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The correlation between BMI and COVID-19 outcomes

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ABSTRACT

Background: The novel coronavirus (SARS-CoV-2) disease spread all over the world and lead to global pandemic, has different outcomes on patients depends on many factors, such as comorbidity, obesity, age and associated with significant morbidity and mortality.
Objective: the study amid to determine the effect of abnormal BMI in patients with coronavirus disease (COVID-19) on their disease outcomes.
Methods: the study involved analyzing the data of 210 post COVID-19 patients, which was collected through answering specific questions related to the relation of dieses outcomes and patients BMI.
Results: the mean age of patients was 34.7, 77 were female and 133 were males, 11% did suffer from shortness of breath of those who suffered from shortness of breath 70% were overweight and above normal BMI. 60% of moderately obese and 85% of severely obese people show symptoms for more than a week.
Conclusions: There is a correlation between BMI and COVID-19 outcomes, represented through moderate and severe obese patients were suffered from COVID-19 symptoms for longer duration than others.

Keywords: COVID-19, SARS-COV-2, body mass index, World Health Organization

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INTRODUCTION

The novel COVID-19 disease that appeared in November 2019 caused by a new coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1, 7]. This disease has contributed to a significant negative impact worldwide [2], recent studies stated that among hospitalized cases of COVID-19, the clinical outcomes for patients with concomitant comorbidity were mild compared to those without. Furthermore, large number of comorbidities were associated with minimal clinical outcomes [3], despite of there are very low delicate data about BMI (body mass index) of COVID-19 patients, the refrain of obesity in COVID-19 outcomes must not be disregard [4].

In general, the obesity takes substantial role in the pathogenesis of many disease due to stimulation of inflammation in the adipose tissue [8]. To prevent morbidity and mortality of many diseases, it is critical to comprehend the impact of obesity on the track of infection [9, 10]. Within reason the obesity makes the patient more vulnerable to infection, it is important to consider it as a striking risk factor for serious COID-19 outcomes [12]. Multiple case reports assigned obesity and morbid obesity as a risk factors for hospital admission, using mechanical ventilation and consequently death from H1N1 influenza [14]. The Center of Disease Control declared that people with obesity; body mass index of 30 or higher, are at increased risk of severe illness from COVID-19 [5]. Furthermore, there is a study suggested that more obese patients are associated with high mortality rate from COVID-19 disease compared with other patients [11].

Our objective was to evaluate the correlation between patients with abnormal BMI and COVID-19 outcomes in Jordan, based on the presence of symptoms the patients suffered from, such as cough, shortness of breath, fever, etc. Besides the duration of these symptoms, the presence or absence of comorbidities such as diabetes and hypertension in patients with COVID-19 were taken into account.

MATERIALS AND METHODS

This study was a retrospective case study conducted through data collected from post-COVID-19 patients in Jordan, and these patients were diagnosed based on the World Health Organization interim guidance [6]. The diagnosis of COVID-19 disease was confirmed by real-time reverse-transcription polymerase chain reaction (RT-PCR) assay done for nasal and pharyngeal swab samples collected from patients [13]. We submitted 210 post COVID-19 patients to the specific questionnaire, and studied them by using different variables, 54.7% of them were had abnormal BMI (25 - 29.9 overweight, >=30 obese). The total number of patients were interviewed from July 2020 to August 2020 by telephone. They were all provided with information about the study that was applied to the Institutional Review Board (IRB) at the Hashemite University, and verbal informed consent was taken from all patients properly. Beside MBI, the following parameters have been considered:

(a) Age,
(b) Comorbidities (presence of hypertension, diabetes, Asthma, OCPD, OSA, other)
(c) using of medications like cortisol,
(d) The presence of COVID-19 symptoms (including cough, SOF, fever, lethargy, anosmia, ageusia, headache, GI symptoms, Flu like symptoms) through the diagnosis,
(e) The duration of symptoms,
(f) The need for O2 mask or ICU admission,
(g) Taken the Flu influenza vaccine in 2019,
(h) Using of Hydroxychloroquine through the admission in hospital,
(i) The complications after recovery.

By taking each parameter into consideration, the study aimed to assess the associated parameters through their own specificity and sensitivity. Also, the predicted correlation between BMI and COVID-19 outcomes was established. In addition to that, the risk factors; like the age, presence of comorbidities, taking flu vaccine were taken into account.

STATICAL ANALYSIS

The types of data in this study include nominal and discrete, the data were analyzed by chi square,
The aim of this statistic is to see if there is a correlation between BMI and the new COVID-19 outcomes (i.e.: death, recovery, complications). Multiple chi square tables were created to rationalize this new disease.

RESULTS

Mean age of Jordanian COVID-19 patients was 34.7-year-old, with the standard deviation of ± 18 for age, with the youngest being age of 1, oldest being age of 83. 77 were females (37.7%) of the total, and 133 were males (63.3%) of the total. 50 (23.8%) exercised, 160 patients (76.2%) didn't exercised. The majority of the sample (70%) of adult category; 19-59-year-old. Old age of patients and male gender have already been identified as risks factor for severe illness and mortality in patients with COVID-19 [15, 21]. 51% of patients had symptoms, 49% had no symptoms.
The Ratio of being symptomic to asymptomatic among children, adolescence, adults, and senior adult was 1:5, 1:3, 1.2: 1, and 1.6:1, respectively. See table 1. So, children are less prone to show symptoms, while adults are more prone to be symptomatic noticeably. So, it appears that the older the patient the more likely to suffer.
53.8% had symptoms for less than a week, 31.9% had symptoms for two weeks, 10% had symptoms for 2-4 weeks, and 3.8 % had symptoms for more than 4 weeks. Thus, it is evident that the majority of people infected with Coronavirus in Jordan showed symptoms for less than a week, similar to seasonal influenza 41.4% were treated with Hydroxychloroquine. 6.2% needed using O2 mask while being an inpatient, 3.3% were admitted to ICU. The BMI of patients was underweight 8.6%, normal 36.6%, overweight 30%, mild obesity 17.1%, moderate obesity 4.3%, sever obesity 3.3%, 92% of those needing oxygen masks were overweight and obese. See table 2.
164 (8.1%) of patient had no comorbidities (hypertension, COPD, Diabetes, immunodeficiency diseases), while 13 patients (6.2%) had hypertension, and 20 patients (9.5%) had diabetes mellitus, one patient (0.5) had asthma, while 12 (5.7%) suffered from other co-morbidities, 16.2% of those patients are on medication for their co-morbidities. 11% did suffer from shortness of breath; of those who suffered from shortness of breath, 70% were overweight. 60% of moderately obese and 85% of severely obese people show symptoms for more than a week.

CONCLUSIONS

The analysis of the data resulted that there is a correlation between BMI and outcomes of COVID-19 represent through moderate and severe obese patient are two times more likely to show symptoms. Likewise, the study showed that the more obesity the patient has, the longer his symptoms will be, as shown in the figure below. Another odd finding was children are less prone to show symptoms, while adults are more prone to show symptoms.

DECLARATION OF INTEREST: NOTHING TO DISCLOSURE

FIGURE LEGENDS

Figure

The figure represnt the correlation between BMI and the duration of symptoms, the graph showed that the patients who had normal BMI, underweight and overweight suffered mostly from COVID-19 symptoms for less than one week duration, but patients with mild obesity suffered from symptoms for less than one week or for 2-4 weeks in equal ratio. Furthermore, patients with moderate obesity complained from symptoms little more for less than one week but take into consederation the qual ratio in the other duration categories. Ultimately, patients with severe obesity suffered from symptoms mostly for 1-2 weeks.

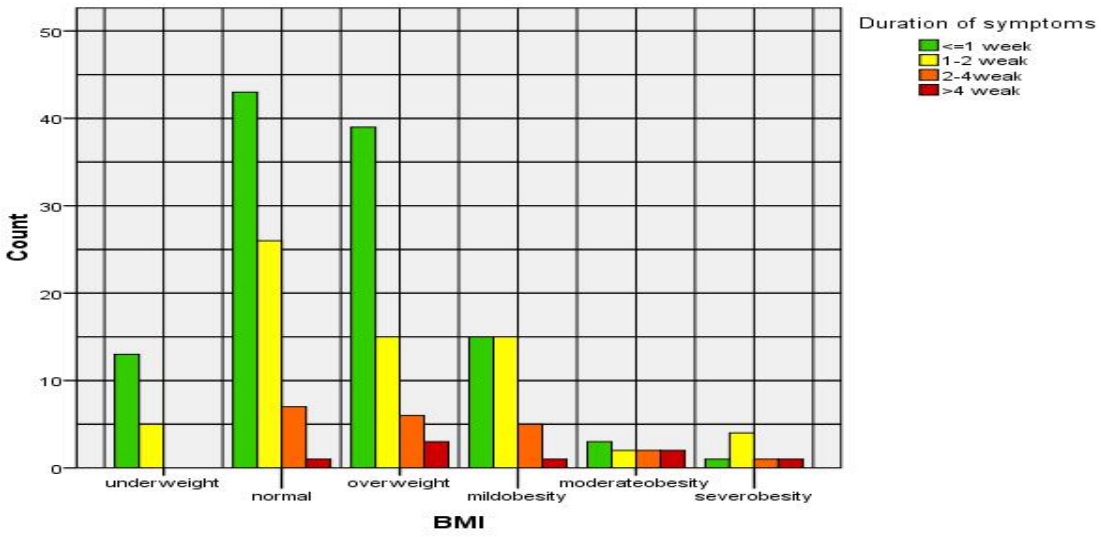

Table 1

	Age group	Total

		children	adolescence	adult	Senior adult	
symptoms	no	20	14	65	8	107
	yes	4	5	81	13	103
Total		24	19	146	21	210

Table 2

		The duration of symptoms				
		<=1 week	1-2 weak	2-4weak	>4 weak	
BMI	Underweight	13	5	0	0	18
	Normal	42	26	7	1	77
	Overweight	39	15	6	3	63
	Mild obesity	15	15	5	1	36
	Moderate obesity	3	2	2	2	9
	Sever obesity	1	4	1	1	7
Total		113	67	21	8	210

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