



BJGH

Brazilian Journal
of Global Health

Revista Brasileira
de Saúde Global

COVID-19 and body mass index of children and adolescents: Observational study

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ABSTRACT

OBJECTIVE

The present study aimed to analyze the impact of the Covid-19 pandemic on patients treated in the pediatrics at Complexo de Saúde Dr. Wladimir Arruda, São Paulo/SP and its correlation with the Body Mass Index.

METHODS

Observational study, based on the records of pediatric patients at the Dr. Wladimir Arruda Health Complex, to find out the incidence of patients' BMI, between the years 2019 and 2022. The selected records were separated by body mass index (BMI), age and sex. For statistical analysis of the results, tests set at 0.05 or 5%, the significance level, were applied.

RESULTS

It was observed that during the period studied, most patients had an increase in BMI. The results did not show significance, however, they suggest that in patients over 10 years of age the increase was greater when compared to other ages.

CONCLUSION

Most patients had an increase in BMI during the years 2019 to 2022, we cannot say that they became obese, as BMI increases according to the children's growth.

DESCRIPTORS

Childhood obesity, Body Mass Index, Pandemic, Covid-19.

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INTRODUCTION

The historical pattern of nutrition in Brazil shows a transition from the high prevalence of malnutrition to a country where overweight and obesity predominate¹. In recent years, children have become more sedentary, as they have exchanged games for electronic games, changed the location of meals, which should be eaten at the table instead of meals in front of the screen, which generates less of a hypothalamic satiety response, causing the child to become more sedentary. eat more than necessary².

Associated with this, the world is going through a change in the way food is sold and offered, leading to an exponential growth in the manufacturing and consumption of ultra-processed foods, which offer little or no whole food in their composition associated with cosmetic additives such as flavorings, emulsifiers and dyes. These foods have low nutritional value, very palatable, generally with low market value, high advertising, great durability, these variants mean that these foods are consumed in large quantities throughout the world³.

Obesity is a chronic disease characterized by the generalized or localized accumulation of fatty tissue in the body, caused by a nutritional imbalance that may or may not be associated with a genetic and/or endocrine-metabolic disorder⁴.

It is a risk factor for many pathologies, including type II *Diabetes mellitus*, cardiovascular and neuropsychic diseases, reproductive disorders, sleep apnea and other respiratory problems, some types of cancer and depression. In addition to causing disruptions in social life, since the ideal body for the media is a thin body, which harms quality of life⁴.

According to the World Health Organization (WHO)⁵, obesity can begin at any age. When it comes to pediatric patients with obesity, early identification and treatment are necessary to avoid the risk of obese adults and those with comorbidities and, above all, improving the patient's quality of life both in the present and in the future.

An obese child can have consequences for the rest of their life, such as illnesses and habits. Customs when acquired in childhood, especially in early childhood, are very difficult to reverse in adult life⁶.

The diagnosis of obesity is based on clinical diagnosis, including anamnesis and physical examination, as well as complementary tests in order to obtain more accurate data on the amount of lean mass and fat mass in the body. According to the Ministry of Health⁷, children and adolescents do not use the same Body Mass Index - BMI values as adults. The normality limit is established by age- and sex-specific BMI curves, classified according to the Z-BMI⁸ scores⁸. Self-assessment of sexual maturation was not used as it is another method that makes it possible to identify the moment of puberty in the individual⁹.

In March 2020, Brazil began to face a pandemic generated by the Sars-CoV-2 virus, known as Covid-19. To try to stop the growing number of cases, the social isolation regime was introduced, where schools and other establishments closed, as a result, children and adolescents remained at home full time, having considerable deprivation of their social relationships, in which they restricted themselves. only to parents and/or those who lived in the same place¹⁰.

For Malta¹⁰, this full interaction with the family; the separation from contact with friends and the uncertain scenario had major impacts on the lives of children and adolescents. In addition to generating a significant increase in the consumption of frozen foods, fast food, sweets, ultra-processed foods and a decrease in physical activity.

The present study arose in light of information published in the media, during the pandemic, about child food security, risk of malnutrition and obesity correlated with the changes faced by Brazilians in both the quality and standard of living

and eating in recent years. Therefore, we aimed to analyze the impact of the Covid-19 pandemic on patients treated in pediatrics at the Dr. Wladimir Arruda Health Complex in São Paulo/SP, correlating it to the Body Mass Index between the years 2020 and 2023.

METHODS

Type and location of study

This is observational research, based on the medical records of pediatric patients at the Dr. Wladimir Arruda Health Complex, São Paulo/SP to find out the incidence of patients' BMI, between the years 2019 and 2022.

Population and sample

The medical records of all patients who began follow-up at the outpatient clinic prior to 2019 and who, until 12/31/2019, were under 20 years of age were selected.

Patients whose visits were not recurring or who were born during the years stipulated by the study, 2019 - 2022, were excluded; and patients whose care began after 12/31/2019.

Data such as self-assessment of sexual maturation, color, head circumference and abdominal circumference were not taken into account in this study.

Data collect

The selected medical records were separated according to their body mass index (BMI) into two moments, the last service in 2019, designated as pre-pandemic, and the last service between the years 2020 and 2022, designated as post-pandemic, taking into account consideration of what is recommended in anthropometric indices and other parameters adopted by Nutritional Surveillance, according to the recommendations of the World Health Organization (WHO) and the Ministry of Health so that it would be possible to identify whether there was an increase or not in the body mass indices of the patients studied and whether this factor is related to the Covid-19 pandemic.

All collected data were entered into an Excel® table to compare the growth and weight of these patients. In the table, patients were separated by age, sex and BMI, according to the Technical Standard of the Food and Nutrition Surveillance System - SISVAN7.

The age groups used to characterize the patients were: Children aged 0-5 years, children aged 6 to 10 and adolescents, over 10 years old and under 20 years old.

Ethical assumptions

Although this is research involving human beings, we request that the informed consent form (ICF) be waived, as the data used are from medical records. The justification for waiving the informed consent form (Plataforma Brasil) was made, in addition to the consent of the institution holding the records.

The variables evaluated in this study are part of the care plan formalized by the Health Complex, and patients will not be identified and their data will be confidential.

Data were collected after submission and approval (opinion number 5,496,724) by the Research Ethics Committee of the University of Santo Amaro.

Statistical analysis

For statistical analysis, statistical tests were applied, all set at 0.05 or 5%, the significance level.

Mann-Whitney test¹¹, with the purpose of comparing, sep-

arately, for each of the age groups studied, female or male children, in relation to percentage differences ($\Delta\%$) of Body Mass Index (BMI) values, calculated in the pre- and post-pandemic periods.

To calculate $\Delta\%$, the formula was applied:

$$\Delta\% = \frac{(IMC\ 2020\ a\ 2022 - IMC\ 2019)}{(IMC\ 2019)} \times 100$$

Kruskal-Wallis¹¹ analysis of variance, with the objective of comparing the three age groups, separately for female and male children in relation to the $\Delta\%$ values, mentioned above.

Chi-square test¹¹, to compare the frequencies of increase or decrease in BMI between girls and boys in the study.

Of the 3,856 medical records made available by the institution that followed the eligibility criteria, 349 were selected for analysis, after carrying out the sampling calculation, with a 5% margin of error and a 95% confidence level¹².

RESULTS AND DISCUSSION

349 medical records were analyzed, including 106 children aged 0-5 years, 149 children aged 6-10 years and 94 adolescents over 10 years old and under 20 years old. Among biological sexes, we have 173 female patients and 176 male patients.

To evaluate the behavior of BMI in the pre- and post-pandemic periods, the difference delta % ($\Delta\%$) that occurred was calculated and with the results it was possible to obtain correlations between age groups and between sexes, as described in Table 1.

Table 1. Children according to the mean and median of $\Delta\%$ of BMI pre and post pandemic.

Feminine			Masculine			
	6-10	>10				
	(n=56)	(n=70)	(n=47)	0-5(n=50)	6-10(n=79)	>10(n=47)
Average	1.79	2.96	5.23	-0.36	1.98	4.63
Median	3.22	2.86	5.00	2.05	2.67	4.76
A Kruskal-Wallis variance analysis						
Feminine			Masculine			
Hcalc =	5.805		9.415			
p=	0.054		0.009			
A Kruskal-Wallis variance analysis						
Feminine						
0-5 years	6-10 years		>10 years			
z=	1.37		0.56			
p=	0.17		0.57			
			0.93			

$\Delta\%$ shows the increase or decrease in BMI that occurred between the two periods, with positive $\Delta\%$ representing post-pandemic greater than pre-pandemic and negative $\Delta\%$ representing post-pandemic less than pre-pandemic. With this, we can observe that the only group where the majority of patients had a drop in their BMI were boys aged between 0 and 5 years.

We compared the three age groups, separately for female and male children in relation to the $\Delta\%$ values, and there was no difference between the sexes, therefore, there was no significance. And when comparing each of the age groups separately, both female and male children none of them showed significance.

The results of the Kruskal-Wallis and Mann-Whitney tests make us understand that, during the period studied, most patients had an increase in their BMI.

The Dr. Wladimir Arruda Health Complex institution is located in the south of the city of São Paulo/SP, in a highly vulnerable region. For Zemrani¹³, during the COVID-19 pandemic, many families experienced financial difficulties, especially informal workers, as they had to stay away from their workplaces, pushing families into poverty. This meant that families needed to make cheaper and often unhealthy food choices to escape hunger and/or cover their expenses.

In Tables 2 and 3 we have the percentage of increase in ages when compared between biological sexes.

Table 2. Children of sex female according to age groups and increase or decrease in Body Mass Index (BMI) during the period studied.

Age groups	Increased	Decreased	Total	%increase
0-5 years	41	15	56	73.2
6-10 years	54	16	70	77.1
>10 years	43	4	47	91.5
	138	35	173	79.8

Chi-square test.
X²= 5.79 p= 0.0553 NS

Table 3. Table 3-Children of sex male according to age groups and increase or decrease in Body Mass Index (BMI) during the period studied.

Age groups	Increased	Decreased	Total	%increase
0-5 years	29	21	50	58.8
6-10 years	57	22	79	72.2
>10 years	35	12	47	74.5
	121	55	176	68.8

Chi-square test.

After performing the chi-square test, the results were not significant, however, they suggest that in the group aged between 10 and 20 years the percentage of increase is greater compared to other ages, followed by patients between 6 and 10 years and finally patients aged 0 to 5 years, in both sexes.

It is favorable to find that patients between 0 and 5 years of age are those who have seen the least increase in their BMI, since the development of overweight/obesity at this age is worrying, as early childhood is of utmost importance for learning healthy eating habits and physical activities that will last throughout life¹³.

On the other hand, during the pandemic, children and adolescents were subjected to a high level of stress and this was reflected in their eating habits, routine, physical activity and their relationship with food. Therefore, for many, food was seen as a form of relaxation and distraction, since they no longer had leisure activities, causing people to eat more than necessary¹⁴. It is known that weight gain is correlated with positive energy balance, that is, when the individual ingests more calories than they expended¹⁵. Therefore, this could be one of the factors why people gained weight during the pandemic.

The urbanization process has also led people to eat more industrialized and ultra-processed foods in their daily lives, due to the ease of consumption during a fast-paced routine. This new eating behavior is passed on to children and adolescents, leading them to increasingly consume foods with low nutritional value and high caloric content¹⁶.

Therefore, the environment in which people live influences their eating behavior, being a risk factor for obesity, living in an obesogenic environment. Therefore, the presence of environmental and family factors in the development of obesity is strongly noted, making it necessary to interfere with the entire family when it comes to childhood obesity¹⁶.

CONCLUSION

It is concluded that most of the patients who were studied at the Dr. Wladimir Arruda health complex had an increase in their BMI during the years 2019 to 2022.

In view of the data presented, it was found that the pandemic caused by Covid-19 has brought significant changes in social spheres, generating strong influences on Brazilian behavior, lifestyle and eating habits. These changes are related to restrictions caused by the pandemic, such as social isolation.

We cannot say that they have become obese, as the BMI increases with the growth of children, but due to the epidemic of childhood obesity faced in the world and the poor diet of the population in recent years, we suggest that there is a correlation between the increase in BMI and the pandemic faced in the years 2020 to 2023.

Doctors must guide their patients, especially those responsible, about childhood obesity and its risks for the future, proposing follow-up with a multidisciplinary team, encouraging good nutrition and physical activity, regardless of age group.

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