ORIGINAL ARTICLE

Impact of BMI on Covid-19 Clinical Features and its Management: A Cross Sectional Study

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ABSTRACT

The whole world is suffering from COVID-19 pandemic. This disease has halted life and has a negative impact on physical and mental health of all individuals.

Objectives: To identify impact of BMI on Covid-19 clinical features and its management in terms of relationship among patients at government hospitals, Pakistan.

Study Design: Cross-sectional study.

Methodology: This study enrolled 206 patients having both genders and was carried at Life Diabetes Centre, Gujrat and CMH Kharian Medical College (CKMC), over a period of 3 months, Kharian-Pakistan following ethical review committee's (ERC) approval.

Statistical analysis: Data was analyzed by SPSS software, version 17. Parameters like age, gender and treatment taken were presented as frequency. Chi square was applied to see the correlation with p-value <0.05 as significant.

Results: Total 206 patients were randomly selected, 89 male and 117 females. Among 206, patients (n=133) showed symptoms while rest of the patients (73) remained asymptomatic. There was no association of BMI with COVID-19 symptoms having P-value greater than 0.05. There was an association of BMI with gender as P-value (0.000*). There was an association of BMI with age having P-value (0.000*).

Conclusion: From present study, we concluded that there was a correlation between BMI and individuals with higher BMI as they developed more serious symptoms and required active management strategies in comparison to individuals who were either underweight or normal weight.

Key Words: Covid-19, BMI, Treatment and Gender.

INTRODUCTION

The whole world is suffering from COVID-19 pandemic. This disease has halted life and has a negative impact on physical and mental health of all individuals. This virus was transmitted from bats, dogs to humans although its transmission is still a mystery. Confirmed COVID-19 cases were 10,533,779 as reported by world health organization (WHO) till today globally. Situation in Pakistan is also alarming as the confirmed COVID-19 cases has surpassed 217,809 till today.[1]

This virus is RNA enveloped having size range (60 nm-140 nm) in diameter.[2] It stays alive on surfaces for days in favourable conditions but are killed by disinfectants like sodium hypochlorite, hydrogen peroxide etc within minutes as reported by literature review.[3] It's transmission is either by inhalational route or touching contaminated surfaces and later touching his own body parts like nose, mouth and eyes.[4]

The novel Corona-virus SARS-CoV-2 (COVID-19) started as an epidemic in Wuhan, China, in December 2019 and rapidly progressed to pandemic status by March 2020.[4] Its incubation period is 2-14 days approximately. Its clinical presentation includes fever, cough, breathlessness and severe malaise among diseased subjects. In majority of cases, the disease is of mild nature or totally asymptomatic. Its complications may present later as pneumonia, acute respiratory distress syndrome (ARDS) and multi organ dysfunction among patients.[5]

Its mortality rate is moderate (2-3%).[6] Its diagnosis needs laboratory assistance like low white cell counts with raised C-reactive protein (CRP). Computerized tomographic chest scan depicts chest abnormalities if present even in asymptomatic or mildly diseased patients.[7]

Certain risk factors like diabetes mellitus, cardio-vascular issues, smoking, obesity with high BMI, low immunity in cases of cancer, organ transplant, autoimmune diseases and long term use of immune-suppressants and old age have immensely contributed towards its spread.[5]

In the early stages of the pandemic, young individuals and children seemed to remain relatively unscathed and the disease seemed to only significantly affect people generally over 30 years of age.[6] But as the subsequent second and third waves of the pandemic hit nations worldwide, and new mutant variants of the virus emerged, younger and younger populations began to be affected by the disease.[7]

Since Pakistan is a developing country and affordability for the patients in this setup matters the most. Even with minimum resources, Pakistan has taken thorough steps like designed special hospitals, laboratories for testing, quarantine facilities, awareness campaign, guidelines for public and smart lock down to control its the

spread of virus.[8] People were made aware of proper hand washing, avoidance of hand shake and use of disinfectants. With such a novel and yet quite ambiguous pathogenesis of the disease itself as well as its countless consequences, further, extensive and region based research regarding Covid-19 and its associations is the need of the hour.

Objectives: To identify impact of BMI on Covid-19 clinical features and its management in terms of relationship among patients at government hospitals, Pakistan.

Methodology: This study enrolled 206 patients having both genders and was carried at Life Diabetes Centre, Gujrat and CMH Kharian Medical College (CKMC), over a period of 3 months, Kharian-Pakistan following ethical review committee's (ERC) approval. Covid-19 negative cases as well as pregnant ladies were excluded from study. **Statistical Analysis:** Data was analyzed by SPSS software, version 17. Parameters like gender, age and treatment taken were presented as frequency. Chi square was applied to see the correlation with p-value <0.05 as significant.

RESULTS

No association was present between BMI and symptoms of COVID-19 as shown in table-1.

Table-1: BMI & Symptoms Cross Tabulation With Correlation Among Enrolled Subjects					
Clinical Features	BMI				P-value
	Under weight	Normal weight	Over weight	Obesity	
No Symptoms	10	36	17	10	
Fever	1	5	4	3	
Flu	0	3	1	2	
Loss of smell / taste	2	3	1	1	
Diarrhea	1	1	0	0	
Oxygen drop	0	0	1	0	
Shortness of breath	0	1	1	0	
Didn't get virus yet	1	6	7	3	
Fever & Flu	0	7	3	2	
Flu, Loss of smell/taste & Diarrhea	6	25	20	15	0.114
Other	1	4	1	1	

There was an association of BMI with gender as P-value is 0.000 (which is less than 0.05) as shown in table-2.

Table-2: BMI & Gender Cross Tabulation With Correlation					
Gender	BMI				P-value
	Under weight	Normal weight	Over weight	Obesity	
Males	4	33	31	21	
Females	18	58	25	16	
Total	22	91	56	37	0.000*

*Statistically significant

There was an association of BMI with age as P-value is 0.000 (which is less than 0.05) as shown in table-3.

Table-3: BMI & Age Cross Tabulation With Correlation					
Age (years)	BMI				P-value
	Under weight	Normal weight	Over weight	Obesity	
1 – 30	21	63	29	17	
31-60	1	24	23	17	
61-90	0	4	4	3	0.000*
Total	22	91	56	37	

*Statistically significant

There was a significant relationship between BMI & different treatments taken for COVID-19 as shown in table-4.

Table-4: BMI, Gender & Treatment Cross Tabulation With Correlation						
Treatment taken	Gender	BMI				*p-value*
		Under weight	Normal weight	Over weight	Obesity	
Injectable with oral medicines	Males	0	5	1	2	
	Females	1	6	6	1	0.943
No Treatment	Males	3	18	16	11	
	Females	9	28	8	6	0.003*
Oral Treatment	Males	1	10	11	7	
	Females	8	23	8	8	0.020*
Oxygen with Injectable & oral medicines	Males	0	0	3	1	
	Females	0	1	3	1	0.593

*Statistically significant

There was a significant association of BMI with no treatment and oral treatment for COVID-19 with respect to age having P-value less than 0.05 as shown in table-5.

Table-5: BMI & Age & Treatment Cross Tabulation With Correlation						
Treatment taken	Age (years)	BMI				P-value
		Under weight	Normal weight	Over weight	Obesity	
Injectable with oral medicines	1 – 30	1	5	3	0	0.131
	31-60	0	5	3	2	
	61-90	0	1	1	1	
No Treatment	1 – 30	12	35	12	11	0.008*
	31-60	0	9	10	6	
	61-90	0	2	2	0	
Oral Treatment	1 – 30	8	23	12	6	0.015*
	31-60	1	9	7	8	
	61-90	0	1	0	1	
Oxygen with Injectable & oral medicines	1 – 30	0	0	2	0	0.419
	31-60	0	1	3	1	
	61-90	0	0	1	1	

*Statistically significant

There was significantly no association of BMI with treatments for COVID-19 in age as P-value is 0.318 (which is greater than 0.05) as shown in table-6.

Table-6: BMI & Treatment Cross Tabulation With Correlation					
Treatment taken	BMI Coding				p-value
	Under weight	Normal weight	Over weight	Obesity	
Injectable with oral medicines	1	11	7	3	0.318
No Treatment	12	46	24	17	
Oral Treatment	9	33	19	15	
Oxygen with Injectable & oral medicines	0	1	6	2	
Total	22	91	56	37	

DISCUSSION

This study was conducted in Life Diabetes Centre, Gujrat with collaboration of CMH Kharian medical college to rule out any correlation between BMI, Covid-19 clinical presentation and its treatment. As novel disease covid-19 is hitting badly almost all nations of the world without limitations of the socioeconomic status, race, gender, age and boundaries. Unfortunately, due to limited resources and research, this major health issue remained unnoticed.

In this study total 206 patient participated, 89 (43.2%) were male and 117 (56.8%) were female, just like study conducted in chine in 2020 November.[8] Total number of patients found asymptomatic were 73, out of which 35 are male patients and 38 female patients. Major age group which remained symptoms free was less than 30.

Both males and female patients of all age groups were recruited in current study as in other previous studies. In this study, a total 206 patient participated out of which 89 (43.2%) were male and 117(56.8%) were female as depicted by table-2. In a previous study, impact of obesity on Covid 19 was evaluated[9] and previous studies exhibit strong association of BMI with Covid 19 infection and severe morbidity and mortality associated with severe coronavirus 19 disease.[10,11]

Patients who remained asymptomatic were underweight = 10, normal weight = 36, over weight and obese = 27. Patients who got mild symptoms and got treatment were underweight = 12, normal weight = 55, over weight and obese = 66. The patients with advanced symptoms, who had significant fall in oxygen saturation, ultimately requiring oxygen therapy included none of the underweight participants, one female in normal weight category, and four males as well as four females in the overweight and obese categories. The severe symptoms observed in the patients with higher BMI is consistent with earlier studies.[11,12]

According to gender, BMI categorized male participants as underweight = 4, normal weight = 33, over weight 31, and obese 21. According to BMI, female participants were underweight=18, normal weight = 58, over weight 25 and obese 16. The males comprising overweight and obese groups were 58.43% and females in the corresponding overweight and obese category were 35.04%. The disease severity was higher in the overweight and obese categories and male gender in current study encompassed a greater percentage in these categories, this finding is also supported by previous studies.[13,14]

The three divisions of participants according to age was group 1 with ages between 1 – 30 years, group 2 with ages between 31 – 60 years and group 3 with ages between 61 – 90 years. The major portion totaling 84 participants out of 130 in group 1 were underweight or normal weight, whereas 46 out of 130 were overweight and obese. Twenty five of the 65 participants in group 2 were underweight or normal weight whereas 40 of 65 in group 2 were either overweight or obese. In a corresponding way, 4 of the 11 participants in 61 – 90 years age group were underweight / normal weight whereas 7 of the 11 were overweight or obese. In all the groups greater percentage comprised of the overweight and obese category. Few studies highlight age as an important factor for Covid related complication and exhibit BMI as a less important

factor[15], and this finding was also consistent with our data as greater proportion of patients in our study requiring advanced management were of higher age group. The number of patients in our study, with severe symptoms, however was high for the overweight and obese group and greater proportion of these patients required active management in the form of oxygen therapy, injectables, as well as oral medication, so BMI was an important predictor of diseases severity. The patients with higher BMI have a lesser 28-day survival rate, longer hospital stay, and active management due to Covid 19 disease or related complications.[16,17] The present study displayed similar results as greater proportion of the overweight and obese individuals developed severe symptoms and required aggressive active management.

Limitations: Our study had limitations like financial constraints, lack of resources and small sample size.

CONCLUSION

From present study, we concluded that there was a correlation between BMI and that individuals with higher BMI as they developed more serious symptoms and required active management strategies in comparison to individuals who were either underweight or with normal weight. Moreover, on individual basis exercise should be made compulsory in-order to have healthy and COVID-19 free life.

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