



# **Ramifications of COVID-19 on Childhood Obesity: A Global Perspective**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The COVID-19 pandemic has had far-reaching ramifications that extend far beyond the Clinical Diseases. Children around the world have been impacted by the socioeconomic, psychological, and physiologic effects brought about by the emergence and response to this virus. This is especially true for children already suffering from obesity. They have been placed in an almost impossible situation due to the negative effects of living in relative isolation. Using logistic regression, the hazard factors for loss of life in young overweight COVID-19 patients were investigated. According to our data, obesity is linked to many health risks for teenage COVID-19 patients. They have a significant death rate, with worsening irritant responses, greater vascular damage, and elevated rates of lung consolidation. Younger children infected with COVID-19 who were hospitalized had a high proportion of comorbidities. Infants had less severe illness. Obese child were more likely to necessitate mechanical ventilation, as well as higher indicators of Inflammation at the time of admission. While in the hospital childhood obesity was linked to serious

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COVID-19 disease. Europe is no exception, three weeks have passed since Italy's mandatory countrywide lock-down began; lifestyle, diet, exercise, and sleep were collected and compared to data on children gathered in 2019. The additional weight accumulated during the lock-down may not be readily reversed, and if better practices are not re-established, it may contribute to obesity in adulthood. The United States similarly has reported increasing weight gain in youth aged 2-19 during the pandemic.

*Keywords: Repercussions; childhood obesity; overweight 2019-novel coronavirus; pandemic.*

## 1. INTRODUCTION

Children around the world have been impacted by the socioeconomic, psychological, and physiologic effects brought about by the emergence and response to this virus. In India for example, the second wave of COVID-19 has left parents scrambling for information on how to safeguard their children. They want to know what to do if their child or a family member exhibits symptoms or tests positive for the virus. As the number of adults in India who have tested positive for COVID-19 has grown, so has the number of children who have contracted the virus. However, there has been no dramatic increase in the total percentage of children in India who are infected with COVID-19. One hallmark of the current wave is that, unlike the previous wave, whole homes are now infected with the virus [1].

In Europe, the most current UK National Child Measurement Programme (data obtained prior to the pandemic), 21% of children aged 10-11 are fat, with the percentage rising to 27.5% in more impoverished regions. This is expected to increase with the Covid-19 lock-downs, which have impacted 75% of pupils worldwide. Weight gain is linked to time spent out of school during holiday closures, and it is more prevalent among those from lower socioeconomic backgrounds; this seems to be equally true for lock-downs. Families are more prone to consume cheaper and more calorie-dense meals when faced with food insecurity (nearly 20% of UK households are in worse financial shape today than before the pandemic). Physical activity has dropped as well, children are no exception. Prior to the pandemic, more than half of youngsters did not meet the recommended levels of physical exercise. Despite constraints permitting 60 minutes of activity in a local region on a normal lock-down day, approximately 30% of youngsters report not leaving the house. With parks, leisure centers, and sports clubs closing and screen time increasing, young peoples' physical activity has decreased even more; this is especially true among ethnic minority populations [2].

The body mass index (BMI) is a measurement that determines if a youngster is obese fat or overweight. Overweight is defined as BMI over the 85th percentile but below the 95th percentile for young people and teens of the identical age and sex. New measures for confirmation of obesity body adiposity index (BAI) and also we can underwater weighing, bioelectrical impedance, measurements with calipers, waist-to-hip ratio measurements, and dual-energy X-ray absorptiometry (DXA). By using all this we should assess the in time whether the children were generally healthy or correlate by clinically. Obesity in toddlers and juvenile of the same gender and age is characterized as a BMI of the 95<sup>th</sup> percentile or above. Instead of utilizing the BMI of 30kg/m<sup>2</sup> to sort out who is obese as in grown-ups. A child's obesity status is calculated using an age and sex-specific percentile for BMI. This is due to the fact that a child's body composition changes with age and difference between young males and young's girls [3].

In 2019, it was anticipated that in some form, 38.3 million children under the age of five were overweight. In over two decades, there has been little improvement in reducing childhood obesity among children under the age of five. A retrospective cohort research which was carried out in France, patients with considerable obesity (BMI >40 kg/m<sup>2</sup>) who came into contact with COVID-19 were more prone to obligate invasive mechanical ventilation, irrespective of age, high pressure or diabetic [4].

In Asia a retrospective study of 13 young patients who died with COVID-19 and 40 matched survivors showed obesity was a possible risk factor for high mortality. The risk factors for death in these young obese COVID-19 patients were studied using logistic regression. According to this study's findings, obese children suffered from a worse inflammatory response, an increase in heart damage, and an increase in coagulation activity. This findings likely contributing to the high mortality. Obesity inhibits diaphragm excursion, affects immunological responses to viral infection, is pro-inflammatory,

and causes hyperglycemia and oxidative stress, all of which have negative effects on cardiovascular function. COVID-19 will influence younger people more than previously thought in populations with a high prevalence of obesity [5].

In the USA, a study by Philip Zachariah et al. a total of 50 children and teens were admitted for COVID-19 infection. The disease presented itself in a variety of ways. As in the study from Zhang Fengqin et al. The risk of serious illness was not enhanced in infants or immunocompromised people. Respiratory symptoms, though prevalent, were not always evident. Babies with coronavirus who were brought to the medical center had a high rate of comorbidities and newborns had less severe illness. Those who were obese had greater rates of mechanical ventilation. Higher levels of inflammation markers at the start of treatment and while in the hospital were linked to more severe illness [6].

In a literature review by Aliva De and Deepa Rastogi (USA) they outline the metabolic problems, which are closely connected to truncal adiposity in the absence of atopy. They also raise concerns for medication non-responsive asthma and its links to obesity. Their 2019 report shows 18% of US children are obese, a number that has likely risen due to the COVID pandemic [7].

Symptoms of asthma and pulmonary function impairments in children who are overweight has been generally constant. Atopic asthma can be differentiated from obesity-related asthma by the lack of response to existing atopy asthma medications. This review suggests that the detection of metabolic deregulation in obese children may aid in the identification of children who are more likely to get this form of asthma [8].

A review published by Maida Tsenoli, Jane Elizabeth Moverley Smith, and Moien AB Khan Express the concerns coming from the United Kingdom on COVID-19 and childhood obesity. Childhood obesity has been rising and COVID-19 has made matters worse. The authors encourage evidence-based, targeted, long-term therapies to address these issues. Obviously such interventions will require enough funding. Optimism and a desire for the both public and private transformation through modern technologies and old customs, may offer hope for change to reverse the current trend of weight growth, significant adjustments in individual and family performance and nutrition, as well as

political and scholastic policies at the highest levels, are required [9]. Children's social life and learning have been affected. Due to the corona virus [10] pandemic, closure of schools has affected the education as well as increase the weight. So we need to engage the children in purposive and creative activity. Fun and Effective Workouts for Children should be started in school as well as in home. This type of activity can be adopted in India as well as other country.

An Italian long-term study questioned 41 obese children and teenagers in the city of Verona three weeks into Italy's mandated national lockdown. Lifestyle data on nutrition, activity, and sleep were collected and compared to data on children collected in 2019. "Depending on the duration of the lockdown, the excess weight gained may not be easily reversible and might contribute to obesity during adulthood if healthier behaviors are not re-established. This is due to the fact that obesity in childhood and adolescence tends to accompany people throughout their lives and predicts adult weight status." [11]. School nurses, pediatricians, and other health care professionals as well as parents and guardians who provide care to children should help educate children about healthy food choices and portion sizes and the need to increase activity and decrease caloric intake and to modify the health behaviours.

This Italian study shows isolation affected teens eating habits. Variations in the amount of vegetables consumed remained unchanged and fruit consumption rose ( $P=0.055$ ). All through the shutdown, however, consumption of potatoes chips, red meat, and sugary drinks rise dramatically ( $P$  values ranging from 0.005 to 0.001). Time spent participating in sports reduced by 2.30 (SD 4.60) hours per week ( $P = 0.003$ ). Children and adolescent replaced large meals with snacks, associated with television-watching, playing indoor games, social media etc. Once a while it was good but to late night games and T.V Individuals tend to have high energy density foods, rich in fat and sugar, leading to outcomes such as excess body weight. Regarding healthy eating markers, the consumption of raw salad and vegetables was higher among isolated families. The high intake of healthy eating markers in strengthening the immune system. Bed time rose by 0.65 (SD 1.29) hours per day ( $P = 0.003$ ). The amount of dwell period in front of the screen rose by 4.85 (SD 2.40) hours / day ( $P 0.001$ ) [12]. The same scenario was there.

## 1.1 Effect of Covid19 in Children

The novel coronavirus epidemic had a wide-ranging effects and consequence that go far beyond the virus itself. Due to the harmful nature of living in relative isolation, those youngsters already suffering with obesity have been placed in an almost very difficult situation. It is critical that health care practitioners and policymakers recognize that juvenile obesity is an extremely important issue. More than just an increase in calorie consumption, a lack of physical exercise, and a resulting energy imbalance; It involves a complex set of elements that, when combined, produce the ideal obese genic storm. This life-altering epidemic has exacerbated the storm, which will regrettably have far-reaching implications when youngsters approach adulthood [13].

The corona virus was and is a serious threat that has infected hundreds of thousands of people around the world, sometimes fatally [14]. COVID-19's effects on the poor and the role of society have been addressed and infect people of all ages [15,16]. Closure of schools as a result of the corona virus (COVID-19) epidemic has affected more than 1.5 billion children's schooling throughout the world. It is obvious that school closures will have detrimental effect on poorer students who do not have access to private teaching that in some cases never stopped during lock-downs (eg private tutors, colleges, schools). It is concerning that officials would continue to lock-down schools and prevent unvaccinated children from receiving an education. Not only does education have the potential to aid in uplifting the children of poor families it can help make their families and communities stronger. The achievement gap between low- and high-income pupils.

## 1.2 The Hidden Impact of Covid-19 in Children

Globally, it is was found that about 8 in 10 children felt that they were learning little or nothing at all, and about two thirds of parents and caregivers reported their child had received no contact from teachers since their schools closed. Three-quarters of households lost income as a result of COVID-19, and the vast majority of households (96%) reported having trouble paying for an essential items or service. This brief global review Results also shows the significant impact on the psycho-social well-being wellbeing of children and their caregivers. More

than 8 in 10 children reported an increase in negative feelings. One third of households had a child or caregiver reporting violence in the home. Children reported that violence was higher when schools were closed, compared to when they were attending in person. The general issues of mental health are growing in kids, during COVID-19 like obesity [17].

Increased adoption of sedentary lifestyles has resulted in a cascading effect on various metabolic diseases associated with obesity. Scientists have come up with various indices and parameters such as MI, ABSI, VAI, BIA, DEXA, waist-hip ratio, and waist circumference to quantify obesity, but none provide a conclusive summation that helps identify the pre-symptoms of obesity. Exploring the cascading effects in changing sedentary lifestyles draws many parallels to the surge in overweight and obesity among the people following such lifestyles [18].

Because children with psychological problems are especially helpless during the isolation and colonial removal period, they begin eating unhealthy foods, which leads to obesity. The rising advanced applications and wellbeing administrations, for example, telehealth, web-based media, and far off intuitive online instruction can connect the social separation and backing mental and conduct wellbeing for youngsters may be that lead to healthy lifestyle [19].

The WHO also recommends that all healthy adults exercise for 30 minutes each day, and that children exercise for one hour each day. We may better maintain our heart health, physical strength, endurance, a healthy mind, and a balanced mind by exercising at home. So some exercise and paly active help to reduce the weight gain [20].

## 2. CONCLUSION

Lifestyle factors are independently associated with long-term weight gain during the COVID-19 pandemic. The fun active ideas is help to stay active in children. This will contribute towards making them healthier, confident and most importantly boost their immunity for a long and healthy life.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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