CHAPTER
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Nutritional status, food consumption and nutritional monitoring practice of children and adolescents with autism spectrum disorder

https://doi.org/10.56238/alookdevelopv1-140

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ABSTRACT
Objective: To evaluate the nutritional status, food consumption, and nutritional monitoring of children and adolescents with autism spectrum disorder (ASD). Methods: Cross-sectional, quantitative study, carried out between September and October 2022, with 8 individuals aged 5 to 14 years, diagnosed with ASD, enrolled in 5 municipal schools in a municipality in Rio Grande do Sul. Data on name, sex, date of birth, the practice of nutritional monitoring, weight, and height were collected to assess the nutritional status through the Body Mass Index for age, according to the growth curves of the World Health Organization (WHO, 2007), in addition to 2 24-hour food recalls, considering the average consumption of both referring to the total energy value (TEV), macronutrients (carbohydrates, proteins, and lipids) and micronutrients (iron, zinc, magnesium, vitamin A, C, and D), which were compared with the Dietary Reference Intakes (DRIs). Results: Regarding nutritional status, 50% (n=4) were eutrophic, 12.5% (n=1) overweight and 37.5% (n=3) obese, with 100% (n= 8) did not perform nutritional follow-up. Intake of TEV and macronutrients was by the daily recommendation, while micronutrients were inadequate. Fresh foods were the basis of the evaluated diet. Conclusion: A considerable portion was overweight. The dietary intake of TEV and macronutrients was in line with daily recommendations, while micronutrients were inadequate. None of the individuals with ASD practiced nutritional monitoring with a professional nutritionist.

Keywords: Nutrition, micronutrients, eating, autistic disorder.

1 INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder, having characteristics of difficulties in communication, and social interaction, and also restricted and repetitive behaviors (BRASIL, 2019).

Symptoms usually manifest in the first years of life and most often are associated with other disorders or medical conditions, such as attention deficit, anxiety, depression, hyperactivity, and epilepsy (GOMES et al., 2020).

Restricted and repetitive behaviors and sensory sensitivity in these individuals are related to greater eating difficulties, such as food selectivity (BATISTA et al., 2019).

Although food selectivity is frequent in childhood, there is a higher prevalence in children with ASD, as restricted and repetitive behaviors extend to feeding, limiting the food repertoire (PAGE et al., 2021).

Food selectivity is characterized by refusal to eat one or more foods and/or by little interest in food. This can result in limitations in the variety of foods consumed and maintain resistance to trying new foods (ROCHA et al., 2019).

One of the worrying factors about the diet of individuals with ASD is the frequent consumption of processed and ultra-processed foods, which, in addition to causing an increase in body weight, leading to overweight or obesity, are rich in fats, sugars, and sodium and have a low content of fiber, vitamins, and minerals, which are essential to achieve nutritional needs (ALMEIDA et al., 2018).

Nutrition has a great influence on physical fitness, intellectual potential, and the protection it offers against overweight and obesity (ROGERS; BLISSETT, 2019).

A diet based on proteins, carbohydrates, good quality fats and rich in vitamins and minerals, is essential for good physical and psychological development (FARIA; SAINTS; VIEIRA, 2021), as minerals and vitamins, such as iron, zinc, magnesium, vitamins A, vitamin C, and vitamin D are directly related to the phase of growth and cognition and are important for good health and proper functioning of the body (ADAMS et al., 2021).

In general, eating habits are related to the sensory vision of the world, as well as being immediately related to motor skills (BRZÓSKA et al., 2021).

The feeding process involves the mouth and face area and is based on the ability to perform movements with the oral and facial muscles.

The proper course of feeding also requires a harmonious development of gross motor skills and manual dexterity, as well as perception and multisensory processing and these mechanisms often fail in people with autism (VIVIERS et al., 2020).

Due to sensory sensitivity in individuals with ASD, it is necessary to introduce and intervene in nutrition (ADAMS et al., 2018), as food research is essential for the formation and establishment of strategies, which aim at prevention and health promotion (PITOMBO et al., 2019).

Thus, it is important to evaluate the nutritional status, food consumption, and nutritional monitoring practice of children and adolescents with ASD.

2 METHODOLOGIES

This is a quantitative, cross-sectional study, whose data collection took place from September

to October 2022, with 8 children and adolescents between 5 and 14 years of age of both sexes, diagnosed with ASD, enrolled in five municipal schools in the municipality of Rio Grande do Sul.

For data collection, we used a structured questionnaire containing name, gender, date of birth, and nutritional monitoring practice with a professional nutritionist, as well as two 24-hour food recalls to assess food intake and anthropometry of weight and height to assess nutritional status.

All data were collected through home visits, and the parents of the children participating in the study were interviewed.

The information on food consumption, obtained through the two 24-hour food recalls, considered one day of the weekend and another referring to the 24 hours before the day of the interview, excluding Saturday and Sunday, if it occurred on Monday. All meals and foods consumed were recorded, as well as their amounts in homemade measures.

The food recalls were analyzed in the DietSmart software to obtain food consumption data for total energy value (VET), macronutrients (carbohydrates, proteins, and lipids), and micronutrients (iron, zinc, magnesium, vitamin A, vitamin C, and vitamin D), being considered the average consumption of both food recalls.

For the analysis of food intake, we considered the difference of 5% more or less from the average consumption of VET and nutrients of interest, which were compared with the Recommended Dietary Allowances (RDA) of the Dietary Reference Intakes (DRIs), according to the age group and sex of each individual, being that for the calculation of the Estimated Energy Requirement (EER) the recommendations of the DRIs (IOM, 2002/2005) were used, for carbohydrates, proteins, and lipids the recommendations of the Acceptable Macronutrient Distribution Ranges (AMDR) of the DRIs (IOM, 2002/2005) were used, for iron, zinc and vitamin A the RDA of the DRIs was used (IOM, 2001), for vitamin C the RDA of the DRIs (IOM, 2000), for vitamin D the RDA of DRIs (IOM, 2011) and for magnesium the RDA of DRIs (IOM, 1997).

To analyze the quality of food consumption, in nature, processed and ultra-processed foods were classified according to the level of processing, according to the Food Guide for the Brazilian Population (BRASIL, 2014).

After the classification of the foods, the percentage of the energy value of these foods was calculated in the DietSmart software referring to the VET of each food recall, considering the average of both.

Weight and height were measured according to the evaluation method of the International Society for the Advancement of Kinanthropometry (ISAK).

To measure the height, an inextensible Cescorf tape measure was used with a precision of 2 meters, with the user in an orthostatic position, erect and barefoot, feet and legs forming a right angle,

head raised looking at a fixed point at eye level, arms extended along the body, head in the Frankfurt plane and free of props (STEWART et al., 2011).

Weight was measured through an electronic scale of the Britania digital platform type, with a capacity of 150 kg, with the user in the center of the equipment, erect, with the weight distributed equally in both feet and arms along the body, barefoot and with as little clothing as possible (STEWART et al., 2011).

Through the weight and height data, the Body Mass Index (BMI) was calculated, represented by the weight (kilograms) divided by the height (meters) squared, to evaluate the nutritional status. BMI was assessed according to the growth curves of the World Health Organization (WHO) for children and adolescents aged 5 to 19 years (WHO, 2007).

For the classification of nutritional status, BMI was considered, according to sex and age (BMI/A), and anthropometric indices were expressed as Z-Score (BRASIL, 2011).

To analyze the results, the Microsoft Office Excel® 2016 tool was used. The data were presented through simple tables. Continuous variables were expressed as absolute frequencies, mean and standard deviation.

The present study was approved by the Research Ethics Committee (CEP) of Univates, under opinion number 5,611,539. Authorization for the participation of children and adolescents was obtained through the signing of the Term of Free and Informed Consent by parents or guardians and the signing of the Term of Assent by children and adolescents.

3 FINDINGS

The present study identified that most of the sample, 75% (n=6), were male and only 25% (n=2) were female. Regarding nutritional status, 50% (n=4) were eutrophic, 12.5% (n=1) were overweight and 37.5% (n=3) were obese, and 100% (n=8) of the sample was not under nutritional follow-up with a professional nutritionist.

Table 1 presents the descriptive statistics for the quantitative variables of age, weight, height, nutritional status according to BMI and dietary intake of VET, carbohydrates, proteins, lipids, iron, zinc, magnesium, vitamins A, and C, as well as in nature, processed and ultra-processed foods, represented as mean and standard deviation, as well as with the minimum and maximum values of each variable.

Table 1. Descriptive statistics for the quantitative variables of age, nutritional status, and food consumption of children and adolescents with autism spectrum disorder.

Variable	Minimum	Maximum	Average	Standard deviation
Age (years)	5,0	14,0	7,6	3,3
Weight (kg)	19,0	45,0	31,6	9,07
Height (m)	1,14	1,61	1,30	0,2
IMC (kg/m²)	14,7	21,6	18,5	2,3
VET (kcal) media	768,9	3006,9	1689,0	667,6
Carbohydrates (%)	41,8	64,2	54,3	0,09
Proteins (%)	11,9	27,2	18,4	0,06
Lipids (%)	21,5	33,2	27,3	0,05
Iron (mg)	5,5	15,2	8,4	3,1
Zinc (mg)	2,9	14,9	10,1	4,0
Magnesium (mg)	75,2	252,5	162,6	58,5
Vitamin A (mg)	117,2	514,1	333,2	147,4
Vitamin C (mg)	43,5	238,7	91,3	72,2
Vitamin D (mg)	0,0	5,9	2,9	2,4
In nature (kcal)	440,6	972,5	811,7	177,7
In nature (%)	28,7	77,7	53,4	16,9
Processed (kcal)	0,0	618,0	154,0	221,6
Processed (%)	0,0	21,5	7,0	8,8
Ultraprocessados (kcal)	278,3	1548,5	723,3	460,3
Ultraprocessados (%)	22,3	55,1	39,6	13,7

Legend: kg = kilograms; mg = milligram; m = meters; BMI = Body Mass Index; kg/m² = kilograms per square meter; VET = Total Energy Value; % = percentage. Source: Construction of the authors.

Based on the recommendations of the DRIs, Table 2 shows that the average daily intake of VET, as well as macronutrients (carbohydrates, proteins, and lipids), being considered the difference of 5% for more or less, were found to be adequate.

Table 2. Comparison of energy and macronutrient intake with the *Dietary Reference Intakes* of children and adolescents with autism spectrum disorder.

Variable	Average	Standard deviation	DRIs
VET (kcal) media	1689,02	667,58	1609,77*
Carbohydrates (%)	54,3	0,09	45% a 65%
Proteins (%)	18,4	0,06	10% a 30%**
Lipids (%)	27,3	0,05	25% to 35%**

Legend: VET = Total Energy Value; % = Percentage; DRIs = *Dietary Reference Intakes. *Estimated Energy Requirement (EER) of DRIs (IOM, 2002/2005);* **Acceptable Macronutrient Distribution Ranges (*AMDR) of DRIs (IOM, 2002/2005).* Source: Construction of the authors.

Table 3 shows the adequacy of the micronutrients found, based on the recommendations of the GDR of DRIs, according to the age and sex of the study participants.

Among the micronutrients, inadequate intake of iron, vitamins A and D were found, and all of them were evaluated with their intake below the recommendations. For zinc, magnesium, and vitamin C, most of the samples presented consumption above the recommendations.

Table 3. Comparison of micronutrients with the *Dietary Reference Intakes*, according to the age and sex of children and adolescents with autism spectrum disorder.

Variable	Number of cases	Average	Standard deviation	Age (years)	Sex	DRIs
Iron	6	9.0 mg/day	3,4	4 to 8	M/F	10 mg/day
	1	7.7 mg/day	-	9 a 13	M/F	8 mg/day
	1	5.5 mg/day	-	14 an 18	M	11 mg/day
Zinc	6	10.9 mg/day	3,3	4 a 8	M/F	5 mg/day
	1	11.9 mg/day	-	9 a 13	M/F	8 mg/day
	1	2.9 mg/day	-	14 an 18	M	11 mg/day
Magnesium	6	173.2 mg/day	65,1	4 an 8	M/F	130 mg/day
	1	128.4 mg/day	-	9 a 13	M/F	240 mg/day
	1	132.9 mg/day	-	14 an 18	M	410 mg/day
Vitamin A	6	357,7 UG/DIA	139,3	4 a 8	M/F	400 ug/he
	1	402,0 ug/he	-	9 a 13	M/F	600 ug/he
	1	117,2 UG/DIA	-	14 an 18	M	900 ug/he
Vitamin C	6	74.8 mg/day	46,5	4 a 8	M/F	25 mg/day
	1	238.7 mg/day	-	9 a 13	M/F	45 mg/day
	1	43.5 mg/day	-	14 an 18	M	75 mg/day
Vitamin D	8	2,9 ug/he	2,4	1 an 18	M/F	15ug/he

Iron, Zinc, and Vitamin A (RDA/DRIs – IOM, 2001); Vitamin C (RDA/DRIs – IOM, 2000); Magnesium (RDA/DRIs – IOM, 1997); Vitamin D (RDA/DRIs – IOM, 2011). DRIs = *Dietary Reference Intakes.* Fonte: Construção dos autores.

Table 4 shows that the highest caloric contribution observed among the mean food recalls came from food Fresh followed by ultra-processed foods.

Table 4. The energy contribution of the consumption of *natura*l, processed and ultra-processed foods about the total energy value of children and adolescents with autism spectrum disorder.

Type of food	Average kcal	Standard deviation Kcal	Average %	Standard deviation %
In nature	811,7	177,7	53,4	16,9
Processed	154,0	221,6	7,0	8,8
Ultraprocessados	723,3	460,3	39,6	13,7
TOTAL	1689,0	667,6	100	-

Caption: kcal = kilocalories; % = percentage. Source: Construction of the authors.

4 DISCUSSIONS

Among the children and adolescents evaluated, when adding those with overweight and obesity, the result reached 50% (n=4), representing half of the sample with nutritional status of overweight.

Almeida et al. (2018), conducted a study in São Luís, Maranhão, with 29 children between 3 and 12 years old, diagnosed with ASD, and assessed the nutritional status through BMI/A, where they found a prevalence of 34.5% (n=10) of overweight and 20.7% (n=6) of obesity, totaling 55.2% when adding those with overweight and obesity, representing more than half of the sample with nutritional

status of overweight, similar to the findings of the present study.

Liu et al. (2019b), conducted a study in San Marcos, Texas, with 51 children aged 7 to 12 years, diagnosed with ASD, and from the BMI/A assessment found that 20% of those evaluated were obese and 17% were overweight, totaling 37% of the sample with overweight, a lower prevalence of overweight in individuals with ASD concerning that evidenced in the present study.

Alkhalidy et al. (2021) conducted a case-control study in Amman, Jordan, with 52 children with ASD (37 boys and 15 girls) and 51 typically developing children (26 boys and 25 girls), aged 3 to 6 years, in which they compared BMI/A between individuals with ASD and with typical development, and boys with ASD had a higher mean BMI compared to boys with typical development, putting them at risk of being overweight, while girls with ASD had lower BMI averages than those with typical development.

Through the assessment of nutritional status, it was possible to identify a high prevalence of overweight in children and adolescents with ASD evaluated in the present study.

Although the consumption of VET is by the daily recommendations, it was possible to notice that the consumption of ultra-processed foods presented a considerable energetic contribution to the VET of the food recalls.

Because of this, such results related to nutritional status are possibly associated with the consumption of these foods.

Ultra-processed foods have high energy density and their excessive consumption associated with inappropriate eating behaviors are harmful to energy homeostasis, as they increase the likelihood of developing overweight and obesity (ELIZABETH et al., 2020).

Still, in individuals with ASD, food selectivity is related to greater aversions to aspects of color, odor, temperature, and texture, thus favoring a certain preference for more caloric foods and decreased consumption of fruits, vegetables, and legumes.

Thus, children and adolescents with autism are more likely to be overweight (KUSCHNER et al., 2017; CAETANO; GURGEL, 2018). In short, obesity considerably increases the risk of developing metabolic diseases such as type 2 diabetes mellitus (DM), liver, cardiovascular diseases, depression, and cancer (BLÜHER, 2019).

As seen, about food intake, the mean VET found from the food recalls was adequate when compared with the recommendation of the calculation of the EER, according to the DRIs (IOM, 2002/2005), indicating an adequate energy intake of the individuals with ASD evaluated in the present study.

However, Caetano and Gurgel (2018), in their study in Limoeiro do Norte, Ceará, with 26 children aged 3 to 10 years with a diagnosis of ASD, from three food recalls found energy consumption

above the recommended. In the study by Neumeyer et al. (2018), in Boston, United States, with 49 boys aged 8 to 17 years, 25 individuals with ASD, and 24 individuals with typical development, when comparing energy consumption through the evaluation of three food recalls, found that individuals with ASD consumed approximately 16% fewer calories compared to those with typical development.

Adequate energy consumption is essential for growth in the first years of life, as an adequate diet, in addition to promoting health, provides the necessary nutrients for the development and proper functioning of the body (ROSSI et al., 2022).

The mean macronutrient intake of the present study was also adequate for carbohydrates, proteins, and lipids. In the study by Caetano and Gurgel (2018), through the three food recalls evaluated, they evidenced adequate consumption of carbohydrates and proteins, but for lipids, the consumption was below the recommended, which may lead to reduced absorption of fat-soluble vitamins.

In the phase of childhood and adolescence, it is essential to practice a balanced diet, which makes natural foods, such as fruits, vegetables, vegetables, roots, tubers, eggs, meats, rice, and beans, the basis of the diet, because these foods are food sources of good quality, provide energy and ensure normal and healthy growth and development in the early stages of life (BRAZIL, 2014; PEAR TREE; OLIVEIRA, 2021).

In addition to energy and macronutrient intake, vitamins and minerals are essential for good health and essential in the growth phase. Iron is the most abundant trace element in the human body (WOOD, 2019) and is involved in several neurodevelopmental processes (PIVINA et al., 2019).

In the present study, inadequate iron intake can be observed, being 100% (n=8) below the daily recommendations. Diaz et al. (2021), conducted a study in Córdoba, Spain, with 54 children with ASD and 57 with typical development, all from 2 to 6 years, and, from three food recalls, found that iron intake, both in the group with ASD and in the group with typical development, was lower than recommended, similar to the present study.

Iron acts mainly in the synthesis of red blood cells (RBCs) and the transport of oxygen in the body. There are two types of iron present in foods, heme iron, found in animal foods, and non-heme iron, found in vegetables.

However, for greater availability of this nutrient, foods such as red meats, chicken, pork, fish, dark green leafy vegetables, and legumes are recommended (BRASIL, 2013; BRAZIL 2022).

In the present study, through food recalls, it was possible to observe the low frequency of these foods in the diet of individuals with ASD, which should be considered, because iron deficiency compromises the immune system, increasing the predisposition to infections and may cause iron deficiency anemia, thus reducing the cognitive function of growth and development and also

decreasing the learning capacity (MEIOS, 2020).

Regarding zinc intake, the results of the present study showed 12.5% (n=1) below and 87.5% (n=7) above the recommendations. However, the values above the recommendations do not exceed the recommendations of the A Tolerable Upper Intake Level (UL), which recommends for children from 4 to 8 years 12mg/day and 23mg/day for children from 9 to 13 years, presenting no harm to health (RDA/DRIs – IOM, 2001).

Zhu et al. (2020), conducted a cross-sectional study in Chongqing and Hainan, China, with 738 children with ASD and 302 with typical development, from 2 to 6 years, and found that children with ASD had higher rates of zinc deficiency than children with typical development, and deficiency of this micronutrient may be associated with ASD symptoms.

In neuron-rich areas, the most abundant nutrient is zinc, which is important for neuronal modulation, learning, and memory (LIU, 2019a).

A deficiency of this mineral can lead to changes in behavior or mental functioning, which can cause learning disorders and also increase the risk of susceptibility to epilepsy (ORDAK et al., 2017).

The consumption of the mineral magnesium in the individuals evaluated with ASD in the present study was 25% (n=2) below and 75% (n=6) above the daily recommendation, and the values above the recommended exceeded the recommendations of the UL, which recommends 110mg/day for children aged 4 to 8 years, not being harmful, because the body tends to excrete excess nutrients, such as magnesium (LOPRESTI, 2020).

However, the high consumption of magnesium was possibly associated with higher consumption of natural foods, such as meat, chicken, and beans, found in the food recalls of the present study.

The study by Diaz et al. (2021), found that magnesium intake, both in the ASD group and in the typically developing group, was lower than recommended, and these results were different from the present study.

Magnesium plays an important role in brain function, being fundamental to keeping neurons healthy, ensuring the proper functioning of the nervous system, by being involved in the formation of membrane phospholipids, being indispensable for nerve transmission (YAMANAKA; SHINDO; OKA, 2019; VERONESE et al., 2020), in addition to being essential for child growth (CAO et al., 2019).

Deficiency of this mineral may increase the risks for diseases such as diabetes and neurodegenerative diseases (YAMANAKA; SHINDO; OKA, 2019).

Among the vitamins, vitamin A showed that all individuals with ASD evaluated in the present

study had consumption below the daily recommendation values.

Liu et al. (2016), conducted a Chongqing study in China, with 154 children with ASD and 73 children with typical development, and to evaluate the consumption of vitamin A performed, for five days a week, the weighing method, where the study participants performed the meals, being in kindergarten or the permanent institution, and during two days of the weekend through a food diary, in which they observed lower vitamin A intake in autistic children compared to typically developing children.

This micronutrient plays an important role in the digestive system, regulating intestinal bacteria and the nervous system acts by affecting brain development, memory formation, and the learning process, being essential for a varied diet and is rich in foods of plant and animal origin, as the lack of vitamin A can impair growth, increase the chances of respiratory infections and eye damage, such as xerophthalmia (LIU et al., 2021).

The results of vitamin C (ascorbic acid) consumption in the present study presented 87.5% (n=7) above the recommendations, presenting no harm to health since the values do not exceed the recommendations of the UL, which recommends for children from 4 to 8 years 650mg/day and 1200mg/day for children from 9 to 13 years (RDA/DRIs – IOM, 2000), and 12.5% (n=1) were below the recommendations, being recommended a variation in diet, including, for example, fruit options in the diet, as they are sources of vitamin C.

Berding and Donovan (2018), conducted a study in Urbana, Champaign County, with 26 children with ASD and 32 children with typical development, between 2 and 7 years, and, from the three-day food recall, they showed that vitamin C intake was lower in the ASD group compared to the typically developing group, probably due to the repetitive eating patterns of children with ASD.

Vitamin C is essential and works as an antioxidant in various oxidative and metabolic reactions allowing the growth and repair of tissues in the body. Its deficiency can cause scurvy, presenting symptoms such as bleeding gums, pallor, and fatigue (BRAMBILLA; PIZZA; LASAGNI, 2018).

The evaluation of vitamin D intake showed that 100% (n=8) were below the recommended value.

Still in the study of Liu et al. (2016), conducted in Chongqing in China, the results through the evaluation of vitamin D intake, indicated a lower concentration of the vitamin in the diet in both children with ASD and those of typical development, but the study showed that vitamin D deficiency was the most prevalent nutritional deficiency observed among children with ASD.

Prolonged deficiency of Vitamin D in the body may be associated with the risk of cardiovascular diseases, infections, and inflammation (JORGE et al., 2018) since this vitamin has an important anti-inflammatory, anti-infectious, immune system regulator and cardiovascular and

cerebral protective role (VIERGE et al., 2017).

On micronutrient deficiency, in the study by Zhu et al. (2020), children with ASD had a higher risk of nutritional deficiencies compared to typically developing children, in which low levels of vitamin D, vitamin A, and zinc were associated with ASD symptoms, such as communication difficulties, social interaction, and also restricted and repetitive behaviors.

Regarding the quality of food consumption, natural foods represented an energy value of 53.4% with the VET, being, therefore, the basis of the diet of individuals with ASD participating in this research.

Processed foods represented 7.0% and ultra-processed foods 39.6% concerning VET, a percentage that cannot be considered low since the consumption of these foods is not recommended by the Food Guide for the Brazilian Population (BRASIL, 2014).

Similar results were observed in the study conducted by Almeida et al. (2018), through a food recall, in which natural or minimally processed foods represented 61% of total calories, being the basis of the diet of children and adolescents with ASD, while the consumption of ultra-processed foods represented 27.6%, being a percentage considered high for the consumption of these foods.

According to Prosperi et al. (2017), the high consumption of ultra-processed foods by individuals with ASD contributes to the emergence of gastrointestinal symptoms such as abdominal pain, diarrhea, or constipation and these symptoms can interfere with the quantity and quality of sleep, in addition, constipation can cause repudiation of food.

The present study showed that none of the individuals interviewed had a nutritional follow-up with a professional nutritionist. However, the practice of nutritional monitoring is essential in the early stages of life, as it favors good growth and development, stops bad eating habits, avoids nutritional deficiencies, obesity and reduces the chances of developing pathologies in the future (PIASETZKI; BOFF, 2018).

Every child has challenges and specific nutritional needs for each age, but due to restricted and repetitive behaviors, care with the feeding of individuals with ASD is essential to reduce some symptoms such as difficulties in communication and social interaction, which may be related to unbalanced nutrient intake (PITOMBO et al., 2019).

Some limitations that surround the present study are considered the limited sample, with only some individuals with ASD living in the city of Rio Grande do Sul, and may not represent the same characteristics for other groups of children and adolescents with the same diagnosis.

Regarding food recalls, parents had to recall all the foods consumed by children and adolescents, who had some meals at school, with the participants being more distant from the actual food consumption. Still, other studies bring the evaluation of three food recalls, while the present study

evaluated only two, to facilitate the memory of the participants.

5 CONCLUSIONS

The assessment of the nutritional status of children and adolescents with ASD showed that a considerable portion was overweight.

Regarding the dietary intake of VET, carbohydrates, proteins, and lipids, the results were within the daily recommendation values.

Although the percentage of the consumption of ultra-processed foods presented a considerable energetic contribution, natural foods were the basis of the participant's diet.

However, the micronutrients presented a possible inadequacy in the intake. Vitamins A and D presented values below the recommendations and vitamin C presented values above.

Regarding minerals, iron presented values below the references, and zinc and magnesium presented values above when compared to the reference values.

None of the interviewees practiced nutritional follow-up with a professional nutritionist. Therefore, from the food selectivity presented in this public, it is recommended the follow-up of a professional nutritionist for individuals with ASD, to promote nutritional education and reduce some symptoms, characteristic of ASD, which may be related to an unbalanced intake of nutrients.

The development of new research and the continuation of new studies on the food consumption of children and adolescents with ASD is important to improve the form of professional approach and, consequently, also improve quality of life and health. Still, it is of fundamental importance the development of new research that addresses the importance of professional nutritionist with individuals diagnosed with ASD.

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