



Selectivity and Food Conduct in Children with Autism Spectrum Disorder: A Brief Systematic Review

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DOI: <https://doi.org/10.34256/mdnt21211>

Received: 03-05-2021; Accepted: 07-05-2021; Published: 12-05-2021

Abstract: Autism Spectrum Disorder (ASD) refers to an alteration in neurological development typified by deficits in social communication, as well as in restricted and repetitive patterns of behavior, interests, or activities, varying in a continuum demarcated by the severity levels of their symptomatic pictures. It is estimated that about 45 to 90% of children with ASD have deficiencies in their eating habits, which may include atypical eating patterns and persistent practices of food selectivity, thus limiting the diet of these subjects. Given this context, the present study has the central objective of discussing, through the bibliographic review, the implications resulting from selectivity and eating behaviors in children with an autism spectrum disorder. It is, therefore, a descriptive study with a qualitative approach, organized from a natural perspective, emphasizing in a contextualized and judicious way the analyzed theme. Literary findings suggest that the conduct of food selectivity is significant for both family members, through high levels of stress; as, and above all, for children with ASD, since they will be more likely to develop gastrointestinal disorders, low quality of life, reduced levels of nutrients necessary for their proper development and scurvy when compared to those with typical neurodevelopment. In this sense, it appears that recognition of the different clinical and behavioral patterns manifested in children with ASD through food selectivity, is an important issue for family members and professionals in their diverse clinical practices, considering that the recognition of these patterns will be immeasurable utility in the development of adequate and early treatment strategies.

Keywords: Food Conduct, Food Selectivity, Autism Spectrum Disorder, ASD

Introduction

It is estimated that about 45 to 90% of children with Autistic Spectrum Disorder (ASD) have deficiencies in their eating habits [1], which may include atypical eating patterns and persistent practices in the selection of some foods, to the detriment of others [2]. Thus, compared to children not diagnosed with ASD, high levels of problems in the eating behaviors of children with ASD in early childhood have been frequently reported in the literature [3].

The restriction of food, based on their selectivity, has often been reported as being an unusually persistent diet, constituting a shared difficulty among children with ASD; therefore, it becomes essentially critical because of its detrimental implications for the nutritional harmonization of these children. Some studies have pointed out the existing associations between the insistent practice of food

selectivity in children with ASD with inappropriate nutritional intake [4], denial of fruits and vegetables [5], and high levels of stress on the part of parents [6, 7]. In this regard, a study showed that children and adolescents with autism spectrum disorder have high concentrations of triglycerides associated with a greater interest in food. Knowledge of this eating behavior can provide a more effective nutritional intervention in this population [8].

Although more current analyzes operationalized in the scope of food selectivity in children with ASD have gained considerable notoriety and their theoretical scope has been leveraged in recent decades [4, 9], few analyzes have explored the possibility that the selective conduct of food, marked in childhood, endures in phases of development, namely in adolescence, in children with ASD. Based on this assumption, the present study has the central objective of discussing the eating habits of children

with ASD, especially about behaviors related to food selectivity.

Given the above, the little understanding that the bibliographic review refers only to a prerequisite for the systematization and construction of the most diverse types of research, leads, not infrequently, to the erroneous understanding that bibliographic research is a process methodological review of literature or bibliographic review. In this regard, the bibliographic research concerns an organized grouping of methodological procedures that aims for congruent explanations of the analyzed phenomenon [10].

Likewise, this research is characterized as having a descriptive character with a qualitative approach, organized from a natural panorama, emphasizing in a contextualized and judicious way the theme analyzed. Thus, bibliographic research, therefore, is carried out through accessible records, as a result of previous studies, in printed sources, such as books, articles, theses, among others, using data and theoretical categories already discussed by other researchers [11].

Therefore, taking into account that the present analysis has the objective of discussing eating behaviors in children with ASD, the review of theoretical references on the subject under discussion classifies this study as having a bibliographic nature, because of the critical-reflective analysis of the investigated documents, composing a concise systematic review of the literature

Methods

Study Design

The rules of the Systematic Review-PRISMA Platform (Transparent reporting of systematic reviews and meta-analysis-HTTP: [//www.prisma-statement.org/](http://www.prisma-statement.org/)) were followed [12].

Data sources and research strategy

The search strategies for this systematic review were based on the keywords (MeSH Terms): "*Food Conduct. Food Selectivity. Autistic Spectrum Disorder*". The research was carried out in November 2018 to July 2019 and developed based on SCOPUS, PUBMED, and SCIENCE DIRECT, including the National Institutes of Health RePORTER Grant database and clinical trial records. Also, a combination of the keywords with the booleans "OR", AND and the operator "NOT" were used to target the scientific

articles of interest. The title and abstracts were examined under all conditions.

Study Quality and Bias Risk

The quality of the studies was based on the GRADE instrument [13] and the risk of bias was analyzed according to the Cochrane instrument [14]. Two independent reviewers carried out research and study selection. Data extraction was performed by reviewer 1 and fully reviewed by reviewer 2. A third investigator decided on some conflicting points and made the final decision to choose the articles. Only studies reported in English have been evaluated.

Results and Discussion

A total of 145 articles were found involving the selectivity and food conduct in children with autism spectrum disorder. Initially, duplication of articles was excluded. After this process, the abstracts were evaluated and a new exclusion was performed, removing articles that did not include the theme of this article. A total of 94 articles were evaluated in full and 23 were included and evaluated in the present study (Figure 1).

Considering the Cochrane tool for risk of bias, the overall assessment resulted in 2 studies with a high risk of bias and 4 studies with uncertain risk. The domains that presented the highest risk of bias were related to the number of participants in each study addressed. Also, there was an absence of the source of funding in 4 studies and 3 studies did not disclose information about the conflict-of-interest statement.

After a thorough analysis of these selected studies, it was found that Autism Spectrum Disorder (ASD) refers to an alteration in neurological development typified by deficits in two essential areas, namely: social communication and restricted and repetitive patterns behavior, interests or activities, varying from a continuum demarcated by the severity levels of their symptoms, as recommended by the Diagnostic and Statistical Manual of Mental Disorders, in its fifth edition [15].

In this sense, behavioral difficulties, such as tantrums, sleep disorders, and atypical eating behaviors, associated with comorbidities with other psychiatric disorders are often present in children with ASD, and the daily management of these problems is difficult for children. class of professionals and family members, in general [16].

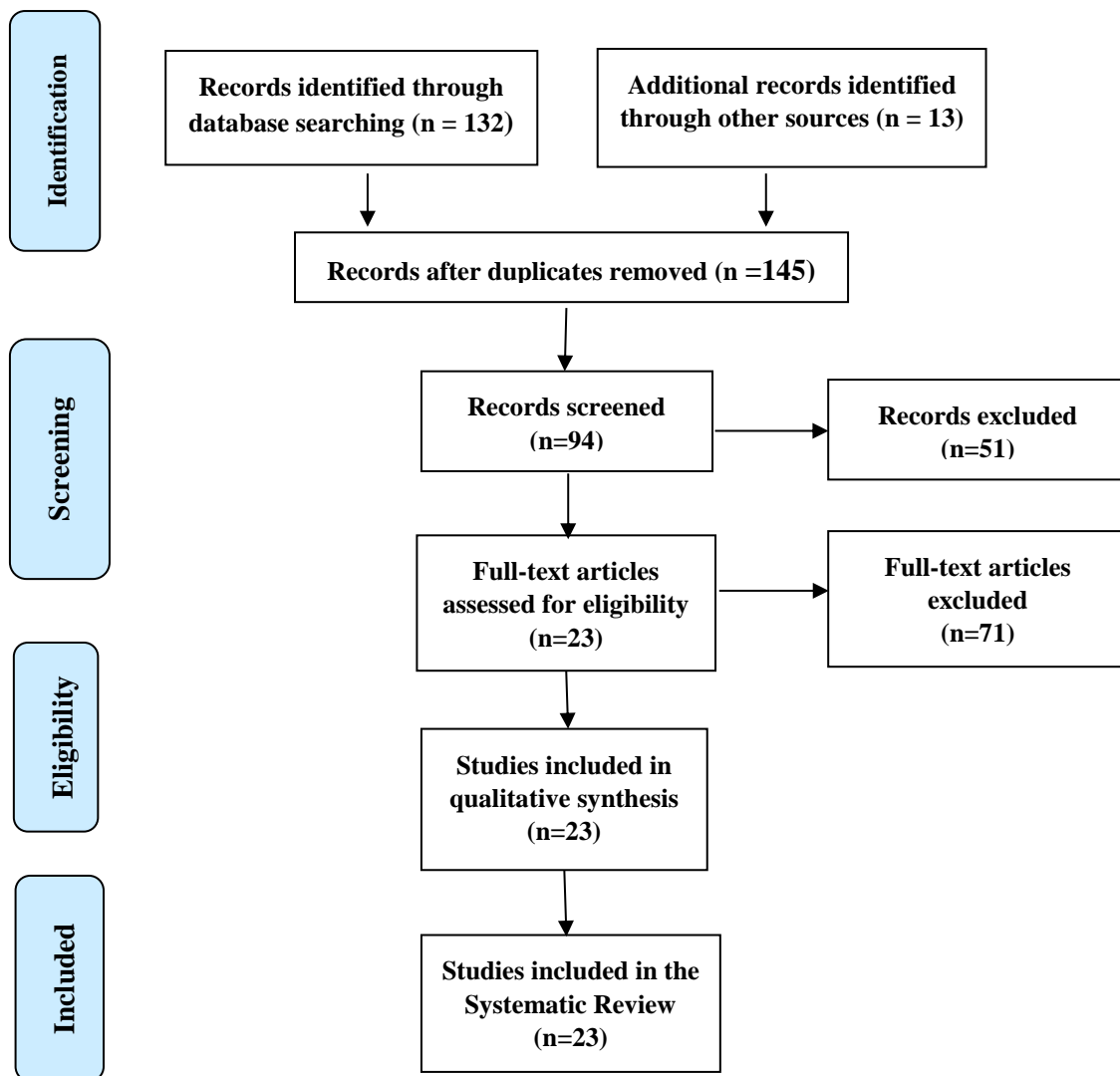


Figure 1. Study Eligibility

Although it does not constitute a typification for the diagnosis of ASD, dietary problems are shared by this clinical demand, with food selectivity being the most frequent behavioral conduct [17].

It is known, however, that the practice of a limited diet for long periods may imply health risks for subjects in the development phase, considering the parameters of a new class of diagnosis, proposed by the DSM-V, referring to the eating disorder preventive/restrictive food [15].

Thus, studies have sought to describe the atypical eating behaviors that frequently occur in children with ASD, with food selectivity being the most common of these problems [5]. The daily management of eating behaviors in children with ASD can have negative implications within the family routine, becoming a contingency of significant levels of stress for families. However, much remains unknown about the reasons why food selectivity is so prevalent among

children with ASD [10]. It is believed that food selectivity has two domains, which can be measured empirically. The first concerns the refusal of food, being measured by the proportion of the denial of the food available to the child. The food repertoire is the following domain and, in turn, refers to the amount of food eaten, solely, by the child, reflecting the variety of foods present in the child's diet⁴.

Bibliographic analyzes show that there is a predominance of this type of atypical eating behavior in children with ASD when compared to children with typical development. Also, food selectivity is regularly insistently restricted and can predispose any child to problems arising from nutritional deficiency [2].

In this context, multiple hypotheses were launched, to clarify the conduct of food selectivity in ASD. In some analyzes, it was noticed that gastrointestinal problems are commonly associated with ASD and, although the findings are conflicting,

the behavior of food restriction tends to cooperate for the development of gastrointestinal problems in a portion of this population [18-20].

Nevertheless, preliminary studies have proposed that disturbances in sensory processing, such as in sensory mechanisms, typical in subjects with ASD, could constitute likely mechanisms underlying the conduct of food selectivity [19, 20]. Indeed, determinant aspects of this conduct are constantly correlated with consistency, the palate, temperature, favoritism, and odor [21]. Even though it has been shown that the conduct of food selectivity constitutes a dubious chronic complication of changes in the absence of treatment, it remains open about the reasons why this conduct is so prevalent among subjects with ASD.

Given the above, food selectivity can be referred to as one of the obstacles faced by family members, as well as by ASD carriers themselves, given that, for this population - who present restrictive responses to sensory stimuli - food constitutes a domain of great clash [11]. Children with ASD may exhibit behaviors that insist on eating the same meals daily since even the mildest of routine changes can be a dull factor [5].

Notably, comparatively speaking, it is assumed that subjects with food selectivity have higher degrees of different clinical symptoms and disorders in behavioral and emotional domains than subjects without this practice. Furthermore, because unusual eating behaviors are more likely to become significant stressful events for the family network, it has been hypothesized that the degree of parents' stress would be higher in the parents of children who have food selectivity compared to those who do not present them in their behavioral repertoire [18, 19].

Also, taking into account that limited food intake can trigger nutritional deficiencies of adequate development, as well as provoke gastrointestinal symptoms, it is expected that children with food selectivity represent significantly higher degrees of these deficiencies compared to children without food selectivity [16].

The operationalized findings to understand this phenomenon was made, finding an antagonistic association between the global score in the Healthy Eating Index - an instrument used to assess the eating habits of a certain population - with an indicator of nutritional deficiencies in the Brief Inventory of Autism and Behavior [9], proposing that children who have

higher levels of feeding problems have reduced quality of nutrients in their diets [10].

In an experiment with about 60 children with ASD, the authors concluded that children who have the persistent conduct of selecting a few foods (considered to be the same or less consumption of 20 types of food to the previous month) had diets that included smaller amounts of fruits and vegetables, compared to the diets of children with inferior selective behaviors [11].

In this context, the nutritional implications can, incidentally, be critical; case studies have shown scurvy due to nutritional deficiencies in children with ASD [17]. Thus, although rare, scurvy tends to affect children with ASD and neurodevelopmental disorders. Therefore, it is up to professionals to take vitamin C levels into account in the primary context of assessing a child with ASD, so that appropriate procedures are performed to mitigate the possible consequences of food selectivity.

In this sense, a meta-analysis study determined the general differences in nutritional intake and food consumption between children with autism spectrum disorder and control children (typical development), as well as determining the extent to which nutritional intake and food consumption of children autistic people comply with dietary recommendations. It was observed that children with autism spectrum disorder consume less protein, calcium, phosphorus, selenium, vitamin D, thiamine, riboflavin, and vitamin B12 and more polyunsaturated acid and vitamin E than the controls. Besides, these children also consume less omega-3 and more fruits and vegetables than children in the control group. The results also suggest a lower intake of calcium, vitamin D, and dairy products and a higher intake of fruits, vegetables, proteins, phosphorus, selenium, thiamine, riboflavin, and vitamin B12 than recommended [22].

Finally, to confirm the findings of the meta-analysis presented above regarding serum vitamin D dosage, a study included 91 children, 47 with ASD and 44 individuals (control group -CG). The serum vitamin D level was assessed in both groups. 74% of the ASD group had blood vitamin D levels below 30 ng/mL (normal range 30-100 ng/mL). The analysis showed that the two groups were significantly different in terms of vitamin D levels ($t = 2.24$, $p < 0.05$), and 31.9% of children with ASD were overweight and 12.6% were obese [23].

Conclusion

In short, the conduct of food selectivity in children with ASD has gained considerable notability, which can be evidenced through the aforementioned studies; and, although contemporary research has emphasized that this problem has perpetuated constantly over the decades, more studies need to be carried out, to have a better understanding of the aspects that support the clinic of food selectivity in children with ASD. Furthermore, although food restriction can be considered as a significant stress factor for family members of children with ASD, triggering significant impairments in the quality of life of those involved, it constitutes a field of research of great relevance that deserves more attention for part of the professionals. The recognition of the different clinical and behavioral patterns, manifested in children with ASD through food selectivity, is an important issue for family members and professionals in their diverse clinical practices, considering that the recognition of these patterns will be immeasurable in the development of appropriate and early treatment strategies.

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Acknowledgement

Nil

Funding

Not applicable

Data sharing statement

No additional data are available

Ethics Approval

Approval was sought and granted by the Departmental Ethics Committee.

Informed consent

Informed written consent obtained from the participant

Conflict of interest

The authors declare no conflict of interest.

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