

Reciprocal impacts of obesity and coronavirus disease 2019

Countries around the world have experienced several problems with the beginning of coronavirus disease 2019 (COVID-19) crisis from late 2019 and its spread throughout the world in early 2020. The pandemic of COVID-19 is causing morbidity and mortality.^[1] Obese individuals are at high risk for this highly contagious virus, however the potential late-onset consequences of this pandemic and related lockdown should be taken into account on the increasing risk of obesity and in turn on chronic noncommunicable diseases (NCDs). Figure 1 shows obesity impact on different body systems and the increasing risk of severe COVID-19.

Some chronic conditions including cardiovascular disease, hypertension, diabetes, and obesity can affect the severity of respiratory diseases such as influenza, Middle East respiratory syndrome-coronavirus (MERS-CoV), and severe acute respiratory syndrome.^[2] A systematic analysis of 637 MERS-CoV cases reported that 16% of the cases were obese.^[3] Studies showed that obesity increased the susceptibility and severity of influenza and increased the rates of hospitalization and admission to intensive care units.^[4,5] A systematic review and meta-analysis study reported that obesity was strongly associated with severe pandemic influenza.^[6] Recent studies showed that severe obesity, i.e., body mass index (BMI) of ≥ 40 kg/m², might increase the risk of infection, complications, hospitalization, and in turn morbidity and mortality from COVID-19.^[7,8]

Findings on 30 medical workers^[9] and 49 patients with novel CoV pneumonia^[10] showed that BMI correlated with the severity of disease, which is more likely to develop into severe pneumonia. Severe patients had higher BMI than nonsevere patients and obese patients were more likely to develop severe pneumonia.

There is a high affinity between angiotensin-converting enzyme 2 (ACE2) and CoV. ACE2 is a binding receptor for CoV. The expression of ACE2 is higher in obese patients and because of higher total amount of ACE2 receptors in obese people, they may be more susceptible to COVID-19. It is suggested that obese people are at a high risk of COVID-19, and they are the key protection targets in epidemic prevention work.^[11]

Inflammatory biomarkers including procalcitonin, C-reactive protein, erythrocyte sedimentation rate, interleukin (IL)-6, and IL-10 increase in patients with COVID-19 and are associated with the severity of disease and mortality.^[12] Obesity is an inflammatory condition and has destructive effect on the immune system function. In addition, obesity alters lung function, increases respiratory rates and fatigue, increases pulmonary emboli and aspiration pneumonia, decreases pulmonary immune defenses, decreases functional residual capacity and expiratory volume, and allocates a disproportionately high amount of total body oxygen to respiratory work. Obese patients with pulmonary diseases need more intensive care unit stay, mechanical ventilation, and hospital stay in comparison with normal-weight patients.^[13] So, obesity can progress COVID-19 to severe type.

In the present COVID-19 crisis, many people have sedentary lifestyle and spend most of their time for getting information about COVID-19 in social and virtual media. They are not interested to spend time for exercising at home or playing with their children. Physical inactivity and sedentary lifestyle would lead to overweight and obesity. The influence of this lifestyle changes on weight gain is very remarkable and is a major underlying factor for the increased risk of NCDs and related health complications both in children and adults.

In addition, sudden disruption of our routines, new norm of social distancing, and confrontation of the new news lead to increased risk of depression and anxiety during the new CoV outbreak. These mental disorders were found to be predictive of developing obesity. Anxious and depressed persons through unhealthy lifestyles are more prone to obesity.^[11]

As COVID-19 is characterized by a notable disorder of the immune response, physically active lifestyle and having healthy diet can have beneficial effects on the immune system.^[14] In addition, weight reduction in obese people decreased systemic inflammation and improved immune responses against bacterial, viral, and fungal infections.^[13] Thus, having healthy lifestyle and weight management are recommended for the prevention of diseases related to the immune system.

In summary, the reciprocal interaction of obesity and COVID-19 should be underscored. In short term, obese individuals are at higher risk for COVID-19 infection, with poorer prognosis, whereas in long term, prolonged home stay for the lockdown of this pandemic would increase the risk of obesity for both children and adults.

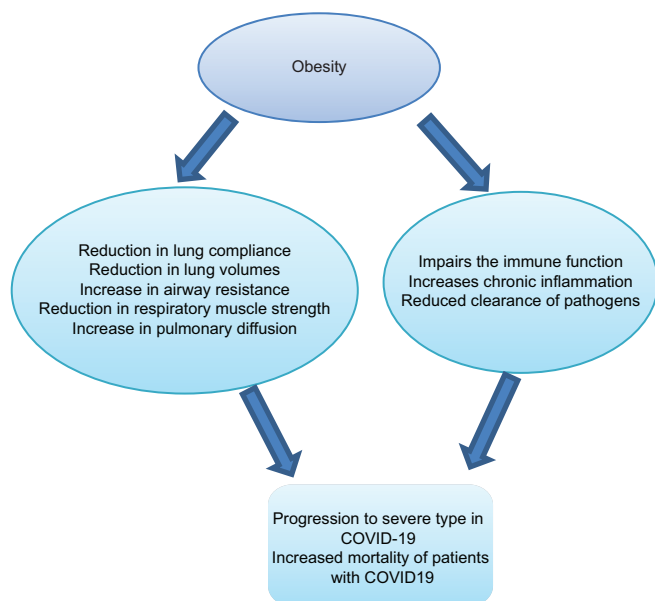


Figure 1: Obesity's impact on different body systems, which increases the risk of severe coronavirus disease 2019

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