AG EDITOR

Eating behavior of children and adolescents with autism spectrum disorder who attend a group in a commune in the region of Ñuble, Chile

Conducta alimentaria de niños y adolescentes con trastorno del espectro autista que asisten a una agrupación en una comuna de la región de Ñuble, Chile

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ABSTRACT

Introduction: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that affects feeding behavior, causing nutrient deficiencies and affecting overall nutritional status. In the rural population, children and adolescents with ASD are especially vulnerable to these effects. This study sought to determine the feeding behavior of children and adolescents with ASD in a commune of Chile.
Method: cross-sectional descriptive study with 21 children and adolescents from the "Tesoros del Infinito" group in El Carmen. A personal history questionnaire and the Brief Autism Mealtime Behaviors (BAMBI) were used to assess eating behavior, together with anthropometric measurements.
Results: 90,48 % of the sample were male, 61,90 % were school children, 57,14 % were from urban areas and 52,38 % were obese. The global BAMBI score was 42,86 ± 6,67 with an internal consistency of 0,74.
Conclusion: the eating behavior of children and adolescents with ASD attending a child and family support group is consistent with the available international evidence of children and adolescents with ASD attending educational institutions.

Keywords: Autism Spectrum Disorder; Feeding Behavior; Nutrients; Nutritional Status; Rural Population.

RESUMEN

Introducción: el Trastorno del Espectro Autista (TEA) es un trastorno del neurodesarrollo que afecta la conducta alimentaria, causando deficiencias de nutrientes y afectando el estado nutricional en general. En población rural, los niños y adolescentes con TEA son especialmente vulnerables a estos efectos. Este estudio buscó determinar la conducta alimentaria de niños y adolescentes con TEA en una comuna de Chile.
Método: estudio descriptivo transversal con 21 niños y adolescentes de la agrupación "Tesoros del Infinito" en El Carmen. Se utilizó un cuestionario de antecedentes personales y el Brief Autism Mealtime Behaviors (BAMBI) para evaluar la conducta alimentaria, junto con mediciones antropométricas.
Resultados: el 90,48 % de la muestra fueron hombres, el 61,90 % eran escolares, el 57,14 % provenían de áreas urbanas y el 52,38 % presentaban obesidad. El puntaje global de BAMBI fue 42,86 ± 6,67 con una consistencia interna de 0,74.
Conclusión: la conducta alimentaria de niños y adolescentes con TEA que asisten a una agrupación de apoyo a niños y familias es consistente a la evidencia internacional disponible de niños y adolescentes TEA que asisten a instituciones educativas.

INTRODUCTION

Neurodevelopmental disorders are a group of heterogeneous conditions characterized by behavioral traits such as insufficient personal, social, academic, or occupational functioning, mainly during early childhood. According to the DSM-5,[1] one type of neurodevelopmental disorder is Autism Spectrum Disorder (ASD), diagnosed only when the child shows deficiencies in social communication accompanied by repetitive behaviors, restricted interests, and insistence on sameness. In addition, social and communication difficulties present themselves more subtly in girls.

Worldwide, the prevalence of ASD in the child population is 1 % (95 % CI 1,09-4,36),[2] while in Chile it has reached 1,96 % (CI 0,81-4,63).[3] This difference could be due to early screening in public health checks. [4] Furthermore, international evidence suggests that children with ASD from rural populations, compared to urban sectors, have financial and geographical limitations in accessing health services, a shortage of trained professionals, and insufficient screening coverage.[5] In fact, children with ASD from rural sectors visit up to twice as many healthcare centers for medical emergencies due to their multiple comorbidities.[6]

Children with ASD show greater sensory sensitivity and perception during meals, which can lead to problems in eating behavior that include rejection of certain foods, a limited variety of food options, behavioral difficulties when eating, and caloric restriction.[7] In addition, a systematic review [8] has shown that children and adolescents with autism are more likely to develop an aversion to various foods, which can manifest itself in aggressive behavior during meals and a more restricted diet.

Eating behavior can affect the variety of foods that children consume, which has led to research demonstrating deficiencies in nutrients such as protein,[9] fiber,[9] zinc,[10] vitamin B12[11] and vitamin D,[12] with these deficits manifesting in gastrointestinal symptoms such as constipation, nausea, and abdominal pain.[13]

Autistic traits related to eating behavior include being fussy when it comes to eating, with girls being observed to eat emotionally compared to boys.[14] A systematic review[15] found that the prevalence of obesity in children and adolescents with ASD was between 7,9 % and 31,8 %, compared to healthy children, whose prevalence ranged from 1,4 % to 23,6 %.

One study [16] evaluated eating behavior difficulties and found that preschool children with ASD face more problems in their relationship with food, with lower quality and diversity, compared to children without ASD. In addition, parents of children with more severe ASD diagnoses have been found to have a lower quality of life in terms of overall health.[17] However, there is evidence that a nutritional intervention aimed at parents can help reduce problematic eating behaviors and achieve long-term stability.[18]

Given that the population with ASD has increased in the country compared to the international reality and is an especially vulnerable group from a nutritional point of view due to eating behavior, added to the factors linked to rurality, it is considered relevant to describe the most frequent eating behaviors observed with local data, to achieve a diagnosis that can serve as input for the planning of future adequate intervention studies, which contribute to reducing the comorbidities associated with the limited nutritional intake of this population.

Therefore, this study aims to determine the eating behavior of children and adolescents with Autism Spectrum Disorder (ASD) who attend a group in a commune in Chile.

METHOD
Design
This study corresponds to a non-experimental, descriptive, and cross-sectional design.

Population
The study participants were children and adolescents with ASD, aged 5 to 18, who are part of the "Treasures of Infinity" group in the commune of El Carmen, Ñuble region in Chile, enrolled in September 2024.

Sample
A sample of 21 children and adolescents was studied, which allowed us to estimate with 95 % confidence the mean score of eating behavior evaluated with the BAMBI scale, which, according to previous estimates, was 44,39 mean and 10,83 as its standard deviation.[19] The error of this estimate was established at 1 point.

The sample was selected using the non-probabilistic accidental method, which consists of selecting participants who meet the eligibility criteria.[20] The researchers specifically chose this group as the sample but with voluntary participation by its members.

Eligibility criteria

Included were: a) subjects with a clinical diagnosis of ASD of both sexes; b) aged between 5 and 18 years; c) whose parents or legal guardians had provided the written informed consent form and whose children or adolescents had agreed to participate in the study.

Children and adolescents were excluded if: a) they had been diagnosed with level 3 ASD; b) at the time of data collection, they were going through a period of emotional deregulation that prevented the application of instruments; c) they had celiac disease or type 1 diabetes mellitus.

Variables

The primary variable of this study is eating behavior.

The secondary variables are sex, age group, geographical area, nutritional status, clinical diagnosis, and degree of ASD.

Data collection

The fieldwork was carried out in the afternoon of September in the commune of El Carmen to ensure the most significant possible participation of the informants. They were interviewed by the study's authors (M A-V, J C-T, and K Y-F) in an office in the Municipality of El Carmen. The interview began with the personal background questionnaire and continued with applying the BAMBI questionnaire, administered as a self-report. Subsequently, the parents or legal guardians of the child were asked to make the necessary preparations for the anthropometric measurements. The procedure began with weighing the child, wearing the minimum amount of clothing, with only the first layer of clothing allowed, and without footwear, keeping the child in an anatomical position. Regarding height measurement, the child stood upright, with the spine straight and the head on the Frankfort plane, following the indications established by the Technical Standard for the Comprehensive Health Supervision of Children from 0 to 9 years of age in Primary Health Care.[21] The nutritional status of the children and adolescents was then classified using the z-Score, according to each chronological age, according to Growth standards for the nutritional assessment of children and adolescents from birth to 19.[22]

Description of instruments

- *Personal history questionnaire*. It was created by the authors of the study in 2024. Its objective is to compile information on the children participating in the study. It consists of 18 closed-response questions, divided into four sections: "Screening" [7], "Sociodemographic characteristics" [3], "Child history" [5], and "Record of anthropometric measurements" [3].
- *Brief Autism Mealtime Behaviors Inventory (BAMBI)*. The scale was created in 2008 by Lukens and Linscheid.[23] It consists of 18 items applied to the parents or legal guardians of the child, divided into three dimensions: "food refusal," "characteristics of autism," and "limited variety." It is scored on a Likert scale from 1 to 5, where a score of 1 indicates that the behavior "never" occurs, and a score of 5 indicates that "always" occurs at mealtimes. Lukens and Linscheid have validated it.[23] It has an internal consistency of $\alpha=0,88$, $p<0,01$.[24] The translation was done by a translator certified in PET (Preliminary English Test) and KET (Key English Test), using the transposition method.
- *Scales*. A Seca brand scale, model 803, with a maximum tare weight of 150 kg and a precision of 100 grams, was used.
- *Stadiometer*. A Seca brand stadiometer, model 217, was used with a precision of 1 mm.

Statistical analysis

Qualitative variables were described with observed frequencies and their respective percentages. Quantitative variables (including the scores of the BAMBI scale dimensions) were described with means and standard deviation and, in the case of variables that did not follow a normal distribution (previously evaluated with the Shapiro-Wilk test), with medians and interquartile range (P75 – P25).

The scores for the BAMBI dimensions will be compared with some personal characteristics of the children with Student's t-tests or ANOVA, depending on the number of groups to be compared, with a significance level of $p<0,05$. The statistical package R-Studio was used.

Ethical aspects

This study was approved by the Scientific Ethics Committee of the Adventist University of Chile (Resolution No. 2024-44 of 06.19.24). Each of the parents or legal guardians signed an informed consent form stating the study's name, objective, and procedures. To obtain the minors' informed assent, documents appropriate to their age group were used: 5-9 years and 10-18 years.

RESULTS

A sample of 21 children and adolescents with a clinical diagnosis of ASD was studied, of which 90,48 % were male, 61,90 % corresponded to the school population, 57,14 % belonged to the urban area of the commune, and 52,38 % of the sample had an obese nutritional status (table 1).

Table 1. Distribution of the sample according to sociodemographic characteristics			
Socio-demographic characteristics	**n = 21**	**%**	**IC 95 %**
Sex			
Man	19	90,48	(68,17 ; 98,33)
Woman	2	9,52	(1,67 ; 31,83)
Age Group			
School	13	61,90	(38,69 ; 81,05)
Adolescent	8	38,10	(18,95 ; 61,31)
Geographic Area			
Rural	9	42,86	(22,59 ; 65,56)
Urban	12	57,14	(34,44 ; 77,41)
Nutritional Status			
Normal	4	19,05	(6,29 ; 42,58)
Overweight	5	23,81	(9,12 ; 47,55)
Obesity	11	52,38	(30,34 ; 73,61)
Severe Obesity	1	4,76	(0,25 ; 25,87)

According to their clinical characteristics (table 2), 52,38 % of the sample obtained their ASD diagnosis from a neurologist, and 90,48 % have grade 1 ASD.

Table 2. Distribution of the sample according to clinical characteristics			
Clinical characteristics	**n = 21**	**%**	**IC 95 %**
Clinical Diagnosis			
Neurologist	11	52,38	(30,34 ; 73,61)
Psychiatrist	10	47,62	(26,39 ; 69,66)
Grade of ASD			
Grade 1 - Mild	19	90,48	(68,17 ; 98,33)
Grade 2 - Moderate	2	9,52	(1,67 ; 31,83)

Table 3 shows that the overall score on the BAMBI scale was 42,86 ± 6,67 (out of a possible maximum of 90 points, considering the 18 items on the scale) with an internal consistency of 0,74. About "food refusal," an average of 8,00 ± 2,41 points (out of a maximum of 25 points) was observed, with á=0,37; however, once item 1 was eliminated: "Cries or screams during meals" was obtained an average score of 6,71 ± 2,35 points (out of a maximum of 20 points), with á=0,45, the highest possible value obtained with the available items. In the "Characteristics of Autism' section, it presented an average of 11,38 ± 3,54 points (out of a maximum of 25 points), with α = 0,57, while in the" Limited Variety "section, it presented an average of 23,48 ± 4,39 points (out of a maximum of 40 points), with α = 0,71.

The scores of the three BAMBI dimensions were broken down by the sociodemographic and clinical characteristics of the study participants (table 4). In "Limited variety," there were statistically significant differences with the variables sex (p=0,0013) and nutritional status (p=0,0275). For this last variable, the Tukey test detected an essential difference between the overweight and obese categories, with p=0,0218. No statistically significant subgroup differences were found in the other BAMBI dimensions.

Table 3. Distribution of the dimensions of the BAMBI questionnaire			
Dimensions	α−Cronbach	Average ± sd	$M_d ± (p_{75} - p_{25})$
BAMBI	0,74	42,86 ± 6,67	42,00 ± 8,00
Refusal to Eat*	0,37[a]	8,00 ± 2,41	8,00 ± 3,00
Characteristics of Autism	0,45[b]	6,71 ± 2,35	6,00 ± 2,00
Limited Range	0,57	11,38 ± 3,54	11,00 ± 5,00
BAMBI	0,71	23,48 ± 4,39	23,00 ± 4,00

Note: * According to the Shapiro-Wilk test, the data does not follow a normal distribution with p<0,05
[a] Items 1-2-4-7-8 of BAMBI are considered
[b] BAMBI items 2-4-7-8 are considered

Table 4. Distribution of BAMBI dimensions, broken down by sociodemographic and clinical characteristics					
Socio-demographic and clinical characteristics	Refusal of Food[a] (5-25 points)	Refusal of Food[b] (4-20 points)	Characteristics of Autism (5-25 points puntos)	Limited Variety (8-40 points)	BAMBI (18-90 points)
Sex*	p=0,7777	p=0,902	p=0,9815	p=0,0013	p=0,6654
Male	8,05 ± 2,48	6,74 ± 2,42	11,37 ± 3,42	23,11 ± 4,46	42,53 ± 6,64
Female	7,50 ± 2,12	6,50 ± 2,12	11,50 ± 6,36	27,00 ± 0,00	46,00 ± 8,49
Age Group*	p=0,0989	p=0,1455	p=0,4970	p=0,2407	p=0,1121
School	8,62 ± 2,66	7,23 ± 2,71	11,77 ± 4,02	24,46 ± 3,73	44,85 ± 5,54
Teenager	7,00 ± 1,60	5,88 ± 1,36	10,75 ± 2,71	21,88 ± 5,14	39,62 ± 7,42
Geographic Area*	p=0,8556	p=0,6296	p=0,4799	p=0,9455	p=0,6237
Rural	8,11 ± 2,15	7,00 ± 2,06	12,00 ± 2,83	23,56 ± 4,64	43,67 ± 5,29
Urban	7,92 ± 2,68	6,50 ± 2,61	10,92 ± 4,06	23,42 ± 4,40	42,25 ± 7,71
Nutritional Status**	p=0,8190	p=0,6140	p=0,2690	p=0,0275	p=0,4670
Normal	8,00 ± 1,41	6,00 ± 0,82	9,25 ± 3,10	23,00 ± 2,16 †;††	40,25 ± 4,65
Overweight	7,40 ± 1,95	6,20 ± 1,64	10,60 ± 3,36	27,80 ± 2,77 †;†††	45,80 ± 5,93
Obesity	8,25 ± 2,90	7,17 ± 2,89	12,42 ± 3,60	21,83 ± 4,41 ††;†††	42,50 ± 7,45
Clinical Diagnosis*	p=0,2042	p=0,3413	p=0,8274	p=0,2998	p=0,2115
Neurologist	8,64 ± 2,84	7,18 ± 2,89	11,55 ± 4,11	24,45 ± 4,06	44,64 ± 6,07
Psychiatrist	7,30 ± 1,70	6,20 ± 1,55	11,20 ± 3,01	22,40 ± 4,70	40,90 ± 7,05
Degree of ASD*	p=0,4507	p=0,5721	p=0,5571	p=0,6757	p=0,4301
Level 1 - Mild	8,11 ± 2,49	6,79 ± 2,44	11,26 ± 3,68	23,21 ± 4,22	42,58 ± 6,91
Level 2 - Moderate	7,00 ± 1,41	6,00 ± 1,41	12,50 ± 2,12	26,00 ± 7,07	45,50 ± 3,54

Note: media ± sd; *t-Student; **ANOVA
[a] Items 1-2-4-7-8 of BAMBI are considered
[b] Items 2-4-7-8 of BAMBI are considered
Test of Tukey: †: p=0,1708; ††: p=0,8561; †††: p=0,0218

DISCUSSION

The objective of this study was to determine the eating behavior of children and adolescents with Autism Spectrum Disorder (ASD) who attend a group in a commune in Chile. About the characteristics of the sample, it was found that ASD is diagnosed more frequently in school-age males, in line with the evidence published by Maenner et al.[25], who found that ASD is 3,8 times more frequent in boys than in girls. This can be explained by the "camouflage effect" that women present, characterized by more significant social and emotional skills. [26] Furthermore, the results of the study show a higher proportion of obesity, in comparison with the study by Şengüzel et al.[27], who analyzed neurotypical Turkish children and children with Autism Spectrum Disorder (ASD), finding that obesity was more frequent in children with ASD.

About the observed eating behavior, an average of 42,86 ± 6,67 out of a total of 90 BAMBI global points was found, which suggests a moderate problem requiring less intervention and additional support. This is because the sample belongs to a support group for children with ASD, and 90,48 % of them have grade 1 ASD. In addition,

Castro et al.[28] argue that community and support groups favor the socialization and development of children with ASD in the face of their problems. Zalaquett et al.[29] indicate that the development of interventions in children with ASD favors their development and well-being. No statistically significant differences were found in BAMBI scores by geographical area, contrary to what was pointed out by Zhang et al.[6], who reported that children in rural areas present more significant comorbidities.

Regarding "food refusal," a mean of 8,00 ± 2,41 points out of a total of 25 was obtained, similar to a study published by Shmaya et al.[30] According to Williams et al.[31], food refusal is defined as an aversion to most or all of the food offered, which prevents it from meeting its caloric and nutritional needs and can be considered a subtype of childhood eating disorder. The criteria for Avoidant and Restrictive Food Intake Disorder [32] focus on eating behavior, covering aspects such as food selectivity, aversion to various foods, and decreased appetite. [33] These factors can contribute to an increase in medical and psychological comorbidities, which highlights the importance of early detection of ASD and associated behavioral problems to carry out timely intervention. In addition, gastrointestinal symptoms can aggravate the clinical picture of ASD due to the discomfort and irritability they cause.[34] It is essential to consider that dietary restriction can lead to nutritional deficiencies, especially in micronutrients, affecting child development and growth. In this sense, Santtochhi[35] proposes that an adequate nutritional intervention can alleviate these symptoms, improving both physical and mental state. An example of this is probiotics, since gastrointestinal symptoms are reduced by balancing the intestinal microbiota, and the "gut-brain axis" is regulated, which can improve behavior in children with ASD.

As for the dimension "characteristics of autism," it presented an average of 11,38 ± 3,54 out of a total of 25 points, which agrees with the study by Sharp et al.[36], who investigated a sample of 30 school-age children with ASD, reporting an average of 11,7 ± 3,9 points. This dimension assesses inattention, self-harm, and rigid behavior during meals. In this study, these aspects do not represent a significant problem due to the mild degree of most cases. However, early intervention[29] can favor brain development, so it is essential to consider the child's and family's individual profile, ensuring comprehensive care by health professionals.

About "limited variety," a mean of 23,48 ± 4,39 out of a total of 40 points was obtained, similar to that reported by Aponte et al.[37], who found a mean of 25,3 ± 7,1 points from a sample of 36 school-age children with ASD. In the review, Beaudry I.[38] states that a limited variety is a characteristic of food selectivity, which is based on the child's willingness to try new foods and their preferences according to organoleptic characteristics, such as texture and smell. Therefore, an effective intervention model must address the facets of the feeding process comprehensively, involving health professionals such as pediatricians, nutritionists, gastroenterologists, etc.[39]

When evaluating the overall score of the BAMBI Scale disaggregated by the study variables, it was found that girls with ASD exhibit more disruptive eating behavior than boys. A study by Van't Hof et al.[14] indicates that girls with ASD exhibit more disruptive behavior in behavioral, cognitive, or sensory aspects compared to boys. This is because they can lose emotional self-regulation mechanisms related to eating, as indicated by the study by Van Strien and Oosterveld,[40] which associates autism in women with emotional over- and undereating due to emotional arousal.

This study has several limitations. The first relates to the internal consistency of the BAMBI instrument. Although the BAMBI scale presented adequate internal consistency, the dimension "rejection of food" presented an α=0,37. This could be due to the content of the items that describe problematic behaviors related to eating, which parents may hide. However, when item 1, "Cries or screams during meals," is eliminated, the internal consistency rises to 0,45. This shows that the beliefs of the Hispanic/Latino culture influence the visibility of autism, as disabilities are not entirely accepted due to feelings of rejection or shame.[41] The second limitation is the small sample size and the non-probabilistic selection method, which limits the inference of the evidence. However, this study can lay the foundations for future research comparing the eating behavior of children with ASD, thus facilitating the creation of effective interventions and integrating the role of the nutritionist.

CONCLUSIONS

The eating behavior of children and adolescents with ASD who attend a support group for children and families in the commune of El Carmen, Chile, is consistent with the available international evidence of children and adolescents with ASD who attend educational institutions.

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