

Article

COVID-19 and childhood obesity (CO-BESITY) in the era of new normal life: A need for a policy research

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Abstract

Background: In the era of new normal life after Coronavirus Disease 2019 (COVID-19), our children are experiencing the double threat of COVID-19 and Childhood Obesity (CO-BESITY). The rate of childhood obesity has been rapidly increasing in developed as well as low middle-income countries during the pandemic.

Design and Methods: The current paper aims to identify the probable reasons of increase in childhood obesity during this pandemic and offers suggestions to reduce the burden of it. Literature search was done using PubMed, Google Scholar, and Scopus databases for the key terms “childhood obesity,” “obesity,” “pandemic,” and/or childhood obesity. All the relevant articles were included to support the argument for this viewpoint.

Results: Childhood obesity is a complicated disorder having diverse outcomes. The incidence of childhood obesity is analysed from Bronfenbrenner’s model of child development. The model examines an overabundance of bio-psycho-social backgrounds, risks, and probable outcomes on the development of a child. COVID-19 pandemic has disrupted the ecosystem of this dynamic model and has created an economic and social-cultural crisis that has ignited a chain reaction of stressors upon children and their families. In this paper, we have described how this Bronfenbrenner’s model of child development also known as the Bioecological Model can be effective for the estimation and prevention of childhood obesity.

Conclusion: We propose that this Bioecological Model will help the children and their families further understand and manage the problem of childhood obesity during this pandemic on their own.

Introduction

In the era of NEW NORMAL life (COVID-19 pandemic), our children are experiencing the problem of overweight and Childhood Obesity. The rate of childhood obesity has been rapidly increasing in developed as well as low middle-income countries during the pandemic.¹ The youth of high-income economies like the United States of America is already witnessing an explosive rise in severe obesity.² The new normal life, (stay-at-home, work from home, school from home and physical distancing) after the COVID-19 pandemic has forced us to adopt major lifestyle changes/behaviours which are extremely harmful to adults as well as children. Due to the pandemic, children lost their precious school life, which aided their physical and mental fitness by diverse activities like interaction with their peers, mandatory physical activity and much more.

To add to this maelstrom, the COVID-19 pandemic has emerged as a highly infectious disease resulting in significant mortality and morbidity in humans.³ Among multiple risk factors of COVID-19 severity, obesity is identified as a major risk factor.⁴ Several studies done worldwide have shown that obese children face a higher risk of catastrophic complications.⁵ Childhood obesity and its repercussions, in tandem with the COVID-19 pandemic, lack a systematic approach and model that explains the fuel for research.

This paper will address the problem of childhood obesity with a fresh outlook, during this COVID-19 pandemic (CO-BESITY), and explain how stress aggravates both COVID-19 and childhood obesity. We will also attempt to suggest interventions that can lessen the prevalence of childhood obesity.

Significance for public health

Coronavirus Disease 2019 (COVID-19) and Childhood Obesity (CO-BESITY) pose a double threat to children in the era of the new normal. The rate of childhood obesity has been rapidly increasing in both developed and low-middle-income countries during the pandemic. As presented in this paper, a Bioecological Model has been regarded as an effective method of estimating and preventing childhood obesity using Bronfenbrenner’s model of child development. With COVID-19 currently on the rise (Co-BESITY), this paper looks at childhood obesity from a new perspective and explains how stress aggravates both COVID-19 as well as childhood obesity. Additionally, we have suggested some low-cost interventions that can reduce the overall prevalence of childhood obesity.

Bronfenbrenner's model of childhood development

Childhood obesity is a complicated disorder having several diverse outcomes. Though developed to explain the psychological development of a person, the Social-Ecological Model (SEM) of Urie Bronfenbrenner's is a useful scaffold for describing child development as a complex set of relationships governed by many factors, from immediate environments such as the family and the school to global cultural values, laws, and customs.⁶ Over time, Bronfenbrenner's model has evolved gradually with four dynamic, interlinked components, viz: i) proximal process or interaction between agent and their environment, ii) host attributes, iii) context and iv) time.⁷

Structurally, Bronfenbrenner's model (Figure 1) has multiple systems and subsystems. The Chrono system suggests lifetime development and the individual's lifespan, scientifically known as ontogeny and history. The Macro has revolved around health policies, socio-cultural impacts, local traditions, personal values, and beliefs.

The various person-centred institutions like administration, the judiciary, mass media, school, manufacturing or personnel that affect the person at an individual level are known as the Exo system. The Meso system depicts a harmonious relationship between Microsystems including components that are an important part of personal life, such as family, neighbours, school, and peer groups.⁸

The incidence of childhood obesity can be analysed from Bronfenbrenner's model. The model discloses an overabundance of bio-psycho-social backgrounds, risks, and probable outcomes. This pandemic has created an economic and social-cultural crisis that has ignited a chain reaction of stressors upon children and their families. We assume that this Bioecological Model will be effective for estimation and intervention so that children along with their families can understand and manage the problem of childhood obesity during this pandemic by themselves.

Definitions and prevalence

Obesity is one of the common risk factors for non-communicable disease, due to deregulation of metabolic function, which is multifactorial in origin such as genetic, environmental, and psychosocial. The CDC standardized growth charts define obesity as "excess adiposity in youth as overweight (85th–94th percentiles), obesity (95–98th percentiles), and severe obesity (≥ 99 th percentile)".⁹ The current prevalence of childhood obesity is approximately 337 million globally, among this, 213 million children come under overweight and 124 million are either under mild, moderate or severe obesity.¹⁰ The rate of childhood obesity varies by ethnicity, geography, age, socio-cultural factors.¹¹

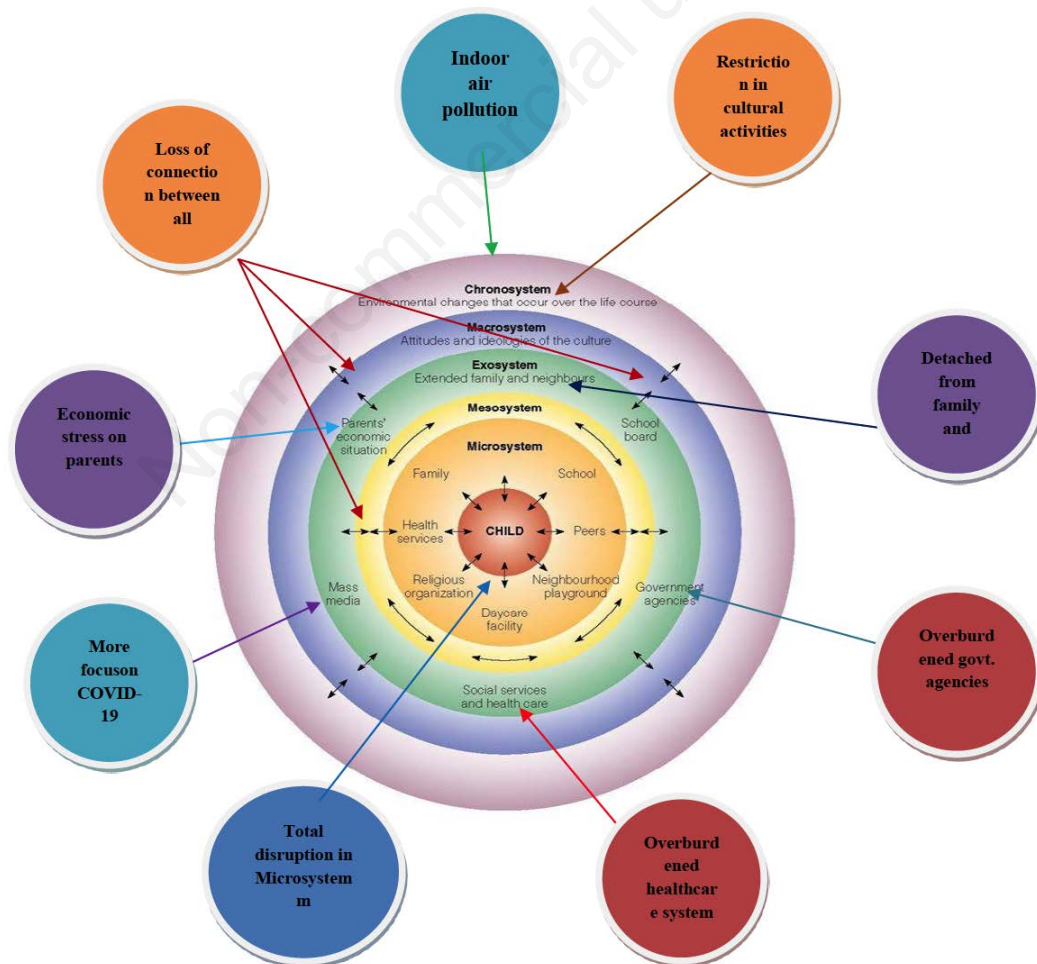


Figure 1. The obesogenic environment created by COVID-19 and increased prevalence in Childhood obesity.

The exact data of COVID-19 among Indian children is unknown and multiple studies are going on it. In the U.S., the prevalence is 1053/100,000 which represents 11% of total cases.⁴

In the U.S., a severe form of COVID-19 in children was first reported as a multisystem inflammatory syndrome (MIS-C) in March 2020.^{12,13} At the end of October 2020, the CDC reports 1097 established MIS-C cases along with 20 deaths.¹⁴

Pathophysiology

Childhood obesity occurs due to an imbalance between energy intake and energy expenditure. Simply, when calorie intake is not equal to energy loss, deposition of excess calories in their body occurs and gives rise to childhood obesity. Adipose (specialized cell for storage of fat) tissue plays an important role in maintaining energy balance.¹⁵

When excess nutrients enter the adipocyte, a stress response is initiated, resulting in a sustained and excess release in cortisol production which initiates a chronic inflammatory reaction in their body. This, in turn, predisposes the children to metabolic disorders like obesity, cardiovascular diseases, depression, cancer, polycystic ovarian disease and many more. The immune system is also weakened by chronic inflammation caused by obesity. Therefore obesity is recognized as an important risk factor of severe COVID-19 disease, which causes severe sepsis and multiorgan failure.^{16,17}

Now, we will describe the influence of COVID-19 on childhood obesity using the Bioecological model. At the microsystem level, the COVID-19 pandemic introduces a stressor among the children and their families due to traumatic life events that have occurred in their lives. It is evident from multiple studies that sustained stress reactions in our bodies can lead to chronic health problems among children, including childhood obesity. Families act as a buffer to counter the stress and support the child's adaptation. Unfortunately, now, parents are experiencing high stress, due to job loss, loss of family members due to COVID-19, home isolation, work from home culture, which has hampered the efficient but delicate adaptation mechanism.¹⁸ In recent studies, an association was found between childhood obesity and parental stress.¹⁹ Global studies conducted worldwide have documented that COVID-19 stressors adversely affect vulnerable segments already stricken with poverty, inequity, domestic violence, child abuse and racism. Similar or worse consequences will ensue in low- and middle-income countries like India where inequity and inaccessibility of resources are considered a norm for disadvantaged people.²⁰

People are separated by social distancing. Infected people cannot spread the virus to others if they stay away from others. During COVID-19 times, social distancing issues are very common among the children. Due to the rapid spread of the pandemic, many countries including India, enforced the closing of schools as a measure of pandemic control strategies to slow down the COVID-19 spread, strengthening the health infrastructure and reducing the strain on the healthcare systems. An estimate suggests that to date, 138 countries including India, have closed schools, adversely influencing 80% of children across the world.²¹ Due to the interruption of physical classrooms, a detrimental effect on the social, physical and mental health looms heavily upon us, especially among children from disadvantaged groups. Closing schools out of school time has increased manifold to the children and research among the Hispanics, African Americans, and children with overweight suggest a strong association between weight gain and out of school time.²² We think that school closure can affect children to maintain their ideal weight in multiple ways: i) due to familial

stressors, the family members are unable to facilitate teaching-learning methods and access to resources for their children; ii) in India and abroad, many schools provide healthy lunches. As per data from the National School Lunch Program, nearly thirty million U.S. children receive lunch from school.²³ Due to school closure, the children were deprived of healthy foods and the insecurity regarding food has increased from 32.6 to 36% during March–July 2020;²⁴ iii) halting of educational progress is associated without school timing and schooling from home.²⁵ This regression/halt are attributed to inadequate parental accessibility and stress (mental and physical) with home-schooling; iv) halt in extracurricular activities in the school like singing, dancing, playing, outdoor activities cause a decrease in physical activities, and it increases the chance of weight gain; v) children's mental health and well-being have also been affected during this pandemic due to isolation from peers and disruption of normal routines activities; vi) due to school closure, the school health programme was affected. School health activities like oral health check-ups, vision screening, growth monitoring and health/nutrition education have been halted completely, and the weight gain/health problems remained unchecked; vii) online learning challenges including the overuse of computers, the internet along sedentary lifestyles like watching TVs with binge eating, attributing to the manifold rise in childhood obesity.

Due to closed outpatient paediatric departments in the hospitals and, or limited access to teleconsultation for the treatment of chronic physical conditions, *per se*, childhood obesity and/or mental illness conditions, are eventually aggravating the whole picture. Furthermore, immunization has acutely suffered as in-person contact for vaccination has been greatly limited when it comes to children.⁴ When it comes to rescue lifestyle medicine, an emerging branch has a lot to offer. There is no doubt that lifestyle interventions are the therapy of choice for children who are obese. The effectiveness of lifestyle interventions has been proven in several randomized controlled trials and meta-analyses.²⁶ The comorbidities of obesity, including cardiovascular risk factors, improve when a growing child with obesity maintains a stable weight. In particular, children aged 5-12 years and children who are overweight rather than obese benefit from lifestyle interventions. Despite this, the degree of weight loss with lifestyle intervention is only moderate, and the success rate two years after starting the intervention is low. Children with overweight or obesity may have difficulty losing weight not only due to a lack of motivation, but also because of genetic background and/or changes in basal metabolic rate, hunger, and satiety hormones as well as the changes associated with weight loss.²⁶

Diet and lifestyle choices are important determinants of health outcomes. Key components of preventive health care include maintaining an appropriate weight, being physically active, and avoiding tobacco, alcohol, and other substances of abuse.

Paediatricians and other primary care providers should promote healthy lifestyles by incorporating the tenets of paediatric lifestyle medicine. This promotes a healthier population of infants, children, and adolescents.

This pandemic has also taken a huge toll on the mental health of the children which is evident by symptoms like easy fatigability, irritability, anxiety, and hyperphagia. During this COVID-19 pandemic, 27% of guardians reported deterioration of mental health and 14% reported deterioration of behavioural health among their children.²⁷

Similar findings were observed during the H1N1 and SARS epidemics in the U.S. (North), where the reported cases of Post-Traumatic Stress Disorder (PTSD) were increased to one-third

among the home isolated/quarantined children.²⁸ Overweight and obese children have a higher risk for depression due to stigma and isolation. It is evident from studies that children with overweight or obesity report more stress and to counter the stress, they are involved in binge eating, further aggravating their obesity.^{29,30}

During COVID-19, being flexible is an important avenue for stress management among the children; however, this strategy is quite difficult to implement when complicated and competing issues like poverty, isolation and mental health are present simultaneously along with COVID-19.³¹ So, from the above discussion, it is evident that COVID-19 has created a favourable condition where the prevalence of childhood obesity can accelerate at a rapid pace. It is also evident that the relationship between stress, mental health, and childhood obesity is complex and interrelated.^{4,29} Home concerns are also a part of the microsystem attributing the childhood obesity phenomenon.

During COVID-19, families have faced financial constraints in the form of job losses, salary cuts, while simultaneously experiencing the increment in food costs.³² It is also evident that due to prolonged lockdown in many countries, many families are stocking ultra-processed foods which are shelf-stable, calorie-dense and easy to cook placing the children at risk for weight gain.³³

During the stressful COVID times, it is difficult to ensure the recommended nutritional requirement of the children suffering from childhood obesity due to limited choices of foods.³³

In the Exo-system, due to loss of income of the families, the safety nets like health insurance get impacted negatively, exposing vulnerable children (including childhood obesity) to the catastrophic insult of COVID-19.⁴ It is seen during our new normal life that parents have less control over the healthy behaviours of their children who have a risk of excess weight gain. Lack of space in the many homes or COVID restriction in green parks/safe working areas has limited the opportunities for children regarding physical exercise and physical activity, which is desirable for maintaining a healthy weight performing large motor skills.⁴

Additionally, exercise and physical activities are anti-obesogenic, as they release anti-stress hormones like endorphin, enkephalin (opioid-like substances) in our brain. Thus, due to lack of exercise during home isolation, our stress level is not neutralised.^{34,35}

Additionally, the home isolated children may experience micro-system hazards like indoor pollution which increase the risk of obesity.³⁶

Taking CO-BESITY by the collar: Recommendations at community and policy level

Strategies at the micro system level need to be devised for maintaining ideal weight among the children during this pandemic. The double health insult from paediatric obesity & COVID-19 disease, *i.e.*, CO-BESITY requires our extended support to affected families and children. Educational resources available on the internet can be used in a positive way to assist children with overweight/obesity to achieve and maintain a healthy routine. Customized interventions have already shown some promise at the family level.³⁶ However, it is important to limit the screen time, maintain an ideal sleep cycle (it is also associated with childhood obesity) and involve the children in tailored indoor physical activities which can be performed at home. Macrosystem interventions like policy interventions are crucial to limit internet/TV advertising of food products specially the processed food that are high in salt, fat, and sugar additionally and front of package food labelling

holds promise. Policy modifications with a focus on the improved nutrient quality of foods with less fat and sugar are quite promising. Many nations have adopted strict food regulations related to food advertising and foods accessibility which can curb the menace of childhood obesity. In many regions where school lunch programmes have been suspended due to the pandemic, school authorities are providing food and raw materials to the doorsteps, indeed this is a welcome step.³⁷ Within microsystems, we must find sustainable safe alternatives to outdoor group-based physical activities during this pandemic for the children. At the macrosystem level, the availability of parks, trails, and water activities is important for pre-booked (so that unnecessary gathering is avoided) family excursions. Chalking socially distanced leisure activities in public places is a proposed long-term plan for physical activity in public spaces. Supervised (ensuring COVID appropriate behaviours) small group outings, rooftop gardening, planned outdoor /indoor activities with neighbours may help in socialization and interactions and reduce the risk of obesity and stress.

Strategies for better nutrition like healthy meal preparation can become a part of daily family activities. Parents can involve children in identifying and designing healthy snacks for the family. Sudden and complete omission of unhealthy snacks must not be done as it may lead to temper tantrums. Rather parents must introduce behaviour change gradually over time, starting from themselves. It has been observed that tailored interventions by multidisciplinary teams involving parents are effective to address obesity and mental health, both among the children. To reduce the stress level, other evidence-based interventions can experiment within the family, such as mindfulness interventions with parent engagement, well-thought-out physical activity, meal preparation engaging children, and improving parenting skills by understanding infant feeding cues.⁴

As we are considering the policy options to protect our children from the double blow of COVID-19 and childhood obesity, we must consider ethical issues during each stage of policymaking. COVID-19 pandemic has constrained many healthy lifestyle options for children. This is high time for the health care workers, family members and communities to build and focus on safe and alternate options for the children. The many adverse effects of the COVID-19 pandemic on childhood obesity must be recognised and an effective policy direction should move forward. Additionally, we recommend that at a policy level an orderly assessment of child health and biopsychosocial requirements is crucial to reduce the double blow of obesity and COVID-19 among the children.

Conclusion

We conclude that the double blow of childhood obesity and COVID-19 (CO-BESITY) is taking a toll on the children. The catch-22 situation created by the two diseases and the changes in the bioecological environment have made the children vulnerable to gain extra weight/aggravate obesity burden among the children. Due to our new normal life, existing health, social and cultural disparities, the stress level of children has increased manifold, which is further weakening the immune system and putting them at a higher risk of COVID-19.

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