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Socioeconomic, demographic and nutritional characteristics of children with autism spectrum disorder

Características socioeconômicas, demográficas e nutricionais de crianças com transtorno do espectro autista

Abstract

Introduction: Autism spectrum disorder (ADS) is a group of highly complex disorders. Over the years, there has been a growing number of ADS-diagnosed persons. In Brazil, there are few studies on the nutritional profile of this population. ***Objective***: To describe the socioeconomic, demographic, anthropometric characteristics and food consumption of children with ADS from a social movement in Macaé, Rio de Janeiro. ***Methods***: An exploratory, descriptive, quantitative, primary research was carried out between March and June 2020, with 92 children aged 2 to 9 years and their respective mothers, members of the social movement in Macaé. Two questionnaires were used: the first was semi-structured containing socioeconomic, demographic clinical and anthropometric variables; the second, a structured questionnaire about foods consumption. The continuous variables were described as means, standard deviation, and the categorical variables as proportion (%). To determine the significance of the differences found in the responses by groups and categories, the chi-square test was used. P-value <0.05 was used for statistical significance. ***Results***: Most children were male (81.5%) and illiterate (75.0%). It was found that 53.5% of the children were overweight, according to the BMI for age, and 91.1% had adequate height for age. Out of 59 children assessed for foods intake, 78.0% ate beans the day before the interview; 57.6% ate fresh fruits, and 54.2% vegetables; 59.3% consumed sweetened drinks and 37.3%, sweets. ***Conclusion***: Overweight and markers of unhealthy eating habits were high for he assessed group.

Keywords: Autistic Disorder. Eating. Nutritional Status. Child.

Resumo

Introdução: O transtorno do espectro autista (TEA) é um grupo de desordens neurocomportamentais de grande complexidade. Ao longo dos anos, um número crescente de pessoas vem apresentando o diagnóstico. No Brasil, ainda há poucos estudos sobre o perfil nutricional desse grupo populacional. ***Objetivo***: Traçar o perfil socioeconômico, demográfico, antropométrico e consumo alimentar de crianças com TEA de um movimento social de Macaé, Rio de Janeiro. ***Métodos***: Realizou-se um estudo do tipo exploratório, descritivo, quantitativo, de base primária, no período entre março e junho de 2020, com 92 crianças entre 2 e 9 anos e suas respectivas mães vinculadas ao movimento social de Macaé. Utilizaram-se dois questionários, o primeiro semiestruturado contendo variáveis socioeconômicas, demográficas, clínicas e antropométricas; e o segundo estruturado sobre consumo alimentar. As variáveis contínuas foram descritas por média, desvio-padrão, e as variáveis categóricas como proporção (%). Para verificar a significância das diferenças encontradas nas respostas por grupos e categorias, foi utilizado o teste estatístico qui-quadrado. Utilizou-se o p-

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valor <0,05 para significância estatística. ***Resultados***: A maioria das crianças era do sexo masculino (81,5%) e não estava alfabetizada (75,0%). Detectaram-se 53,5% crianças com excesso de peso para a idade, segundo IMC por idade, e 91,1% com estatura adequada, segundo estatura por idade. Das 59 crianças avaliadas quanto ao consumo alimentar, 78,0% consumiram feijão no dia anterior; 57,6% frutas frescas e 54,2% vegetais e/ou legumes; 59,3% bebidas adoçadas e 37,3% doces. ***Conclusão***: O excesso de peso e o consumo de marcadores de alimentos não saudáveis foram elevados no grupo avaliado.

Palavras-chave: Autismo infantil. Consumo alimentar. Estado Nutricional. Crianças.

INTRODUCTION

Autism spectrum disorder (ASD) is a group of highly complex neurobehavioral disorders, in which the individual presents different levels of neurodevelopmental disorders and comorbidities and unusual behavioral characteristics, e.g., reduced eye contact; restriction in showing objects of interest, catching or using them; repetitive or restricted behaviors, interests or activities; stereotyped behaviors; problems with communication and social interaction and limited speaking skills.[1]

People with a diagnosis of ASD are different from each other, which determines the unique condition of each one and specific interventions. There are those who live independently, while others have severe disabilities, requiring care and support throughout life.[2] This condition can entail a heavy emotional and economic burden to caregivers and their families.[3] The demand for care and attention by caregivers and professionals is huge, especially when access and healthcare are inappropriate.[3]

It is estimated that one out of 160 children in the world has ASD, with prevalence in male individuals.[2] Research studies conducted in the United States by the Center for Diseases Control and Prevention (CDC) through the Autism and Development Disabilities Monitoring (ADDM) network between 2011 and 2012 estimated a global prevalence of ASD of 1:68 children aged up to eight years, representing a 23.0% increase over the period of 2006-2008.[4,5] More recent data point to an ADS incidence of 1:44 children aged less than eight years in the United States, with a prevalence 4.2 times higher in male than female individuals.[4]

The factors that probably account for this greater prevalence are early diagnosis, more awareness on this subject in the last years, expansion of criteria of diagnosis of milder cases and better diagnosis tools.[2]

In Brazil, there is a lack of studies that estimate individuals with ASD and associated socioeconomic, demographic, clinical and nutritional factors. However, a study conducted in the city of Santa Catarina (state of Paraná) showed a ratio of 1.31 autistic individuals in 10,000 people.[6] Regarding the nutritional status, the study of Almeida et al.[7] carried out in São Luís (state of Maranhão), with a sample of 29 children, in 2017, revealed that 55.2% of children were overweight and had a high consumption (in calorie) of ultra-processed, obesogenic foods.

Currently, in the municipality of Macaé, there are about 600 families with individuals with medical diagnosis of ADS and registered in a social movement. Furthermore, there are no numbers that indicate the total population of autistic persons living in the town, as well as data that show the characteristic of families of this specific group.

In this regard, because of the importance of this topic and lack of published research, the present study aims to determine the socioeconomic, demographic, anthropometric profile and food consumption of ADS children from a social movement in Macaé, Rio de Janeiro.

METHODS

An exploratory, descriptive, quantitative, primary research was carried out between March and June 2020 with all children (n=97) (2 to 9 years, 11 months and 29 days) with ADS and their respective mothers, members of a social movement that at the time had 400 member families.

The study was developed during the period of the Covid-19 pandemic and, given the impossibility of conducting face-to-face interviews, a sample of children was defined so that the mother or guardian could answer the second form related to food consumption. Thus, a sample with an estimated population of 97 children with autism, as informed by the social movement, was defined. So, with an estimated prevalence of

1.0% of the Brazilian population, 5.0% of statistical error and 95.0% confidence interval, added by 20.0% for possible losses, a sample of 15 children was considered.

As study instruments, two virtual questionnaires were built for the survey, using de free of charge, free access Google Forms research administration application.

The first instrument consisted of a semi-structured questionnaire (containing 48 questions) with socioeconomic, demographic, clinical characteristics, nutritional status and eating behavior. It was sent via messaging application to the parents and/or guardians by the coordinator of the social movement in late March. Firstly, when opening the questionnaire, the participant was asked to accept the Free Consent Term and, afterwards, he/she began to fill it out. If "not accepted", the form did not allow the participant to begin completing the questionnaire, that is, answering the questions.

It should be noted that one of the researchers was previously introduced by the coordinator of the social movement and included into two groups of a messaging application, to help participants to complete the questionnaire and to clarify any doubts they might have (depending on the doubt, the researcher called the child's mother or guardian to clear it up directly with her).

The second questionnaire was semi-structured, containing 14 questions, including nine questions of the form "Food Consumption Markers" designed for children over age 2 years, proposed by the *Coordenação-Geral de Alimentação e Nutrição (CGAN)/Ministério da Saúde* (General Coordination of Food and Nutrition/ Ministry of Health) in contribution to the *Sistema de Vigilância Alimentar e Nutricional (SISVAN)*[8] (Food and Nutrition Inspection System). It proposes to recognize foods or behaviors that are associated with healthy or unhealthy diets. Moreover, because it contains questions related to the foods eaten the day before the interview, it minimizes memory bias. The part of the form that was used was specific for children aged two years or over.[8]

In this study, the following variables were selected for analysis:

1. Socioeconomic and demographic data: kinship (father, mother, others), age of the mother and father in years), household income (in minimum wages [MW]: <1MW, 1 to 2 MW, 3 to 4 MW, =>5 MW); education level of the mother and father (primary, secondary and higher education), profession, employment situation of the mother and father, child' school level.

2. Anthropometric data: weight (kg) and stature (m). The most recent information (last two months) was requested, as described in the child's health log book, or obtained from doctor's or nutritionist's visits), for later calculation of the body mass index for age (BMI - kg/m^2).

3. Eating habits: (a) Do you usually eat meals watching TV, using the computer and/or cell phone? (Yes, No and Don't know); (b) Which meals do you take every day? (breakfast, lunch, afternoon snack, dinner and supper); (c) Foods eaten the day before: markers of healthy consumption (beans; fresh fruits [fruit juice was not considered]); and greens and/or vegetables (without considering potato, cassava, *mandioquinha*, yam). Unhealthy markers (hamburger and/or cold cuts [ham, mortadella, salami, pork sausage, hot dog sausage, other sausages]); sugary drinks (soda, packaged juice, powdered juice, packaged coconut water, guarana/currant syrup, sugar-added fruit juice); instant noodles; packaged snacks or savory crackers; stuffed cookies, sweets or treats (candies, lollipops, gum, caramel, Jell-o). All questions had answer options as yes, no, and don't know.

Data were collected in three steps, as follows: (1) Contacting the coordinator of the social movement for identification of the children and their parents or guardians; (2) Sending the link of the first online

questionnaire in the groups of a messaging application, and the researcher was available to clear up any doubt; (3) Sending the link of the second online questionnaire (Food Consumption) to all participants who answered the first questionnaire, in the groups of a messaging application. This strategy was used to ensure the minimum number of participants defined in the sample calculation.

Data were analyzed in the Statistical Package for the Social Sciences – SPSS software, version 19. The continuous variables were described in means, standard deviation, and the categorical variables in proportion (%). To determine the significance of the differences found in the responses by groups and categories, the statistical chi-square test was used. P-value < 0.05 was defined as statistically significant.

The BMI for age was calculated based on the "weight" and "stature" variables, dividing the weight by the stature squared. The nutritional status was classified following the criteria of growth curves proposed by the World Health Organization and the Brazilian Ministry of Health.[2]

Markers of healthy and unhealthy food consumption were used in the analysis of food consumption. As markers of healthy foods, fruits, greens and beans were considered; as markers of unhealthy foods, processed cold cuts, sweetened drinks, instant noodles and savory crackers as well as sweets, treats and stuffed cookies.[8] Healthy food indicators were also assessed (leafy greens, vegetables, fruits and meats), calculating the proportion of each food eaten the day before the recording by the total population of children with the same age. It was considered healthy consumption when its frequency reached 80.0% for each indicator of healthy foods eaten on the previous day, as defined by the Ministry of Health.[9]

The study is linked to the *Núcleo de Ações e Estudos em Materno-Infantil (NAEMI)* (Center for Mother/Child Actions and Studies) of the *Centro Multidisciplinar UFRJ-Macaé* (CM UFRJ-Macaé) (UFRJ-Macaé Multidisciplinary Center) of the Federal University of Rio de Janeiro, and was approved by the Research Ethics Committee of the Medical School of Campos dos Goitacazes, with number CAEE: 30178620.0.0000.5244.

RESULTS

Of the total 97 children that are registered in the social movement, 95.0% (n=92) were assessed in the first questionnaire of both sexes, with mean age (±SD) of 5.4(±1.8) years. The majority was male (81.5%) and illiterate (75.0%) (Table 1).

Table 1. Percent distribution of the sociodemographic characteristics of children aged 2-9 years with autism spectrum disorder from a social movement. Macaé-RJ. March to June, 2020 (n=92)

Characteristics	N	%
Sex		
Female	17	18.5
Male	75	81.5
Age (years)		
<7	46	50.0
7 or over	46	50.0
Education		
Illiterate	69	75.0
Literate	23	25.0

The questionnaires were answered by the children's mothers who had a mean age of 33.8(±7.0) years. The fathers (n=91) had a mean age of 37.2(±6.9) years; and the mean number of children was 1.7(±0.8) (data not shown in the table).

With respect to the parents' demographic and socioeconomic characteristics, it could be seen that 54.3% of them had two children or more. The majority of parents had completed high school (mother, 54.3%; father, 58.7%), followed by parents with college degree (mother, 41.3%; father, 31.5%). It was found that most families (53.3%) had an income of ≤ 2 minimum wages. Regarding employment, 47.8% (n=44) reported that only the child's father was employed during the interview period (Table 2).

Table 2. Absolute and relative distribution of the socioeconomic and demographic characteristics of the parents of children aged 2-9 years with autism spectrum disorder registered in a social movement. Macaé-RJ. March to June, 2020 (n=92)

Characteristics	N	%
Mothers' education level		
Primary	3	3.3
High School	51	5.4
Higher Education	38	41.3
Fathers' education level		
Primary	9	9.8
High School	54	58.7
Higher Education	29	31.5
Who has a job		
Mother	11	12.0
Father	44	47.8
Both	23	25.0
Others	14	15.2
Per capita Income (minimum wage)		
≤2	49	53.3
3-4	21	22.8
≥5	22	23.9

The children's mean weight was 24.3kg (±8.7); average height was 112.4(±22.2) cm; and average BMI for age was 18.2(±4.8) kg/m^2. The study found that 53.5% of the children were overweight and obese, and regarding the height-for-age index, 91.1% had an adequate stature (Chart 1).

Chart 1. Mean values and standard deviation (±DP) of anthropometric variables and absolute and relative frequency of the anthropometric indices of BMI[1] for age and stature for age of children aged 2 to 9 years, with autism spectrum disorder form a social movement. Macaé-RJ, March to June, 2020 (n=90[2])

Anthropometric variables	**Mean**	**SD[3]**
Weight (kg)	24.3	8.7
Statute (cm)	112.4	22.2
BMI (kg/m^2)	18.2	4.8
Anthropometric indices[4]	**N**	**%**
BMI for age		
Normal weight	41	45.5
Overweight	49	53.5
Stature for age		
Short stature	8	8.9
Adequate stature	82	91.1

[1]BMI = body mass index.
[2]missing (not informed).
[3]SD = standard deviation.
[4]World Health Organization [2]

In the present study, 59 autistic children had the food consumption questionnaire answered by their mothers, of which 74.6% usually had meals watching TV, using a computer and/or cell phone. On average, the children had 4.7±1 meals a day, of which 86.4% ate breakfast, 52.5% a morning snack, 96.6% lunch, 94.9% an afternoon snack, 91.5% dinner and 52.5% supper (Table 3).

Table 3. Percent distribution of variables related to screen media use and daily meals of 2-9 years old children with autism spectrum disorder from a social movement. Macaé-RJ. March to June, 2020 (n=59)

Variables	Yes N (%)	No N (%)
Screen media use during meals	44(74.6)	15(25.4)
Daily meals		
Breakfast	51(86.4)	8(13.6)
Morning snack	31(52.5)	28(47.5)
Lunch	57(96.6)	2(3.4)
Afternoon snack	56(94.9)	3(5.1)
Dinner	54(91.5)	5(8.5)
Supper	31(52.5)	28(47.5)

The survey showed that 78.0% of the children ate bean on the previous day; 57.6% ate fresh fruits, 54.2% leafy greens and/or vegetables and 25.4% consumed meats and eggs (markers of healthy eating). With respect to markers of unhealthy foods consumption, on the previous day, sweetened drinks were the most consumed item (59.3%), followed by sweet foods (37.3%) (Table 4).

Table 4. Percent distribution of food consumption according to healthy and unhealthy food markers of 2-9 years old children with autism spectrum disorder from a social movement. Macaé-RJ. March to June, 2020 (n=59)

Food consumption	Yes N(%)	No N(%)
Healthy eating markers		
Beans	46(780)	13(22.0)
Fruits	34(57.6)	25(42.4)
Leafy greens/Vegetables	32(54.2)	27(45.8)
Meats and eggs	15(25.4)	44(74.6)
Unhealthy eating markers		
Sweetened drinks	35(59.3)	24(40.7)
Sweets	22(37.3)	37(62.7)
Instant noodles	14(23.7)	45(76.3)
Hamburgers	4(6.8)	55(93.2)

The children who consumed sugary drinks the day before the interview had an average ±SD BMI for age (19.5±2.9 kg/m^2) higher than the ones who did not consume it (16,6±5,6 kg/m^2), this difference being statistically significant (p-value=0.03). Consumption of fruits was higher for children who did not use screen media during meals (80.0%), when compared to those who had this habit (50.0%), this difference being statistically significant (p-value=0.04) (data not shown in the table).

DISCUSSION

In this study, there was a predominance of illiterate, male children, with most parents having more than eight years of school (most having graduated high school followed by college graduates). The father is the principal income earner, and household income was low (less than three minimum wages). Most children were overweight and with adequate stature; high consumption of beans the day before the survey, followed by fresh fruits, greens and/or vegetables, meats and eggs. However, indicators of healthy eating did not meet the goal established by the Ministry of Health. Consumption of sugary drinks was high, followed by sweet foods. There were statistically significant differences in the consumption of sugary drinks in children who had a BMI for age higher than the ones who did not consume it, as well as a high consumption of fruits by the children who did not use screen media during meals compared with the ones who did.

The literature points out that ADS is commonly found in male individuals, as observed in this study, usually 4 to 5 times more in males than females.[10] It should also be noted that the proportion of male (4 boys: 1 girl) in the survey agrees with world statistics divulged by the CDC network in the United States[4] and, later, in Canada.[11]

In Brazil, the survey conducted by Kummer[12] in Belo Horizonte-MG indicated that 86.9% of the sample comprised boys, in a total of 69 participants. The study of Baptista,[13] conducted in São Paulo-SP, found that 76.0% of the sample, in a total of 100 children with ADS, consisted of boys.

In this study, the parents' education level varied between high school and higher education, and this finding was similar to the one observed by Rocha *et al.*,[14] who reported that most parents had completed high school. Regarding the child' school level, as half of them are in the preschool level, that is, under six years of age, it can explain the high rate of illiterate children.

Great part of the families earned a low income, similar to the study of Silva *et al.*,[15] who revealed that most families of autistic children had a family income of less than one minimum wage. In the study of Silva,[16] 60.0% of the parents of autistic children had a family income ranging from 2 to 4 minimum wages.

Based on these findings, we can say that the mean family income described in the studies can affect negatively the access to multidisciplinary treatments, because they are very expensive, causing damages to the growth and development of these children. Therefore, this fact reinforces the demand for public, free and quality healthcare programs in the municipality.

With respect to the anthropometric profile, it was found that more than half of the children were overweight, a finding that is similar to the studies of Curtin *et al*.[17] (54.7%) and Silva *et al.*[18] (64.1%).

In the past few decades, it has been observed an increased overweight in Brazilian children. According to the Household Budget Survey (POF 2008-2009), in 2009, prevalence of overweight in 5-9 years old children ranged from 25.0% to 40.0%, showing that one out of every three children at this age was over the weight recommended by World Health Organization. The survey also showed that both overweight and obesity are high in all household income groups and in all Brazilian regions.[19] Therefore, the findings show that children with ADS are likely to be overweight, so a careful look at this specific group of people is important.

Studies have shown that the overweight-associated factors among the child population include the early introduction of processed and ultra-processed foods, rich in fat, sugar and salt;[20] an early exposure to screen media such as television, cell phone, among others, a long-time of use of screen media; and poor physical activity, in addition to genetic and metabolic factors.[21-23]

The peculiar eating habits of autistic children are often cited in research studies, and selectivity based on food group and texture, refusal to eat some foods and indiscipline behaviors during meals are the three characteristics more cited,[24] which will definitely interfere with the consumption of some kinds of foods.

In the population of ADS-diagnosed children, studies have indicated changes in the dietary pattern of these children with respect to selectivity, with a significant increase of aversion to some kind of foods based on colors, aromas, temperature and textures[25]. Such aversion is often related to fruits, leafy greens and vegetables because of the typical colors of these foods. Preference, in turn, is for high-calorie foods, e.g., chicken nuggets, hot dog, etc., which contribute to an increased risk of overweight and obesity.[26]

It should be noted that the aforementioned dietary pattern in typical children is associated with a greater risk of cognitive impairment due to oxidative stress and neuroinflammation. Thus, we can infer that the adverse impacts on children with ADS are even worse.[12]

In this study, the food consumption indicators were initially evaluated with the purpose of identifying healthy and unhealthy eating practices.[8] Consumption of beans by the children with ADS was close to the World Health Organization target (80.0%), although still low for fruits, greens and vegetables. In addition, consumption of sweetened drinks and sweet foods was high, resulting in a poor-quality diet and weight increase.

The number of daily meals eaten by the children in this study was considered satisfactory, which might be influenced by the longer time at home during the period of social distancing imposed by Covid-19, when data were collected. The most consumed meals were lunch, afternoon snack and dinner. Regarding screen media use, it could be observed the habit of children eating meals while viewing TV, using computers and/or cell phones. The study found a higher frequency of fruits consumption by children who did not use screen media during meals compared to those who had this habit. Excessive screen use is considered a risk factor for the development of overweight in the early life stages.[27]

Literature indicates that TV viewing is one of the habits that leads to poor physical activity, as well as a high consumption of foods with high calorie density.[27,28] In addition, the distraction caused by screen media interferes with the physiological signs of hunger ad satiety, leading to inadequate food choices with excessive intake of high-calorie and low-nutrient products.[27]

National population studies indicate that the consumption of ultra-processed foods by children has been observed since the early 21st century. The *Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher* (National Survey of Demography and Health of Children and Women) in 2006 showed that children aged 2 to 5 years from different Brazilian regions had consumed unhealthy foods such as fried foods, sodas at least one time in seven days before the survey. [29]

Souza *et al*.,[30] in a quantitative and qualitative cross-sectional study with 43 students from the public-school network in Manaus-AM, aged between 6 and 11 years, of both sexes, found a high consumption of processed foods, animal-based foods, sugars and refined sugars and low consumption of dietary fibers and fishes.

National surveys show that a high consumption of ultra-processed foods and low intake of fruits and vegetables increase the risk for overweight, obesity and development of noncommunicable chronic diseases (NCD), changing the child's taste liking substantially, since children who eat ultra-processed foods tend to refuse natural, fresh foods as they are less attractive to taste.[7]

Given this scenario, it can be seen that there has been an inadequate eating habit by Brazilian children, including those with ADS, as observed in the present study. Therefore, it constitutes a worrying fact that requires great attention by health professionals such as doctors and nutritionists. In addition, public policies targeted to children under 10 years of age should be strengthened, since they are very susceptible to variations in the nutritional status, which will have repercussions in adult life.[31,32]

However, it should be noted that the abnormalities related to the eating habits observed in children with ADS may be linked to the central disorders of autism. This is because ADS children's immaturity for social interaction and behavior during the meals can hinder the development of common skills such as the use of cutlery, as well as the communication difficulty can affect the expressiveness of feelings such as hunger and satiety.[33]

The present study has limitations. The first one refers to data collection, which occurred during the beginning of the Covid-19 pandemic. The Brazilian government, through Law no. 13.979/2020, specified some protective measures to prevent contamination and the spread of the coronavirus, determining social distancing of the population.[34] The city of Macaé followed these measures through the Decree no. 27/2020.[35] Thus, social distancing may have influenced the participants' daily routine, interfering with the responses. But it should be noted that most of the Brazilian population experienced this problem, not only the study population.

The second limitation is related to the use of on-line questionnaires, impeding face-to-face interviews. But the use of communication technologies such as the messaging application enabled a direct contact with the participants to clarify doubts with the researcher, who was always available, as well as the participation of almost all selected families, making the sample representative of this group. However, the results of this study cannot be generalized to other populations. It should also be mentioned that the information about the nutritional status (weight and height) was reported, not collected directly from the children studied. Thus, the nutritional diagnosis may be over- or under-estimated. However, data were obtained from information contained in the child's health log book or doctor's and nutritionist's visits recorded by healthcare professionals, a secondary source also utilized in descriptive studies.

To finalize, the third limitation is related to eating behavior. Even not being the focus of analysis of the present study, it should be noted that in the literature one can find the Labyrinth Scale *(Escala para Avaliação do Comportamento Alimentar em pessoas com TEA)* (Scale for Assessment of Eating Behavior of People with ADS), with 26 questions, aiming to "identify the dimensions of altered eating behaviors, providing a more specific direction for therapy, and also to assess the treatment progress".[36:191] Because data collection occurred during the pandemic period, it was decided not to use the instrument because of the number of questions, considering that the families' emotional stress and social isolation could lead to the participants' withdrawal or aggravate the percentage of errors in filling it out, and returning more than one virtual questionnaire. In addition, due to the study originality with the assessed group, the researchers understood that, in a first moment, it would be possible to identify the main characteristics of the autistic children from the social movement for the conduction of future studies with a more specific approach.

CONCLUSION

The study found a great number of male, illiterate, overweight and normal-height children from low-income families. Except for meats and eggs, more than half of the children consumed healthy foods, although the indicators of a heathy diet had not reached the target set by the Ministry of Health.

Consumption of sugary drinks and sweet foods (markers of unhealthy eating habits) was high. Moreover, the intake of sugary drinks was high for children who had a BMI for age higher than the ones who did not consume this kind of drink, as well as the consumption of fruits was high for children who did not use screen media during the meals compared to those who did so.

The findings are worrisome and flag up the need for research studies that could allow more in-depth methodology about the complexity of the eating habits in order to identify the specific needs of an autistic individual, as well a greater number of variables to assess the nutritional status (anthropometric assessment and eating habits) to refer children to an adequate therapeutic intervention.

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Contributors

MFB, JCSC and LSM participated in the study conception and design; data collection, analysis and interpretation; in the writing and final revision of the manuscript. AB, ACSC, CP, NS and AVL participated in data analysis and interpretation and in the writing and final revision of the manuscript. All authors approved the final version of the manuscript.

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