Studying the Increased Risks of COVID-19 in Obese Pregnant Women in Tikrit City

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Abstract

Background: It was not known whether pregnant women with (COVID-19) were at greater risk for maternal morbidities and adverse obstetric outcomes, and if pregnancy associated with obesity will have greater risk in case of infection with COVID-19.**Patients and Methods:** A cross sectional study was carried out in Salah Al-Deen General Hospital /Gynecology and Obstetrics Department in Tikrit City, during period (1st Jan-12th June 2022). A convenient sample of 62 pregnant women infected with COVID19. Data collection done through a questionnaire included demographic, obstetrical, and medical information. Laboratory investigation, included Real Time-Polymerase Chain Reaction, levels of hemoglobin, serum ferritin, C-reactive protein, complete blood count, IgG, IgM, D-dimer, and lactate dehydrogenase. **Results:** Normal body Mass Index found among (44%) of the patient followed by obese (29%), and overweight (27%). Most of the patient had COVID-19 of mild severity (58.1%), followed by moderate (29%) and sever (12.9%). Respiratory rate was ≥ 30 per minuet among (12.9%) of the patients. The symptoms of presentation were fever (75.8%), malaise (21%), cough (17.7%), sore throat (12.9%), myalgia (11.3%), sputum (9.7%), dyspnea (11.3%), headache (11.3%), and diarrhea (8.01). The distribution of patients according to severity and BMI showed that (38.9%) of obese patients had severe infection (5.9%) of the overweight patients had severe infection in comparison to (0%) of those with normal BMI. **Conclusions:** Obese patients significantly had higher proportion of severe infection than the normal weight, and overweight patients. Mean D. dimer level among obese patient was significantly higher than the overweight and normal BMI patient.

Keywords: Risks Of COVID-19, Obese Pregnant Women, Tikrit.

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Introduction

Coronavirus 2 disease -19 (COVID-19) is an acute infectious respiratory disease caused by a new strain of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first demonstrated in China as the patients suffered from flu-like symptoms then followed by severe pneumonia [1].

It started in 2019 in China, then spreads globally and become a challenging pandemic disease. In Iraq, from 3 January 2020 to 18 February 2022, there have been 2,286,451 confirmed cases of COVID-19 with 24,824 deaths, reported to WHO [2].A critical component in the management of any communicable disease threat is the care of vulnerable populations. Pregnant women are known to be disproportionately affected by respiratory illnesses, which are associated with increased infectious morbidity and high maternal mortality rates.

Enormous attention has been made to the adverse effects and the underlying mechanisms of COVID-19 with management, particularly during pregnancy [3]. The impact of coronavirus infection and pregnancy outcomes is still not known. Studies highlighted an association between risk of hospitalization with coronavirus infection and both ethnicity and underlying conditions such as obesity and diabetes. This supports other reports that these groups are more likely to develop severe infection and die from COVID-19 infection [4,5]. The aim of the study is to study the increased risk of covid-19 in obese pregnant women in comparison with non-obese pregnant women.

Patients and Methods

A cross sectional study was carried out in Salah Al-Deen General Hospital /Gynecology And Obstetrics department in Tikrit City, during the period 1st Jan-12th June 2022. A convenient sample of (62) pregnant women infected with COVID19. Inclusion Criteria: women aged 18 years or older at any stage of pregnancy or delivery with the diagnosis of COVID-19 during the present pregnancy based on laboratory confirmation of COVID-19 and/or radiologic pulmonary findings suggestive of COVID-19 Exclusion Criteria: non-pregnant women, pregnant women without COVID-19 infection evaluated as negativity for COVID-19 the time of nasopharyngeal RT-PCR swab, women aged less than 18 years old, without informed consent. Data were collected through direct interview using a questionnaire which include

the following information: maternal age, parity, body mass index history of gestational diabetes, hypertension, anemia, amniotic fluid abnormalities (hydramnios, oligoamnios, infection), placental abruption, vaginal bleeding, premature rupture of membranes, and preterm birth. Clinical manifestations included fever, cough, sore throat, headache, fatigue, myalgia, dyspnea. diarrhea, loss of taste or smell, the complication of COVID-19, oxygen saturation and respiratory rate. Laboratory investigation, included RT-PCR, levels of hemoglobin, serum ferritin, C-reactive protein, white blood cells count, lymphocyte count, neutrophil count, and platelet count IgG, IgM, D-dimer, and lactate dehydrogenase. Cases were considered as having SARS-CoV-2 infection based on positive results of reverse-transcriptase–polymerase chain-reaction assays of nasopharyngeal swab specimens; only cases with laboratory confirmation were included. Nasopharyngeal wash/aspirate or nasal wash/aspirate (performed by a trained healthcare provider) The COVID-19 cases were divided according to severity to: Mild, moderate, & severe.

RESULTS

Age range was (18-44 years) commonest age group were ≤ 29 years (54.8%), followed by 30-33 years (27.4%), most of the patients were housewives (74.2%), teacher (11.3%), employer (9.7%), and health staff (4.8%). The gestational age at presentation was 1st trimester (22.6%), 2nd trimester (45.2%) and 3rd trimester (32.3%). Iron & folic acid supplementation found among (90.3%). Maternal complications include: anemia (75.8%), GDM (6.5%), hypertension (8.1%), oligohydramnios (3.2%) and polyhydramnios (72.6%), as shown in Table 1. BMI of the patients with normal weight found among (44%) of the patients followed by obese (29%), and overweight (27%).

Table 1: The general characteristics of the patient

Characteristics		Frequency	%
Age (Years)	≤ 29	34	54.8
	30-33	17	27.4
	≥ 34	11	17.7
Job	Teacher	7	11.3
	Housewife	46	74.2
	health staff	3	4.8
	Employee	5	9.7
Parity	Nulliparous	30	48.4
	Multiparous	32	51.6
Gestational age	First	14	22.6
	2nd trimester	28	45.2
	Third trimester	20	32.3
Iron and folic acid supplementation		56	90.3
Maternal complications	Anemia	47	75.8
	Gestational Diabetes Mellitus	4	6.5
	Hypertension	5	8.1
	Oligohydramnios	2	3.2
	Polyhydramnios	45	72.6
	Vaginal bleeding	4	6.5

Most of the patients had mild infection (58.1%), followed by moderate (29%) and severe (12.9%). Respiratory rate was ≥ 30 per minuet among (12.9%) of the patients. Fever was found (75.8%), of patients, 33.9% of patients presented with loss taste or smell, (21%) of patients presented with malaise, (17.7%) of patients presented with cough, (12.9%) of patients presented with sore throat, (11.3%) of patients presented with myalgia, (9.7%)of patients presented with sputum, (11.3%)of patients presented with dyspnea, (11.3%)of patients presented with headache, and (8.01%) of patients presented with diarrhea, as shown in Table 2.

Table 2. The clinical signs and symptoms of COVID19 infection among pregnant women

		Frequency	%
Severity of COVID	Mild	36	58.1
	Moderate	18	29
	Sever	8	12.9
Respiratory Rate	≥ 30 per minuet	8	12.9
	< 30 per minuet	54	87.1
Fever		47	75.8
Loss of taste or smell		21	33.9
Malaise		13	21
Cough		11	17.7
Sore throat		8	12.9
Myalgia		7	11.3
Sputum		6	9.7
Dyspnea		7	11.3
Headache		7	11.3
diarrhea		5	8.01

The present study revealed that 38.9% of obese patients had severe infection in comparison to 5.9% of the overweight patients, while no one of normal BMI had severe infection, this relation was statistically significant (P value < 0.05), as shown in figure 1.

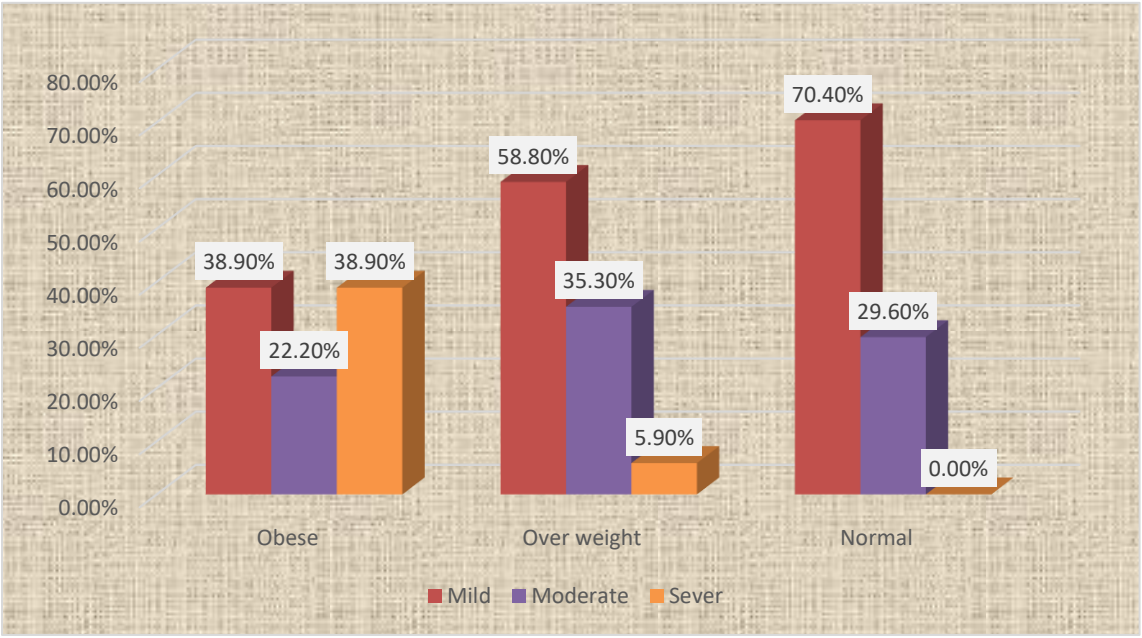

Figure 1. The relation of COVID-19 infection severity with BMI of patients.

Mean hemoglobin level in obese patients (10.4±1.4) was lower than the overweight and normal BMI patient (11.2±3.6 and 10.6±1.22respectively), this relation was statistically not significant.

Mean neutrophil cell count among obese patients (14.5±3.8) was higher than the overweight and normal BMI patients (10.7±1.46 & 11.1±3.6 respectively), this relation was statistically significant. The mean lymphocyte cell count among obese patient (0.93±0.4) was lower than the overweight and normal BMI patient (0.98±0.3 and 1.4±0.5 respectively), this relation was statistically significant, as shown in Table 3.

Table 3: The hematological characteristics of the COVID 19 pregnant women

Hematological characteristics	Obese	Overweight	Normal	*P value* (F)
	Mean ± SD			
Hemoglobin level g/dL	10.4±1.4	10.7±1.46	10.6±1.22	>0.05(2.03)
White blood cell count (WBC)x109/L	8.7±3.2	8.6±2.5	8.9±2.9	>0.05(0.04)
Neutrophil cell count (NEUT)	14.5±3.8	11.2±3.6	11.1±3.6	<0.05(5.07) **S**
Lymphocyte count (LYMPH)	0.93±0.4	0.98±0.3	1.4±0.5	< 0.05(8.4) **S**
Platelet count(PLT)X109/L	243.8±70.3	210.1±71.3	196.5±57.1	>0.05(0.025)

Mean CRP level in obese patient (53.5±34.5) was higher than the overweight and normal BMI patient (50.3±43.7), (32.2±37.5) respectively, this relation was statistically not significant. The mean random Blood Sugar level among obese patient (139.6±44.27) was higher than the overweight and normal BMI patient (125.59 ± 42.8), (129.67±46.5) respectively, this relation were statistically not significant. The mean D. Dimer level among obese patient (1764.23± 670.71) was higher than the overweight and normal BMI patient (497.5±233.4), (412.59±263.7) respectively, this relation was statistically significant. The mean S. Ferritin level among obese patients (420.6±300.4) was higher than the overweight and normal BMI patient (319.3± 215.2), (256.1±150.2) respectively, this relation were statistically significant (P value < 0.05). Mean LDH level among obese patient (322±105.1) was higher than the overweight and normal BMI patient (178.33±41.9), (301.3±95.85) respectively, this relation were statistically not significant. The mean SPO2 level among obese patient (93.9±3.86) was lower than the overweight and normal BMI patient (95.7±3.82), (96.7±2.86) respectively, this relation was statistically significant, as shown in Table 4.

Table 4. The Biochemical characteristics of the COVID 19 pregnant women

Biochemical characteristics	Obese	overweight	normal	P value(F)
	Mean ± SD			
CRP	53.5±34.5	50.3±43.7	32.2±37.5	>0.05(2.002)
Random Blood Sugar	139.6 ± 44.27	125.59±42.8	129.67±46.5	>0.05(0.46)
D. Dimer	1764.23± 670.71	497.5±233.4	412.59±263.7	< 0.05(8.79)
S. Ferritin	420.6±300.4	319.3± 215.2	256.1±150.2	< 0.05(3.13)
Lactose dehydrogenase(LDH) u/L	322±105.1	178.33±41.9	301.3±95.85	>0.05(2.488)
SPO2	93.9±3.86	95.7±3.82	96.7±2.86	>0.05(3.7)

The main complications found in the COVID 19 pregnant women according to BMI; were respiratory rate ≥30/minute which was higher in obese patient (38.9%) than the overweight and normal weighted patient (5.9%), 0(0) respectively, this relation was statistically significant. Anemia was more common among obese patient (83.3%) than the overweight and normal weighted patient (64.7%), (77.8%) respectively, this relation was statistically not significant. Polyhydramnios was more common among normal weighted patient (74.1%) than overweight and obese patient (70.6%), (72.2%) respectively, this relation was statistically not significant. GDM was higher among obese patient (16.7%) than overweight and normal weight patient (0%), (3.7%) respectively, as shown in table 5.

Table 5. The complications of the COVID 19 pregnant women

Complications		**BMI**						**P value**
		Obese		overweight		normal		
Respiratory Rate	≥30 per minute	7	38.9 %	1	5.9 %	0	0.0 %	<0.005
	< 30 per minute	11	61.1 %	16	94.1 %	27	100.0%	
Anemia	Yes	15	83.3 %	11	64.7 %	21	77.8 %	>0.05
	No	3	16.7 %	6	35.3 %	6	22.2 %	
oligohydramnios	Yes	0	0.0 %	0	0.0 %	2	7.4 %	>0.05
	No	18	100.0%	17	100.0%	25	92.6 %	
Polyhydramnios	Yes	13	72.2 %	12	70.6 %	20	74.1 %	>0.05
	No	5	27.8 %	5	29.4 %	7	25.9 %	
GDM	Yes	3	16.7 %	0	0.0 %	1	3.7 %	>0.05
	No	15	83.3 %	17	100.0%	26	96.3 %	
HT	Yes	2	11.1 %	1	5.9 %	2	7.4 %	>0.05
	No	16	88.9 %	16	94.1 %	25	92.6 %	
Vaginal bleeding	Yes	2	11.1 %	1	5.9 %	1	3.7 %	>0.05
	No	16	88.9 %	16	94.1 %	26	96.3 %	
Death		0			0		0	

DISCUSSION

In H1N1 influenza, obesity is an independent risk factor for hospitalization and death [62]. Since obesity has been shown to increase vulnerability to infections, it may be a risk factor for COVID-19-related mortality [6]. The most of the patient had mild severity (58.1%), followed by moderate (29%) and severe (12.9%). This goes with Kayem G *et al* in France 2020 suggested a mild clinical course in pregnancy, with no maternal deaths and very few women requiring ICU-level care, he found that 13% of the pregnant women had severe disease, and the severity of the disease was associated with age older than 35 years and obesity, as well as preexisting DM, previous preeclampsia, and gestational hypertension or preeclampsia [7]. Breslin *et al* in New York city 2020 reported 13.9% of 43 pregnant COVID-19-positive patients in New York had severe or critical disease. [8] The symptoms of presentation were fever (75.8%), malaise (21%), cough 11(17.7%), sore throat 8(12.9%), myalgia 7(11.3%), sputum (9.7%), dyspnea 7(11.3%), headache 7(11.3%), and diarrhea (8.01).

Delahoy MJ, *et al* in USA 2020 found that most commonly reported symptoms were fever or chills (59.6%) and cough (59.2%). [9] Islam MA *et al* in (a systematic review and meta-analysis of 17515 patients) 2021 found that fever prevalence in adult COVID-19 patients ranged between 68.26% and 98.63% and about 56.45% of the pregnant women or new mothers with COVID-19 presented with fever. [10] This differ from Breslin N, et al in New York city 2020 found that the most common symptom at presentation was dry cough (65.6%) followed by fever (48.3%) and myalgias (37.9%).[8] The current study revealed that (38.9%) of obese patients had severe infection, (5.9%) of overweight patients had severe infection in comparison to 0(0%) of those with normal BMI. Villar J et al in (The INTERCOVID Multinational Cohort Study) 2021found that 48.6% of the COVID-19 diagnosed pregnant women had overweight early in pregnancy compared with 40.2% of those without COVID-19 diagnosis. [11]

Mean Neutrophil cell count among obese patient (14.5±3.8) were significantly higher than the overweight and normal BMI patient (10.7±1.46) (11.1±3.6) respectively, this goes with Sun G *et al* Hubei Province in China 2020, who found that the pregnant women with COVID19 infection had higher neutrophil count(80.83 ± 8.88) than non-infected (77.17 ± 6.10). The mean Lymphocyte cell count among obese patient (0.93±0.4) were significantly lower than the overweight and normal BMI patient (0.98±0.3) (1.4±0.5) respectively, this goes with Sun G *et al* Hubei Province in China 2020 [12] who compared the COVID19 infected & pregnant women with non-infected found the blood indices of pregnant COVID-19 with patients significantly lower lymphocyte count (1.25±0.53) than the controls (1.66±1.18). Chen L. et al. in Wuhan-China 2020 reported that lymphopenia was present in 50% of infected pregnant women. [13] Mean D. Dimer level among obese patient (1764.23± 670.71) was significantly higher than the overweight and normal BMI patient (497.5±233.4), (412.59±263.7) respectively. This goes with

Rahman MA et al in Bangladesh 2021 who found that the D-Dimer was higher among severe COVID infection, non-severe COVID 19 infection patients. [14] These are frequently encountered in severe stages of COVID-19 and are also considered a prime reason for death [15]. Many past studies have presumed the elevated d-dimer levels responsible for altered coagulation in COVID-19 patients [16,17]. The mean S. Ferritin level among obese patient (420.6±300.4) was significantly higher than the overweight and normal BMI patient (319.3± 215.2), (256.1±150.2) respectively. This supported by Demeulemeester F *et al* in a review 2021 found a relationship between obesity and elevated serum ferritin levels. [18]

The mean random blood Sugar level among obese patient (139.6±44.27) was non significantly higher than the overweight and normal BMI patient (125.59 ± 42.8), (129.67±46.5) respectively. Twenty-five percent of critically ill patients with no history of DM have stress hyperglycemia [19]. Hyperglycemia was also noted in some non-diabetic patients in a series of SARS-CoV-2 patients from the United States; in this series admission hyperglycemia was associated with chest imaging findings [20]. SARS-CoV-2- may also provoke hyperglycemia (the mechanisms are not elucidated yet) [21]. The common complications reported among the COVId19 patients was gestational diabetes (16.7%) of the obese patient this goes with Epelboin S et al 2021 [22]. found that 15.9% of infected patient had GDM, but he didn't classified patients according the BMI. Villar J *et al* in 2021 [11] found that complications during pregnancy like; vaginal bleeding, pregnancy-induced hypertension, preeclampsia, eclampsia, HELLP, preterm labor, infections requiring antibiotics or maternal death, admission to intensive care unit, or referral for higher dependency car were associated with overweight (OR 1.81 (1.48-2.21)) among COVID19 infected pregnant women. Al-Sabah S *et al* in Kuwait 2020 [23] found that diabetes and BMI were associated with severe COVID-19 outcomes.

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