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# Social distancing, cardiometabolic risk and psychosocial change in obese children during COVID-19 pandemic

Distancia social, riesgo cardiometabólico y cambio psicossocial en niños obesos durante la pandemia de COVID-19  
Distanciamento social, risco cardiometabólico e alteração psicossocial em crianças obesas durante pandemia do COVID-19

## ABSTRACT

**Objectives:** To correlate the data of the waist / height ratio in the social distance resulting from SARS-CoV-2 with the period before the pandemic in obese and eutrophic children, and to compare the psychosocial behavior of anxiety with hyperphagia and pinching habits of obese children. **Method:** Case-control study carried out at the Center for Medical Specialties for Children and Adolescents in Aracaju-Sergipe, with 30 obese and 10 eutrophic children. **Results:** The waist / height ratio in the pre and post social isolation in boys was 0.64 and 0.74 respectively ( $p < 0.001$ ) and in girls it was 0.72 before isolation and 0.81 after ( $p < 0.001$ ); obese children were already showing anxiety behavior both in pre-isolation (OR = 5.4) and in post (OR = 9.6); and hyperphagic and pinching eating behavior in pre-isolation (OR = 7.2) and post (OR = 9.2). **Conclusion:** It was observed that social distance promoted an increase in central obesity and anxiety, reflected with hyperphagic and pinching habits.

**DESCRIPTORS:** Obesity; Child; Coronavirus; Anxiety.

## RESUMEN

**Objetivos:** Correlacionar los datos de la relación cintura / altura en la distancia social resultante del SARS-CoV-2 con el período anterior a la pandemia en niños obesos y eutróficos, y comparar el comportamiento psicossocial de ansiedad con hiperfagia y hábitos de pellizco de obesos niños. **Método:** Estudio de casos y controles realizado en el Centro de Especialidades Médicas de la Infancia y la Adolescencia de Aracaju-Sergipe, con 30 niños obesos y 10 eutróficos. **Resultados:** La relación cintura / talla en el pre y post aislamiento social en los niños fue de 0,64 y 0,74 respectivamente ( $p < 0,001$ ) y en las niñas fue de 0,72 antes del aislamiento y 0,81 después ( $p < 0,001$ ); los niños obesos ya mostraban un comportamiento de ansiedad tanto en el pre-aislamiento (OR = 5,4) como en el post (OR = 9,6); y comportamiento alimentario hiperfágico y de pellizcos antes del aislamiento (OR = 7,2) y después (OR = 9,2). **Conclusión:** Se observó que la distancia social promovió un aumento de la obesidad central y la ansiedad, reflejada en hábitos hiperfágicos y de pellizco.

**DESCRIPTORES:** Obesidad; Niño; Coronavirus; Ansiedad.

## RESUMO

**Objetivos:** Correlacionar os dados da relação cintura/estatura no distanciamento social decorrente do SARS-CoV-2 com o período antes da pandemia em crianças obesas e eutróficas, e comparar o comportamento psicossocial de ansiedade com hábitos de hiperfagia e beliscador das crianças obesas. **Método:** Estudo caso controle, realizado no Centro de Especialidades Médicas em Crianças e Adolescentes em Aracaju-Sergipe, com 30 crianças obesas e 10 eutróficas. **Resultados:** A relação cintura/estatura no pré e pós isolamento social nos meninos foi 0,64 e 0,74 respectivamente ( $p < 0,001$ ) e nas meninas foi 0,72 antes do isolamento e 0,81 após ( $p < 0,001$ ); as crianças obesas já apresentavam comportamento de ansiedade tanto no pré isolamento (OR=5,4) quanto no pós (OR= 9,6); e comportamento alimentar hiperfágico e beliscador no pré isolamento (OR = 7,2) e pós (OR= 9,2). **Conclusão:** Observou-se que o distanciamento social promoveu um incremento da obesidade central e ansiedade, refletida com hábitos hiperfágicos e beliscador.

**DESCRIPTORES:** Obesidade; Criança; Coronavírus; Ansiedade.

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**INTRODUCTION**

Childhood obesity is an alarming problem in Brazil and worldwide, with serious cardiometabolic and psychosocial repercussions, and is around 10-15% according to Taylor et al.<sup>1</sup> Its prevalence is increasing due to the behavioral changes that have occurred in the last decades, especially inadequate nutrition and sedentary lifestyle.<sup>2</sup> It can be said that obesity is seen as a multifactorial chronic disease, involving genetic, environmental and psychological issues, and its treatment must have a multidisciplinary approach.<sup>3,4</sup>

Obesity is characterized by the accumulation of adipose tissue in the body, which results from the imbalance between food consumption and caloric expenditure, resulting in a positive energy balance, being considered a disease that has several physiological implications for the endocrine-metabolic system, and potentially significant to maintaining health.<sup>5</sup>

It is known that obesity in the pediatric age group already presents risks of cardiometabolic comorbidities, such as: diabetes mellitus, systemic arterial hypertension, dyslipidemia, and also some cases of neoplasms, in addition to psychological manifestations, such as anxiety. These manifestations contribute to the adoption of hyperphagic and pinching eating habits, which are still exacerbated by the compulsory social distance due to the risk of the new coronavirus pandemic.<sup>6</sup>

The discovery of this new type of coronavirus, currently known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), in the city of Wuhan in China in December 2019, causes Coronavirus disease 2019 (COVID-19).<sup>7</sup> In Bra-

zil, the first case was reported on February 26, 2020, and the indication of social distance in Brazil began in the second week of March.<sup>8</sup>

The clinical picture of this disease can vary from asymptomatic to respiratory failure, its main symptoms are: fever, fatigue, dry cough, myalgia and dyspnoea; individuals may also experience headache, sputum, hemoptysis and diarrhea.<sup>9</sup> SARS-CoV-2 has spread worldwide in pandemic proportions, resounding negatively in pathologies related to obesity, type 2 diabetes, chronic obstructive pulmonary disease, rheumatic diseases in use of corticosteroids and several neoplasms.

Given the characteristics of the virus, a new social isolating behavior is being adopted in order to prevent viral spread and its proliferation.<sup>10</sup> In this sense, it is known that social distance is currently the only way to prevent the spread of the new coronavirus, although it has had a negative impact on individuals with other pathologies such as children with obesity.<sup>11,12</sup>

In view of the social distance established by COVID-19, the present study aimed to: correlate the anthropometric data of the waist/height ratio in the period of social distance resulting from SARS-CoV-2 with the period before the pandemic in a group of obese and eutrophic, and to compare the psychosocial behavior of anxiety with hyperphagia and pinching habits of obese children in the pre and post social isolation period.

**METHOD**

This is a case-control study carried out at the Center for Medical Specialties for Children and Adolescents (CEMCA -

Centro de Especialidades Médicas em Crianças e Adolescentes) em Aracaju-Sergipe. CEMCA is a public service composed of an interdisciplinary team (doctors, nurses, nutritionists, psychologists and physical educators).

Forty children aged 6-8 years participated in this study, 30 obese children with body mass index (BMI) score +2 and 10 eutrophic children with BMI score +1. Obese children were selected through the CEMCA interdisciplinary monitoring group to combat childhood obesity, and eutrophic children were first-degree relatives of obese children of the same age group.

The children were evaluated for a period of 4 months (March to June 2020) at home due to the social distance established by the World Health Organization to combat the new coronavirus pandemic. There was no dropout at the end of the study. The results of the two clinical parameters (waist and height) were reported by the parents or guardians at the time of the telephone consultation carried out by the members of the CEMCA interdisciplinary team.

The assessment of children at home in the quarantine period, as established by the Municipal Health Department of Aracaju, was carried out by parents or guardians, who were properly trained by the interdisciplinary team via telephone through video calls via the WhatsApp application, containing explanatory guidelines.

Parents or guardians received an inelastic measuring tape (150 cm) to measure height, and were trained to place children on the wall in an anatomical position with their feet together, thus measuring these children, and after checking the height, they placed the measuring tape at the mi-

point between the lower costal margin and the highest elevation of the iliac crest and checked the waist. In this sense, central obesity was assessed using this indirect indicator of cardiometabolic comorbidity, dividing the waist by height. The cut-off point for the cardiometabolic risk adopted for this waist/height ratio is greater than 0,5.<sup>13,14,15,16</sup>

The other variables (sex, self-reported color and age) were collected from the medical records of children who are followed up at CEMCA. The hyperphagic and pinching eating behavior was reported by the parents during consultations with a psychologist. This behavior was confirmed after a period of isolation by telephone, where the parents confirmed a greater intake of palatable foods (sweets and treats) in greater quantity and frequency in the group of children with obesity.

Anxiety was assessed by the CEMCA psychologist via telephone via video call and telemonitoring/teleconsultation was also used. The assessment was made using the Revised Children's Manifest Anxiety Scale (RCMAS), known by its trade name "What I think and feel", which was developed by Reynolds and Richmond in 1978. This scale proposes to measure anxiety as a personality trait, was validated for Portuguese, it consists of 37 items in which the subject must choose the answer yes or no.<sup>17</sup>

The variables sex, self-declared color, age, waist-to-height ratio, anxiety, hyperphagic habits and pinching were tabulated by the Statistical Package for Social Sciences - version 22.0. The bivariate association and Odds ratio calculation were evaluated. For the analysis, binary and crude and adjusted logistic regression was used with  $p < 0,05$  after the adjustment.

This study was approved by the Research Ethics Committee of the State University of Santa Cruz (UESC), through the Presentation Certificate for Ethical Appreciation 04065412.600005526.

## RESULTS

Table 1 presents the children's data regarding gender, self-declared color, waist/height ratio in the group with obesity in the isolation period for 4 months by the new coronavirus when compared to the data previously tabulated in the monitoring of this group on a monthly basis in CEMCA, in addition to the data eutrophic children.

It was observed that obese children were 6-8 years old ( $\pm 7,2$  years old), with 15 boys (50%) and 15 girls (50%) belonging to the interdisciplinary monitoring group in the fight against childhood obesity in the CEMCA, and 10 eutrophic children. As for the self-declared color, it presented an Odds ratio (OR) 7,4 and a

confidence interval of 2,2-31,6 and with a  $p$ -value  $< 0,001$ .

The waist-to-height ratio showed a considerable increase in four months of social distance due to COVID-19, this information is confirmed when the waist-to-height ratio is compared in the period of pre and post social isolation for both boys (0,64- 0,74) with OR of (4,6-7,2) and confidence interval of (1,84-11,8) and  $p < 0,001$ , and in girls (0,72-0,81) with OR (4, 6-7,2) and confidence interval of (2,7-20,2) and  $p < 0,001$ . Still in relation to the increase in the values of the waist/height ratio, it was higher in girls (0,72-0,81) in the period evaluated after isolation due to the pandemic of the new coronavirus, when correlated to boys (0,64-0,74). There was no change in the waist/height ratio in the eutrophic group when comparing the pre and post pandemic periods for the new coronavirus.

In relation to table 2, it shows the comparison of psychosocial characteristics of 40 obese and eutrophic children in the period of social distance due to the new coronavirus compared to the evaluation period of the closed group at CEMCA. Children with obesity already show anxiety behavior observed both in the pre-isolation period with OR = 5,4 with a confidence interval of 3,2- 21,6 and  $p < 0,001$ , exacerbated after isolation with OR = 9.6 with a confidence interval of 5,84-11,8

Table 1: Sociodemographic and clinical characteristics of obese and eutrophic children in the period of social isolation due to the new coronavirus compared to the evaluation period of the closed group at CEMCA, Aracaju-2020.

FEATURES		% CLASSIFICATION		ODDS RATIO	IC95%	P <sup>a</sup>
		OBESE	EUTROPHIC			
Sex	Male	15	05	1,1	0,5 – 2,6	0,794
	Female	15	05			
Self-declared color	Blacko	20	08	7,4	2,2 – 31,6	<0,001
	White	10	02			
Waist/Height Ratio	Boys	0,64	0,40	4,6	1,84 – 11,8	<0,001
	Girls	0,72	0,30			
Waist/Height ratio after 4 months of isolation by the new coronavirus.	Boys	0,74	0,41	7,2	2,7 – 20,2	<0,001
	Girls	0,81	0,31			

Source: Prepared by the authors (2020).

Subtitle: the Chi-square test and Odds Ratio with 95% confidence interval (95% CI).

and  $p < 0,001$  and hyperphagic and pinching eating behavior in the pre-isolation period with  $OR = 7,2$  and a confidence interval of 2,7-20,2 complicated in the post-social confinement period by the new coronavirus with  $OR = 9,2$  and a confidence interval of 5,7-22,2 and  $p < 0,001$ .

On the other hand, the eutrophic group of children did not present reports of anxiety or hyperphagic and pinching eating behavior.

## DISCUSSION

With regard to sociodemographic aspects, it has been reported that obesity has a hereditary factor and that black adults are more likely to be obese, this was confirmed for the children in the present study, in which the self-declared black color was predominant. This finding is congruent with the data published by Bell and Thorpe<sup>18</sup> and for Lew et al<sup>19</sup>.

However, the result differs from the study by Moretto et al.<sup>20</sup> with 885 elderly Brazilians in which obesity was not associated with self-declared black color, but with socioeconomic variables such as education and family income, but these variables may be related to color according to reports by Hruby and Hu<sup>21</sup> and by Fradkin et al.<sup>22</sup>

As for anthropometric data, it was noted that in this study, children showed a considerable increase in three months of social distance due to COVID-19. This result is in line with the content published by Ashwell et al.<sup>23</sup>, because they concluded that waist circumference should be kept less than half the height, this explanation may be useful for public health. The increase in central obesity is probably due to sedentary behavior arising from greater anxiety with hyperphagic habits exacerbated in this period.<sup>24</sup>

Childhood obesity is a risk factor for the development of cardiovascular diseases as adults.<sup>25</sup> In addition to causing cognitive effects, it also promotes hemodynamic changes by stimulating the sympathetic and renin-angiotensin-aldosterone systems, inducing greater concentration and retention of saline solutions, significantly overloading the cardiovascular system.<sup>26</sup>

In this study, it was found that children showed anxiety in the period before the pandemic, which was exacerbated in the post-pandemic period due to social confinement, associated with reduced energy expenditure activities.<sup>27</sup> With the COVID-19 pandemic, negative feelings and emotions are common, such as fear, sadness, anxiety, distress and stress; because

of anxiety and stress, individuals develop automatic and also voluntary involuntary responses.<sup>28</sup>

According to Rajkumar<sup>29</sup>, the new SARS-CoV-2 coronavirus has had an impact on the health and well-being of people, including children, and may even generate a real mental health crisis, culminating in behavioral changes. The social distance imposed by COVID-19 predisposes the consumption of industrialized foods and fast-food delivery among with the absence of activities to lose weight in gyms.<sup>30</sup>

These data corroborate the research by Carson et al.<sup>31</sup>, that it was demonstrated in a systematic review that sedentary behavior due to the higher frequency and time spent on TV and electronic games were associated with exacerbation of anxiety behavior with a reflex of hyperphagia and pinching habits.

Anxiety is a complex emotional state generated by some stressor stimulus.<sup>32</sup> Anxious behavior interferes in people's lives, it can be expressed through physiological manifestations (dyspnea, muscle tension, increased heart rate, among others) and cognitive (difficulty concentrating, repetitive and intrusive thoughts, hopelessness, difficulty remembering information, etc.).<sup>33</sup> Thus, children with anxiety experience behavioral and die-

Table 2: Psychosocial characteristics of obese and eutrophic children in the period of social isolation due to the new coronavirus compared to the evaluation period of the closed group at CEMCA, Aracaju-2020.

CARACTERÍSTICAS		% CLASSIFICATION		ODDS RATIO	IC95%	P <sup>a</sup>
		OBESE	EUTROPHIC			
Sex	Male	15	05	1.1	0,5 – 2,6	0,794
	Female	15	05			
Anxiety for obesity pre Coronavirus	Yes	24	-	5,4	3,2 – 21,6	<0,001
	No	06	-			
Anxiety for post Coronavirus obesity	Yes	29	-	9,6	5,84 – 11,8	<0,001
	No	01	10			
Hyperphagic eating behavior and pinching pre Coronavirus	Yes	25	-	7,2	2,7 – 20,2	<0,001
	No	05	-			
Hyperphagic eating behavior and pinching after Coronavirus	Yes	29	-	9,2	5,7 – 22,2	<0,001
	No	01	-			

Source: Prepared by the authors (2020).

Subtitle: the Chi-square test and Odds Ratio with 95% confidence interval (95% CI).

tary changes, adopting compulsive eating habits frequently.

Obesity in the pediatric age group is related to reports of depression, anxiety, loneliness and behavioral changes. These can interfere with the child's life, impairing school performance and family and social relationships. According to Rodrigues, Pombo and Koifman<sup>34</sup>, the excess of adipokines in childhood acts to progressively delay the child's neuropsychomotor and cognitive development, since the multiplication of adipocytes promotes a global delay in neurological development with implications for the immune system, making the obese child more vulnerable to mental and infectious diseases, in addition to increasing the chances of obesity in adulthood.

In view of the current scenario related to the COVID-19 pandemic, it is clear that it leads to the adoption of unhealthy behaviors, such as a low-quality diet and lack of physical exercise, in addition, it also contributes to aggravating the person's emotional aspects.<sup>35</sup> Because of this, it is observed that obese children who participated in this study showed anxiety and increased waist/height ratio.

The study points to the need for health professionals to use the waist/height ratio, as it is a good indicator of central obesity. Due to its practicality of execution and the objective data that this relationship provides, even in the earliest age group, as from this indicator, it is possible to intervene vigorously in this pediatric group in

order to avoid cardiometabolic comorbidities as early as possible.

## CONCLUSION

Given the above, it was observed that social distance promoted an increase in central obesity determined by the waist/height ratio, and also anxiety. The anxiety reflected with hyperphagic and pinching habits is a reality of children with obesity and that the social confinement determined by the pandemic has exacerbated this psychosocial behavior. Thus, one must act effectively by stimulating energy expenditure and individualized, family and group psychosocial guidance to mitigate these psychological repercussions for this group with great social fragility. ■

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