

Obesity in Children as a Risk Factor for Covid-19

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Abstract

This systematic review was conducted in order to address the relationship between covid 19 and obesity in children. Compared to adults, children with SARS-CoV-2 infection may have fewer symptoms and these may be less severe. But having a basic disease characterized by weakening and impacting the immune system increases the risk of severity in obese pediatric patients who acquire a covid-19 infection.

Keywords: Childhood obesity; Pediatric obesity; Covid-19; Risk factors

Introduction

Obesity is a chronic and multifactorial disease, characterized by the accumulation of excess fat to a degree that causes alterations in health. Changes in lifestyle, mainly poor eating habits and sedentary lifestyle, are currently identified as the main causes of obesity. The incidence of childhood obesity has shown a great increase during the last decades.

Children eat more fats and sugars, eat fewer fruits and vegetables, and lead less active lives than before; All of these situations have a direct impact on the growth and development of children.

Our beliefs about food and health also contribute to children's weight gain. The increase in childhood obesity is accompanied by complications that imply future risks to health and quality of life both in childhood and in adulthood, however, weight problems begin at an earlier age so complications of Women's health does too and is associated with a greater likelihood of premature death and disability in adulthood.

In addition to these future risks, obese children suffer from respiratory diseases such as asthma, increased risk of fractures and hypertension, and have early markers of cardiovascular disease, insulin resistance, and psychological effects. Children with obesity have a 46% higher risk of infection by SARS-CoV-2, compared to those with normal weight. In case of suffering COVID-19, they present twice the risk of requiring hospitalization. In addition, the risk of severity also increases when there is excess weight, ICU admissions increase by 73% and the need for assisted mechanical ventilation in 63% of the patients.

It has been proven that worse previous conditions of cardiorespiratory training, nutritional and muscular functional status (sarcopenia), contribute to a worse evolution of COVID-19

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[2]. Therefore, we carry out this review to publicize the role of childhood obesity as an aggravating factor of covid 19.

Materials and methods

A bibliographic search was carried out that spanned from 2019 to 2021 in the databases pubmed, Elsevier, scielo, Update, medline, national and international libraries. We use the following descriptors: Covid-19, Pediatric obesity, risk factors

in covid-19 infection in pediatric patients. The data obtained oscillate between 16 and 60 records after the use of the different keywords. The search for articles was carried out in Spanish and English, it was limited by year of publication and studies between 2019 and 2021 were used. The main exclusion criteria were articles that had more than 5 years of publication.

Results

Studies indicate that children with obesity are at increased risk of developing severe COVID-19, and inflammation associated with obesity could be one of the factors that worsen COVID-19 symptoms due to an increased inflammatory response where they are seen molecules such as interleukin 6, tumor necrosis factor alpha, and monocyte chemoattractant protein are involved [1].

During confinement, between April and May 2020, the combination of a higher intake and sedentary lifestyle was the most frequent justification for the weight gain that affected almost half of the Spanish population and ranged between 1 and 3 kg. Among the risk factors associated with weight gain in the pediatric population during confinement, the female sex, younger age, previous excess weight and having been confined in southern Spain should be highlighted. On the other hand, living in small flats, having a lower level of education and low income are associated with a greater probability of gaining weight. In addition, a "halo effect" was observed, such that a weight gain occurred in 44.6% of the people around those subjects who had gained weight.

After the first weeks, the purchase of high calorie density products, such as alcoholic beverages, sweets and snacks, increased by more than 50%. On the other hand, confinement limited access to sports centers and made it difficult to practice physical activity outdoors, which together with the absence of the habit of exercising at home, greatly hindered the ability to maintain an active lifestyle [2].

The effect of obesity on COVID-19 mortality was reported in 10 studies. Two studies presented HR to report obesity as a risk factor for mortality compared to non-obese people (BMI:<30 Kg/m²) and two other studies presented measures for obesity grades II and III. However, four studies reported that the effect of obesity on mortality was not significant. Furthermore, obesity was found to be a risk factor for admission to the intensive care unit (ICU) [3].

Discussion

Studies indicate that children with obesity are at increased risk of developing severe COVID-19, and inflammation associated with obesity could be one of the factors that worsen COVID-19 symptoms due to an increased inflammatory response where they are seen molecules such as interleukin 6, tumor necrosis factor alpha, and monocyte chemoattractant protein are involved [4].

In relation to cardiometabolic factors and respiratory well-being, in prepubertal children, insulin resistance and hyperglycemia have been shown to be more closely associated with airway hyperresponsiveness than with obesity itself. Metabolic dysregulation, defined by insulin resistance and

dyslipidemia, worsens lung function and promotes bronchial hyperresponsiveness, regardless of BMI [5].

Current evidence suggests that the effects of obesity versus COVID-19 infection, both in incidence and severity, are mediated by an inflammatory and cardiometabolic pathway. Adipokines secreted by adipose tissue exert significant effects not only on metabolism but also on the immune system and, although the detailed mechanisms of their contribution have yet to be established, they appear to represent important mediators in obesity-associated asthma. The metabolic health of adipose tissue seems more important than the fat mass itself; in fact, the negative effect of trunk adiposity in the obese asthmatic patient, rather than due to a mechanical effect, is due to the inflammation associated with central obesity [6].

Coronavirus disease (COVID-19) is caused by the virus "severe acute respiratory syndrome-coronavirus 2" (SARS-CoV-2). Compared to adults, children with SARS-CoV-2 infection may have fewer symptoms and these may be less severe. Gastrointestinal symptoms are commonly reported in children, sometimes as the sole manifestation of the disease. The most common are anorexia, diarrhea, nausea and vomiting, and abdominal pain. Although most children have a mild or asymptomatic condition, 10% of those infected may experience a severe or critical condition, and even death. Multisystem inflammatory syndrome is a rare but serious condition that was recently documented in children with COVID-19.

On the other hand, evidence of a higher protein expression of ACE2 has been found in visceral adipose tissue of obese and malnourished humans, and this could be associated with the complications and severity of COVID-19. Therefore, the regulation of the intake of macronutrients or micronutrients could be used as a strategy to reduce the consequences of the disease. The diet in general and bioactive compounds could play an important role in preventing the inflammatory cascade. The micronutrients with the most indicative evidence that they play a role in immune support are vitamins C and D, Zinc, and Polyphenols.

Conclusion

The presence of obesity and its relationship with the severity of the disease has been previously reported for other viral respiratory infections. For example, it has been reported that in the case of the H1N1 virus, children with obesity and with pre-existing chronic diseases have a greater probability of developing acute respiratory distress syndrome that can evolve to multiple organ failure and death. In the same way, a systematic review about Sars-Cov-2 infection reported that obesity was present in 16% of cases of severe disease in children and that this condition, as well as others related to metabolic syndrome, it could predispose to the appearance of inflammatory processes that would sensitize individuals to develop complications and lead to pneumonia, respiratory distress and death.

Children with obesity should be treated as a high-risk population, intensifying contagion prevention measures before infection and providing specialized assistance in confirmed COVID-19 cases. In addition, it is necessary to create a culture that promotes healthy lifestyles and obesity prevention.

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