly reported in those with mild disease severity, and the difference between the three groups is statistically significant (P value 0.005). While strokes commonly occur among the moderate and severe groups, this occurrence has not shown any statistically significant. Epilepsy and GBS were also reported, mainly in the severe group. Regarding the cardiovascular manifestations, myocardial infarction, atrial fibrillation, and deep venous thrombosis are approximately equally reported among the moderate and severe groups, and this shows a statistically significant higher incidence if compared with the mild severity group (P value less than 0.05). For ischemic limbs, it was significantly higher among the severe group in comparison with the moderate and mild groups (P value 0.02). Furthermore, gastrointestinal manifestations including nausea and vomiting, abdominal pain, diarrhea, and anorexia were commonly reported among the mild severity group, while gastrointestinal bleeding and disturbed liver function were mostly developed among the severe type. However, only diarrhea, gastrointestinal bleeding, and disturbed liver function showed significant differences (P value less than 0.05). Finally, conjunctivitis, urticaria, fatigue, and joint pain were commonly reported in the mild form of the disease, while macular skin rash and acute kidney injury mostly developed in the severe type. Meanwhile, diabetic ketoacidosis and hyperglycemia were more common in the moderate type of diabetes. Of all these symptoms, acute kidney injury, fatigue, and diabetic ketoacidosis were registered as significant differences (P value less than 0.05).

Table 5. The relationship between the extra-pulmonary manifestations and severity

Variables		Mild	Moderate	Sever	P-value
		No. (%)	No. (%)	No. (%)	
Neurological Manifestations	Stroke	5 (3.1)	7 (6.5)	6 (7.6)	0.205
	Epilepsy	0 (0.0)	0 (0.0)	2 (2.5)	0.033
	Headache	50(31.3)	23 (21.3%)	10(12.7)	0.005
	Guillain-Barrésyndrome	0 (0.0)	1 (0.9)	2 (2.5)	0.138
Cardiovascular manifestations	Myocardial infarction	2 (1.3)	12(11.1)	9 (11.4)	0.001
	Atrial fibrillation	1 (0.6)	6 (5.6)	4 (5.1)	0.043
	Ischemic limb	1 (0.6)	2 (1.9)	5 (6.3)	0.02
	Deep venous thrombosis	0 (0.0)	2 (1.9)	2 (2.5)	0.001
Gastrointestinal manifestations	Nausea and vomiting	50 (31.3)	34 (31.5)	20 (25.3)	0.240
	Abdominal pain	43 (26.9)	21 (19.4)	18 (22.8)	0.292
	Diarrhea	54(34.0)	24 (22.2)	10(12.7)	0.001
	Gastrointestinal bleeding	1 (0.6)	1 (0.9)	5 (6.3)	0.008
	Anorexia	20 (12.5)	17 (15.7)	16 (20.3)	0.289
	Disturbed liver function	8 (5.1)	15 (13.9)	22(27.8)	0.001
Ocular Manifestations	Conjunctivitis	13 (8.1)	10 (9.3)	6 (7.6)	0.091
Dermatologicalmanifestations	Rash	2 (1.3)	4 (3.7)	4 (5.1)	0.208
	Urticaria	6 (3.8)	4 (3.7)	4 (5.1)	0.864
Renal manifestations	Acute kidney injury	2 (1.3)	5 (4.6)	13(16.5)	0.001
Musculoskeletal Manifestations	Fatigue	63(39.4)	19(17.6)	15 (19.0)	0.001
	Joint pain	19 (11.9)	10 (9.3)	10 (12.7)	0.723
Endocrine manifestations	Diabetic ketoacidosis	2 (1.3)	10 (9.3)	3 (3.8)	0.007
	Hyperglycemia	7 (4.4)	12 (11.1)	9 (11.4)	0.054

Discussion

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According to the results of this study, it showed that gastrointestinal manifestation is the most commonly reported extrapulmonary features followed by musculoskeletal and neurological manifestations and respectively. GI manifestations are becoming increasingly evident among COVID-19 patients since its outbreak in Wuhan, China. The original Wuhan outbreak reported diarrhoea in only 3% of cases.[33] In a subsequent study from Wuhan, the percentage increased to 10%. In a study from Singapore, the percentage increased to 25%.[34] The number of reports of GI symptoms in studies is increasing as healthcare professionals become more aware of the GI manifestations. In this study, we observed that the most common neurological manifestation was headache, which was presented in 23.9% of the patients, while 18 patients (5.1%) presented with stroke. Furthermore, epilepsy and Guillain-Barré syndrome were recorded in only 2 (0.6%) and 3 (0.9%) cases, respectively. Ömer Karadaş et al. stated in their study, which was conducted on 239 patients with COVID-19 infection, that headache was observed in 26.7% of the patients, strokes were recorded in 3.8%, and Guillain-Barre syndrome was observed in only one case (0.4%) in their study, which is similar to this article's results. [24] Similarly, Biyan Nathanael and his colleagues, in a narrative, meta-analysis study, revealed that headaches were present in (14.7%), stroke (2.3%), epilepsy and seizures (0.9%), and 2 cases of Guillain-Barre syndrome.[25] This result also complies with a previous report from Basrah about the neurological manifestation of COVID-19, which also demonstrated that headache is the most common reported symptom and stroke is reported in an approximately similar percentage, but the overall percentages of neurological manifestations were previously higher than in this study, which may reflect the different viral strains' characteristics.[26] Many other neurological presentations and complications are also reported in different literature, but they were not demonstrated in this sample, especially the sleep disorders and altered sleep behaviour, which are reported in previous local literature.[26] In terms of cardiovascular manifestations, 6.6% had a myocardial infarction, 3.2% had atrial fibrillation, and only 2.3% had ischemic limb. Previous reports have indicated an incidence of 7.2% of acute myocardial infarctions among COVID-19 patients.[27] The incidence, however, was found to be much higher in two different studies, with an incidence of 19.7% and 27.8%, respectively. These studies also established an independent link between cardiac injury and mortality and that COVID-19 patients with cardiovascular injury experienced more severe acute illnesses, worse radiographic findings, and a higher risk of requiring invasive ventilation.[28,29] Furthermore, several studies have shown that both pulmonary embolism and deep vein thrombosis (DVT) are associated with COVID-19 patients admitted to intensive care units, which has been reported to reach 35% in some cases.[43,45] According to a recent study in general ward hospitalizations, asymptomatic DVTs were as common in COVID patients as they were in non-COVID patients.[46] As we reported, deep venous thrombosis was observed in (1.1%) and most of the cases had severe infection with COVID-19. The gastrointestinal manifestations, including nausea and vomiting, abdominal pain, diarrhea, gastrointestinal bleeding, anorexia, and disturbed liver function, were observed in 29.97%, 23.6%, 25.5%, 2.0%, 15.3%, and 13.0%, respectively.[30] reported a pooled prevalence of 15% in COVID-19 for gastrointestinal symptoms, of which 10% were not respiratory related.[30] Earlier reports have suggested liver injury among patients with COVID-19, including increased transferases and INR, and reduced albumin levels.[31,32] As mentioned previously, the prevalence of diarrhoea with COVID-19 is increasing and, in our results, there is a significant association with disease severity as it commonly reported among mild cases as an early manifestation, but with the progression of disease severity, its frequency has declined significantly, and it is reported as late onset among those with severe

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respiratory illness. Conjunctivitis could be a manifestation of COVID19 Because the eye could be considered a direct potential portal of entry for the virus.[36] A meta-analysis study conducted by Lorenzo Loffredo, including three studies of total patients with 1167 patients infected with COVID-19, in which all the patients were categorised into severe and non-severe disease, found the overall rate of conjunctivitis was 1.1%. It was (3%) among severe and (0.7%) in non-severe COVID-19 patients (Loffredo, et al., 2020). In this study, conjunctivitis was observed in (8.4%) and most of the presented with moderate severity (9.3%), which was statistically non-significant. The incidence of acute kidney injury (AKI) in patients with COVID-19 varies in different case reports. According to several Chinese studies.[38,39] AKI was reported in 5% to 29% of patients within a median of 7–14 days after admission. However, the rates were much higher, reaching from 37% to 57%, according to USA reports.[40,41] In another study, 67% of COVID-19 patients developed stage 3 AKI, according to a study from Brazil.[42] In this study, acute renal injury was observed in 5.8%. Several COVID-19 patients have been reported to suffer from diabetic keto acidosis. However, the exact pathological mechanism is unknown at present. Several studies have observed and reported this complication. According to,[47] there was a significant rise in DKA during the COVID-19 period compared to the two preceding years for diabetes diagnosis in 2020 (44.7% in 2020 vs. 24.5% in 2019)[47] As reported.[27] DM patients had elevated levels of inflammation-related biomarkers compared to non-DM patients, and DM was correlated with worse progression and prognosis for individuals with COVID-19 (Guo et al. 2020) in the current article, DKA is reported in 4.3% of the cases while recent hyperglycemia is reported in about 8% of the patients. Regarding the other symptoms, various reports document a various percentage of presentations. Fatigue is reported in this study in about 30% of cases, and this is lower than what is reported by Yousif et al. in Basrah (16%). While arthralgia is reported in this research at around 11%, in the previous literature it is reported at about 30%.[49] Red eye and conjunctivitis were reported frequently in COVID-19 circumstances, and many reports show that it may be the first and sole symptom of infection.[50] In this context, it was reported in 8.4% of the cases and in two of the reported cases, it was the only presentation for COVID-19 and the diagnosis was confirmed by positive PCR taken from a conjunctival swab. According to our findings, erythematous non-itchy rah is reported in approximately 3% of cases, and urticaria is reported in approximately 4% of patients. Many reports confirmed the various dermatological presentations of COVID-19 with swinging percentages among different populations.[17] Several limitations have been encountered through the study conduction; firstly, the limited sample size obtained in this study as the majority of the mild cases weren't admitted or attended to the hospital; secondly, only a single centre of the COVID-10 isolation unit.

Conclusions and Recommendations, **e**xtrapulmonary manifestations are commonly reported among the COVID-19 population with different classes of severity, and there are some serious systemic complications that might exacerbate the natural course of COVID-19 illness, leading to increased morbidity and mortality. Therefore, we recommend increasing the doctor's awareness of the systemic manifestation and complications of COVID-19, which may occasionally be the sole presentation of this infection. Also, it is important to diagnose and treat these symptoms and complications in order to decrease the patient's suffering, improve their quality of life, decrease their morbidity, and achieve the best possible care. We also recommend that a follow-up study with a larger sample size and a

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comparative design be conducted to thoroughly investigate these manifestations and complications.

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أعراض ومضاعفات كورونا خارج الرئة: دراسة قائمة على الملاحظة في محافظة البصرة – جنوب العراق

الخلفية: تم التعرف على الفيروس التاجي لأول مرة في كانون الثاني من عام ٢٠١٩ في مدينة ووهان في الصين على أنه تفشي لزوبعة صحية غير معروفة، على الرغم من أن الأعراض الرئيسية كانت علامات تنفسية، إلا أن العديد من المرضى يعانون من مظاهر متعددة خارج الرئة.

الهدف من الدراسة: تهدف هذه الدراسة إلى تقييم الاعراض غير التنفسية لفايروس كورونا المستجد.

طريقة العمل: تم إجراء دراسة مقطعية في مستشفى البصرة التعليمي، وهو مركز متخصص في علاج المرضى المصابين بالفايروس التاجي ولمدة خمسة أشهر وتضمنت ٥٠٧ مريض مصاب بالفايروس.

النتائج والاستنتاجات: لوحظت المظاهر غير الرئوية في ٣٤٧ مريضا (٦٨٪) وأظهر تحليل العلامات السريرية للمرضى المسجلين أن معظم المظاهر العصبية كانت عبارة عن صداع. بينما كان احتشاء عضلة القلب هو أكثر مظاهر القلب والأوعية الدموية شيوعًا. علاوة على ذلك، أظهرت المظاهر المعدية والمعوية أن الغثيان والقيء، متبوعًا بآلام في البطن وإسهال، تمت ملاحظتها بشكل متكرر، بالإضافة إلى ذلك، لوحظت أيضًا السكتة الدماغية، والرجفان الأذيني، والتهاب الملتحمة، والطفح الجلدي البقعي، والشرى، وإصابة الكلى الحادة، والنحول، وآلام المفاصل، والتخثر الوريدي، والحماض الكيتوني السكري، وارتفاع السكر في الدم بنسب منخفضة.

الكلمات المفتاحية: كوفيد –١٩، خارج الرئة، غير تنفسي، البصرة، العراق

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