

Feeding Problems in Children with Autism Spectrum Disorders

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Abstract:

Background: Feeding problems are common in autism. Parents are frequently worried about the health status of their children, which may be threatened by some consequent nutritional deficiencies. Despite this, feeding behaviours remain little explored by clinicians working with children with autism spectrum disorders and researches are lacking especially in Tunisia.

Aim: To evaluate the frequency and the types of feeding problems in children with autism spectrum disorders.

Settings and Design: A comparison was made between 57 children with autism spectrum disorders and 57 control groups regarding the feeding problems. Parents completed the children's eating behavior inventory (CEBI). Autism severity is evaluated using the Childhood Autism Rating Scale. The SPSS statistical package, version 20.0 was used.

Results: According to the CEBI, children with autism spectrum disorders showed more feeding problems than the control group (82.4% versus 56.1%, $p=0.002$). In fact, the parents of these children observed more pica habits on their children compared to the control group ($p=0.000$). They also observed more selectivity for starchy foods compared to the control group ($p=0.000$). The more the autistic symptoms were severe, the more children exhibited feeding problems ($p=0.02$).

Conclusions: Our findings suggest that feeding problems are more common in children with autism. Clinical implications trigger the need for clinicians to provide the necessary assessment and treatment.

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Keywords: autism, feeding behavior, children, food selection

Received: July 27, 2018

Accepted: Aug 20, 2018

Published: Aug 23, 2018

Editor: Alaa Ali Mohamed Elzohry, Lecturer of Anesthesiology & Pain Management South Egypt Cancer Institute Assiut University, Egypt.

Introduction

The incidence of autism spectrum disorder (ASD) has increased substantially. A report showed that one out of every 68 children at the age of eight has ASD [1]. This implies that the possibility of paediatricians or family physicians or childcare professionals encountering children with ASD during their professional practice is rather high [2]. Paediatricians, family physicians, or childcare professionals are the front-line professionals who receive parents of children with ASD consistently and detect their concerns about the feeding behavior of their children. Children with ASD may be at risk for nutritional deficits resulting from limited dietary variety [3-5]. Some authors have suggested that the presence of feeding difficulties in infancy may be an early sign of ASD [6-8]. Therefore, the paediatricians, the family physicians, or the childcare professionals play an important role in the screening for ASD. Feeding problems in children are significantly associated with stress in parents [9, 10]. The diagnosis and treatment of these feeding problems are essential for the interest of the child but especially to reduce parental stress. In fact, parental mental health problems negatively affect adherence to treatment recommendations for the child with autism [11, 12].

Feeding problems are common in childhood. They arise widely in normally developing children at different ages [13] and in ASD [14, 15]. ASD are characterized by an impairment of social interaction and communication and by restricted and repetitive behavior. ASD are complex and serious disorders and can affect many areas of life of the child, among others, feeding. Parents of children with ASD frequently report challenge at mealtime and are worried about the feeding patterns of their child. Feeding problems occur in about 25% of all children and in 80% of those with a developmental disorder [16]. The estimated prevalence of feeding problems in children with autism has been reported to be as high as 90% [17,18]. The most frequent feeding problems in children with ASD mentioned by authors, included food selectivity [19-26], food refusal [27,28], rituals, hyperactivity, or motor and gastro intestinal disorders [29]. About 58% to 67% of parents of children with ASD report selective or picky

feeding in their child [30-32]. Children with ASD are often described as picky or selective eaters [33]. Neophobia, which is defined as systematic refusal of novel foods, is also frequent in children with ASD. Recently, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) has included "hyper or hypo reactivity to sensory input" as a symptom of ASD, such as severe food selectivity [34]. Moreover, some explanations, such as sensory characteristics of children with ASD, communicational and social factors, specific cognitive abilities, restricted interests and food choice by the family [29, 35], have been given.

The local feeding context, actually, is that Tunisia is facing a double burden of malnutrition, including micronutrient deficiencies combined with overweight and obesity. Child malnutrition continues, however, and 10 percent of children were stunted in 2012. Poor dietary diversity, physical inactivity and feeding habits – with Tunisians getting a high proportion of their calories from wheat based foods – explain the prevalence of stunting, obesity and overweight [36].

In Tunisia, we have not had previous research about the screening of feeding problems in all children and in those with ASD. Therefore, in this study, we attempt to describe the feeding problems and habits in Tunisian children with ASD compared to a control group.

Material and Methods

We conducted a cross-sectional and comparative study on 114 children, during a period of one year from September 2013 to October 2014.

Sample

The sample was split into two groups, an ASD group, which included 57 children with ASD recruited from the department of child psychiatry, who were seeking either daily consultation or health care at the clinical department. In fact, we receive in the department of child psychiatry of Sfax, children with ASD for institutional therapy based on psychoeducational care during 2 hours per day in a day hospital at the clinical department. Children with ASD are also received at the consultation unit. We have randomly selected from all the ASD children those who were free from diseases or disorders that could affect dietary habits (diabetes, celiac disease, other chronic

gastrointestinal illnesses...) and who were aged from 2 to 12. This age range was chosen in compliance with the norms of the Children's Eating Behavior Inventory (CEBI) [37] used in this study. The diagnosis of autism in children with ASD was confirmed according to the criteria of the DSM 5 [34], by a trained child psychiatrist. All the children of the ASD group were administered according to the Childhood Autism Rating Scale (CARS) [38]. The control group was drawn from two Kindergartens randomly selected from the kindergartens located around the hospital. The educators of the two kindergartens were initially contacted and informed about what the study involved. They distributed the cards to the parents who were volunteered to take part in the study. A child psychiatrist was available on call at all the time for further informations. Exclusion criteria were no parents' consent and having diseases or disorders (like diabetes, chronic gastrointestinal illness...) that could affect their dietary intake. Participants of the two groups were matched on age, sex and socioeconomic status.

Procedure

The parents of the children with ASD were first contacted at the child psychiatry department and then at the kindergartens for the control group where they were informed about the objective of the study. Therefore, oral informed consent was obtained from the parents of each participating child. Subsequently, the parents were given questionnaires were to complete them at home.

Finally, the parents completed the CEBI items and the predetermined self-report. They answered the questions at home by checking the appropriate response for most items and answers to the open questions relating to the types of the preferred or the refused foods.

Instruments

CEBI

The CEBI was used to evaluate the children's feeding habits. In fact, the CEBI was created to assess feeding and mealtime problems in children aged between 2 and 12 with a variety of diagnosis [37]. The questions asked about some personal and environmental factors related to the child and interaction between these factors and the feeding behavior and autonomy.

The CEBI, which is available as a parent report form, includes 40 items rated on a 5-point scale with responses: never, seldom, sometimes, often and always. In addition, parents were asked whether the behavior assessed in each item is a problem for them (yes/ no). The items of the CEBI were scored on the total eating problem score and on the number of items to be perceived as a problem, which is the count of yes responses, but can also be expressed as a percentage. A cutoff value of 16% is indicative of having a feeding problem.

CARS

Autism is evaluated using the CARS [38]. This scale, which consists of 15 items, rates the children from 1 to 4 for various criteria (midpoints were also allowed) with a total score ranging from 15 to 60 with a minimum score of 30 considered as a cutoff for a diagnosis of autism. The test interpretations, which were based on the composite score, ranged autism into mild moderate or severe autism.

The tests were translated into Arabic but not validated for the Tunisian population.

Predetermined Report

The CEBI has some limitations, as it is not specific to ASD children. In fact, understanding of the situation was not investigated by the CEBI. However, these issues are important to consider in children who have communication and sensorial disorders, like autism. To our knowledge, no test has so far been carried out to screen for feeding problems in children with autism and adapted to Tunisian sample. Therefore, the CEBI was used associated with a predetermined form to handle its limitations. This predetermined report included 10 questions, Have you any difficulty to feed your child? Does your child eat varied food? Is there a specific food refused by your child, for instance meat / chicken /eggs /fish /pasta /vegetable /fruits /other. Does your child have a favourite meal? Have you had any difficulty to switch from mixed to solid food? Does your child accept a new tasty food? Have you ever obliged your child to eat while playing games/ moving /watching TV? Does your child tell you he is hungry? Does your child express his satiety? Does your child eat uneatable things, such sand, soap or other things? The

predetermined report was also used to gather demographic informations (date of birth, gender, socio-economic status, parent's age). The form also listed a number of medical diagnostics for the caregivers to indicate if their children were or had been medically diagnosed.

Statistics

Statistical analyses were performed by using the SPSS statistical package, version 20.0. For the descriptive study, the qualitative variables were expressed in percentage while the quantitative variables were expressed as the average of their standard deviations. Comparisons between the averages were made using student's t-test. On the other hand, the Chi-square test was used to compare the percentages. All the p -values < 0.05, which are two-sided, were considered significant.

Results

Socio-Demographic Characteristics

The study included 57 children, 35 boys and 22 girls with an average age of 4.28 years (± 0.95), who were diagnosed with ASD. Our analysis showed that 36.3% and 63.8% of these ASD children presented mild to moderate and severe autistic symptoms in the CARS, respectively. In fact, the parents who participated in the survey showed a predominance of the mothers (77.5%) compared to the fathers with an average age between 35.8 and 42.25 years, respectively. Parents were not inbred in almost 74% of cases. Seventy per cent of them came from urban areas. Moreover, 55% of these parents had an average socio-economic status against 38% with a low socio-economic status. In 70% of cases, the mothers were unemployed.

Prevalence of Feeding Problems in Children with ASD

Table 1 shows the prevalence of feeding problems and the comparison of the mean scores on the two groups.

Characteristics of Feeding Problems in Children with ASD

Children with severe autism (according to the CARS) exhibited significantly more feeding problems as perceived by their parents (according to the CEBI), than children with mild to moderate autism ($p=0.02$).

[Figure1].

Types of feeding problems, such as food neophobia, pica, and difficult transition to solid food...) are presented in table 2. The types of food refusal are shown in table 3. Children with ASD eat fewer types of food than children without autism (22.8% versus 3.5%, $p=0.002$). In fact, children with ASD manifested food selectivity for starchy in 35% of cases compared to 3.5% in the control group ($p=0.000$). Parents have reported that 73.68% of their children with ASD expressed their hunger, versus 84.21% in the control group. In the ASD group, 57.89% of the children expressed their satiety against 85.96% in the control group ($p=0.002$). As for the feeding problems related to the environment, children with ASD expressed more significant straits during mealtime at restaurant than the control group (38.59% versus 8.7%, $p=0.001$). The parents were very strained to feed the children whether while they are playing games and while they are moving, with respectively 24.57% versus 7% in the control group ($p=0.01$) and in 31.57% versus 12.28% in the control group ($p=0.02$). However, there was no significant difference between the two groups concerning feeding when watching TV (36.84% versus 47.36%, $p=0.3$).

Discussion

Our results indicated that children with ASD had more significant feeding problems according to the CEBI than those of the control group ($p=0.002$). Firstly, our control sample requires some attention. Feeding problems were high in the control group (56.1% according to the CEBI). Through the literature, approximately 20% to 50% of normal children were reported to experience some feeding problems [16, 39]. Actually, some factors could undoubtedly affect the feeding habits of children and then may lead to feeding problems for children. Moreover, the lack of universally recognized definition of feeding problems may not help determine its prevalence. Feeding family practices (such as an early introduction of solid foods to babies, overfeeding...) are crucial in the feeding habits of children [40]. Cultural factors may intervene. According to the Arab culture, a chubby child is considered to be in good health. Foods, especially candy and other sweets,

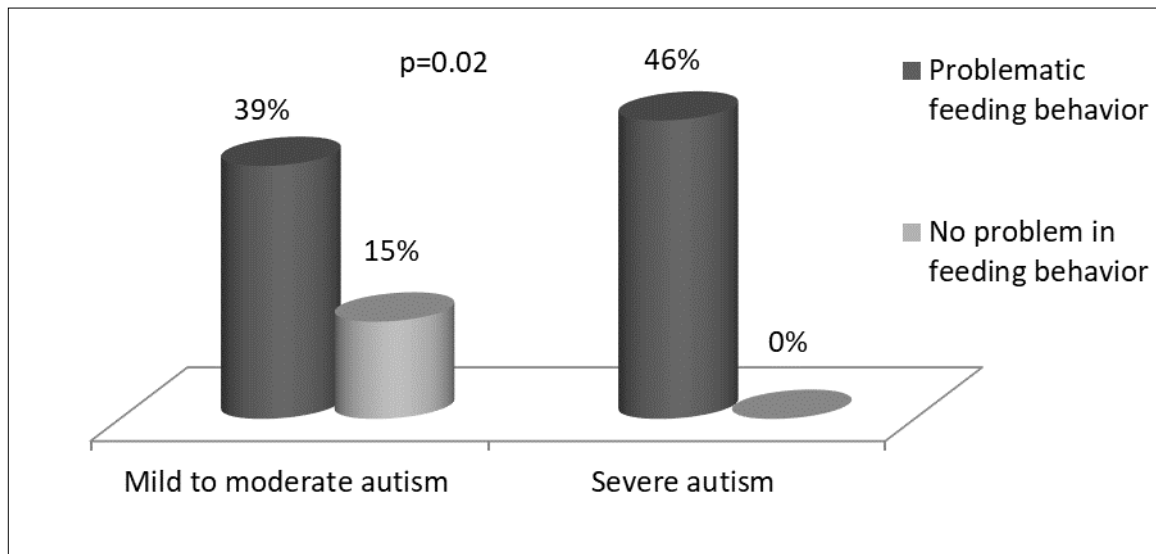


Figure 1. Comparison of the frequency of eating problems according to autism severity

Table 1. Eating problems according to the CEBI on the two groups

CEBI score	ASD group (N=57)	Control group (N=57)	p
Number of item perceived as a problem (SD)	14.07 (± 6.8)	10.49 (± 7.28)	0.008
Frecuence of eating problems (%)	82.4	56.1	0.002

CEBI: Children's Eating Behavior Inventory

ASD: Autism spectrum disorder

SD: standard deviation

Table 2. Types of eating problems in children with ASD

Eating habit (%)	ASD group (N=57)	Control group (N=57)	p
Limited Food repertoire	22.8	3.5	0.002
Food neophobia	42.1	57.89	0.09
Pica	42.1	7	0.000
Difficulties in transition to solid food	40.35	22.8	0.04

Table 3. Types of food refusal on the two groups

Refused food (%)	ASD group (N=57)	Control group (N=57)	p
Fish	33.33	28.07	0.5
Chicken	35	7	0.000
Meat	24.56	14.03	0.1
Eggs	43.85	14.03	0.000
Vegetables	56	22.8	0.000
Fruits	42	17.54	0.004

are frequently used to reward good behavior [41]. Even though, feeding problems are common in the control group, as they are significantly more prevalent in the group of children with ASD. Other studies have also shown that children with ASD have more feeding problems compared to normally developing children [42,43] with prevalence of feeding problems ranging from 56 to 87% [14,29,33,44,45]. In fact, anatomical, metabolic, gastrointestinal, motor or sensory problems may be the cause or may contribute to some of these feeding problems [46]. These problems may also arise from a limited ability to communicate or from poor social and cognitive skills. There is no defined etiology for feeding problems either in children with ASD or in the paediatric population in general [47]. Therefore, a global medical assessment is necessary when feeding problems persist [48].

Concerning the characteristics of feeding habits in autism, our study revealed that children with ASD eat fewer food types than the control group ($p=0.002$). According to literature findings, and compared to other populations, although a substantial number of children are little eaters, foods repertory in children with ASD may be even more restrictive [42, 35, 49, 50]. Children with ASD have a fivefold increase in selective feeding [51]. In the present study, children with ASD refused to eat chicken ($p=0.000$), eggs ($p=0.000$), rice ($p=0.04$), vegetables ($p=0.000$) and fruits ($p=0.004$).

This food selectivity can have serious consequences such iron and vitamin deficiencies [3, 5,52]. A current meta-analysis of 17 prospective controlled trials found a significantly lower protein intake in children with ASD than in those with typical development. Moreover, some studies reported that iron deficiency and anaemia are more common in children with ASD [53-56]. Our results also showed that children with ASD exhibited more pica and difficulties in transitioning to solid food, which represents added risk factors for anaemia.

In our sample, children with ASD manifested more selectivity for starchy foods or carbohydrates ($p=0.000$). Children with ASD are more likely to suffer from nutritional deficiencies despite the high body mass index [57-59]. Therefore, physicians should be vigilant to the excessive food intake in carbohydrate because children with autism are at risk of obesity given the sedentary lifestyles [60] and the possible use of antipsychotic drugs.

In the current study, children with ASD presented more straits in restaurants at mealtime compared to the control groups. In fact, their parents were obliged to feed them while they are playing games or on the move. Children with ASD may exhibit some behavioral disorders at mealtime, such as crying or being agitated. In fact, they have difficulty sitting down during all the mealtime period [61]. It was found that the parents of the control group reported that they feed

their child when they are watching TV more frequently than those with ASD. Parents are worried when their children do not eat enough; therefore, they often try different strategies to encourage their child to eat. In our study, parents of children with autism stated that their children are able to express their hunger in 73.68% of cases and satiety in 57.89% of cases. In individuals with ASD, the oxytocin system may not function properly, as a result, an ASD child may be unable to know when they are already full up, which can cause overeating [62].

We found that feeding problems were associated to the severity of ASD ($p=0.02$). Johnson et al [63] found strong associations between parents reported feeding habits and repetitive and ritualistic behaviors, sensory features, and externalizing and internalizing behavior. There was a lack of association between feeding behaviors and the social and communication deficits of ASD and cognitive levels.

Conclusion

Our results showed that feeding problems are important in children with autism. This is essentially reflected in their refusal of vegetables, fruits and meats, pica, selectivity to starches and limited food varieties. A selective diet can lead to nutritional deficiencies if varieties of foods remain restricted, which makes feeding problems a potential health risk. However, studies assessing nutrient intake in children with autism have conflicting results. Because feeding children and family mealtimes are an integral part of child-rearing and family life, the presence of feeding problems concurrent with autism represents an increased burden for families of children with autism. In fact, due to the clinical characteristics of their disease, children with autism often attribute this failure to their parents' skills about food, justifying the need for a systematic dual approach, such as a careful evaluation and an appropriate treatment. Further research is thus necessary to better target this problem. In this context, clinical implications require comprehensive and early treatment of feeding problems in children with autism to prevent the perpetuation of some difficulties in the mother-child relationship in connection with early failures of feeding and give later targeted therapy. It is

therefore important to raise the awareness of the clinicians working with children with autism to systematically look for feeding problems in a global perspective in order to act on time and prevent nutritional deficiencies and mother-child interaction disorder.

No Acknowledgments

No Conflicts of Interest to Disclose

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