Survey on the Patterns of Feeding Difficulties and Behaviors in Filipino Children with Autism Spectrum Disorder Seen in a Philippine Tertiary Hospital and the Impact of the COVID-19 Pandemic

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ABSTRACT

Objective. To describe patterns of feeding difficulties and behaviors of Filipino children diagnosed with Autism Spectrum Disorder (ASD).

Methods. An electronic mealtime survey was administered to caregivers of 3- to 9-year-old children diagnosed with ASD in a Philippine tertiary government hospital. Descriptive statistics and correlation analyses between feeding difficulties measured as Mealtime Survey Score, sociodemographic data, and early feeding history were performed. The impact of the COVID-19 pandemic to these was analyzed through a binomial test.

Results. All of the 115 study subjects reported at least one problematic feeding behavior, with picky eating being the most frequent (61.74%). Significantly, more feeding difficulties were observed among the children with reported early feeding difficulties during their 2nd and 3rd year of life. There were no documented statistically significant changes in feeding behaviors during the past six months of the COVID-19 pandemic.

Conclusion. There is a high prevalence of feeding difficulties and problematic feeding behavior among Filipino children with ASD, however no significant changes to these during the past six months of the COVID-19 pandemic were documented. Present feeding difficulties and behaviors were associated with history of early feeding difficulties, highlighting the need to include feeding difficulties in screening tools, and early training programs and interventions for children with ASD.

Oral Presentation – 4th International Developmental Pediatrics Association Virtual Congress (Nurturing Children in Crisis), December 3, 2021.

Poster Presentation – 11th PSDBP Biennial Convention (Growing Up During the Pandemic: The Impact on Child Development, Learning and Behavior), virtual presentation, September 8-9, 2021.

eISSN 2094-9278 (Online)
Published: April 30, 2024
https://doi.org/10.47895/amp.v58i7.6340

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Keywords: Autism Spectrum Disorder, feeding, Filipino children, feeding difficulty, feeding problem, feeding behavior, COVID-19

INTRODUCTION

The COVID-19 pandemic has triggered an unparalleled global medical, social, and economic crisis, and its spread all over the world has affected the daily lives of individuals. Among the most vulnerable are children with Autism Spectrum Disorder (ASD)[1] since their restrictive and repetitive patterns of behavior, particularly their rigidity and sensitivity to change, puts them at risk for the development of various difficulties instigated by the precipitously changing conditions in this pandemic. Of particular risk are these children's feeding patterns and behavior.

Children with Autism Spectrum Disorder are already at a higher risk of developing feeding difficulties, with the prevalence of feeding difficulties and problematic feeding behaviors ranging from 46-89%[2,3] compared to 25-45% among their typically developing counterparts[4-6]. Feeding difficulties among children with ASD manifest as selective eating patterns and aversion, excessive mouthing or packing of food, avoidant behaviors, and other atypical feeding rituals or peculiar mealtime behaviors.[7-9] Compared to typically developing children, the development of these feeding difficulties tend to increase more rapidly at a significantly higher frequency among children with ASD.[10] Furthermore, children with ASD were also found to require a longer period of time to overcome feeding difficulties, possibly due to their difficulties in adapting to changes.[11] In the local setting, a study done on children with developmental disabilities have found that in the subgroup of children diagnosed with ASD, 74 out of 80 children presented with feeding difficulties.[12] However, the detailed pattern of feeding difficulties and behaviors of Filipino children with ASD, particularly in the face of a pandemic is yet to be elucidated.

The complex interplay of intrinsic and extrinsic factors such as early experiential learning, general health status, as well as the family's economic status, parental education and income, feeding practice, parenting style, perception of the healthiness of the child's diet, perceived responsibility for child feeding, food accessibility, and family structure predict the success of feeding and the development of feeding difficulties in children.[13,14] Unfortunately, several of these aforementioned factors are currently threatened by circumstances brought about by the COVID-19 Pandemic. Presently, there are very limited studies investigating the direct effects of the COVID-19 pandemic to food and feeding in general, much less in feeding in ASD. Nonetheless, the United Nations System Standing Committee on Nutrition has issued statements regarding the possible impacts of the pandemic on food environments and food security. Strict quarantine guidelines have restricted the movement of individuals affecting previously accustomed food consumption routines as well as food availability, affordability, convenience, and access.[15] Locally, a rapid assessment of the impact of COVID-19 to children and their families conducted by the World Vision Philippines found that food security was among the topmost critical problems identified. According to the survey, 68% of Filipino households are not able to fully meet food expenses and 10% of children eat less than three meals a day.[16] This is particularly significant because previous studies have also proposed that food insecurity can lead to a restriction in the variety of food children consume, as well as contribute to parental stress and the disruption of household dynamics which may in turn affect a child's feeding behavior.[17,18]

Feeding behaviors, especially in ASD, is indeed highly multifaceted and we need to examine the complex interplay of the aforementioned factors so that strategies in their identifi-cation and management can be improved as well. Failure to identify and address the aforementioned problems in feeding may have profound effects on the child's health, such as the development of medical problems such as constipation, diarrhea, vomiting, aspiration, and malnutrition.[8,19,20] These chronic problems in turn may also further affect daily family functioning and relationships, adding to the already heavy demands of rearing a child with ASD.[21] The negative perceptions of parents regarding their child's feeding behaviors may also lead to further parental stress as it influences family dynamics and confers changes in family mealtime behavior.[19] Moreover, as the child grows older, atypical feeding behavior and feeding problems may also begin to affect social func-tioning and may lead to social stigmatization.[22]

In order to study these feeding difficulties and behaviors, a systematic review of seven descriptive studies found that the most common process of collecting data on the atypical feeding behaviors of ASD was through the use of questionnaires.[2] Several scales such as the Behavioral Pediatrics Feeding Assessment Scale (BPFAS), Brief Autism Mealtime Behavior Inventory (BAMBI), and STEP-CHILD have been used to assess feeding difficulties in children with autism. However, a review of these different scales identified the need for instruments to consider the parental perceptions and views.[23] Furthermore, the aforementioned scales may not be able to identify and determine cultural peculiarities of eating and feeding behaviors. In the attempt to obtain a more comprehensive understanding of the patterns of feeding difficulties and behaviors among Filipino children with ASD, this study thus employed the use of the Mealtime Survey by Provost et al. This 49-item questionnaire has been previously reviewed for face and content validity by an inter-disciplinary panel of experts. It consists of items on early history, mealtime environment, child likes and dislikes, and parental views, that comprises of yes/no questions, checklists and open-response questions reflecting parents' perceptions of their children's feeding behaviors and mealtime issues.[24]

In summary, this study aims to describe the patterns of common feeding difficulties and behaviors observed in Filipino children diagnosed with ASD seen in a tertiary hospital subspecialty clinic. It also aims to explore the association between the presence of feeding difficulties and problematic feeding behaviors to child factors (i.e., age, early feeding history, presence of other medical symptoms and health concerns) and sociodemographic variables (i.e., parental education, employment, socioeconomic status). Lastly, it aims to identify the changes brought about by COVID-19 to these feeding difficulties and problematic feeding behaviors. The identification of these specific problems and patterns, as well as the possible impacts of COVID 19 on these, may not only pave the way to earlier identification of vulnerable populations and eventual diagnosis, but may also lead to the identification of potential targets and venues for intervention therefore reducing or even preventing complications of these feeding

problems. Furthermore, the knowledge of possible impacts of the pandemic on the feeding patterns and difficulties of children with ASD can lead to the development of specific programs to address the feeding needs of these children.

MATERIALS AND METHODS

Study Design

This is a single-center, descriptive, questionnaire-based, cross-sectional study, to identify and describe the feeding patterns and behaviors of Filipino children diagnosed with Autism Spectrum Disorder and elucidate possible changes in these feeding behaviors brought about by the COVID-19 pandemic.

Study Population and Settings

Based on previous studies wherein it was found that children's feeding behaviors remain relatively stable from around age of 2 until puberty,[25] and taken into consideration that the average age of diagnosis for children with autism is around 4-years-old,[26] a purposive sampling strategy was used to recruit a sample of parents of 3- to 9-year-old children diagnosed with ASD from the Developmental and Behavioral Pediatrics Clinic, Philippine General Hospital (PGH). Due to the limited number of patients available, all patients scheduled for their online consultations for the month of September 2020 who met the following criteria were recruited and included in the study:

Inclusion Criteria

- Parents with children clinically diagnosed with ASD using the DSM V criteria
- Informants must be the primary caregiver of the child

Exclusion Criteria

- Presence of other co-morbid medical and neuro-developmental disorders
- The research proper was conducted during the month of September to October 2020.

Sample Size

Using previous prevalence data from Napalinga et al., wherein the presence of feeding difficulties was seen in 92.5% of children with ASD,[12] a margin of error of ±5% (i.e., $|\hat{p}-p| \leq 0.05$, where p is the true proportion of these children with feeding problems and $\hat{p}$ is the estimated proportion based on the sample, and a 95% confidence level, the computed minimum sample size is n = 107.

Data Collection Procedure

Survey Administration

Patients from the Division of Developmental and Behavioral Pediatrics who were scheduled for their telehealth consults were evaluated by the principal investigator to confirm that they were diagnosed with ASD through the fulfillment of Diagnostic and Statistical Manual of Mental Disorders (DSM–5) criteria. Participants deemed eligible were briefed by the principal investigator regarding the study's objectives and procedures. Those who agree to participate in the study were assigned an alphanumeric case code and provided with the hyperlink for the consent form. Upon the completion of the consent form, the hyperlink to a secure, password-protected, web-based, self-administered survey questionnaire using SurveyMonkey was provided. The completion of the self-administered questionnaire was estimated to take 15 to 30 minutes.

Sociodemographic Questionnaire

The first part of the survey consists of questions on the study participant's sociodemographic background including items on parental age, gender, children's age, number of siblings, parental education, employment, monthly income, and area of residence. Socioeconomic classification based on the Roberto scale which considers the participants' housing conditions including the materials used, appearance, and structure was also used.

Assessment of Feeding Behaviors and the Impact of COVID-19

The second part of the survey is a questionnaire adapted from the Mealtime Survey by Provost et al., which has been previously reviewed for face and content validity. The survey questionnaire is composed of 49-items comprising key sections on Early History, Mealtime Environment, Child Likes and Dislikes, and Parental Views. Questions from the survey questionnaire consisted of yes/no questions, multiple choice questions, and open-response questions.[24] Multiple-response/checkbox questions were also utilized for items on eating behaviors during the first three months of life, parental report of feeding concerns at age intervals until three years of life, mealtime set-up and location, feeding cues, mealtime behaviors, routines and rituals, eating problems, food restrictions and sensory behaviors, and parental perception and strategies. Questions on the impact of COVID-19 were included and adapted to assess for changes in feeding behaviors encountered during the COVID-19 pandemic. These were presented in a nominal scale (1– Present with decreased severity/intensity 2 – No change from previous 3 – Present with increased severity/intensity 4 – New onset symptom/behavior).

The questionnaire was made available both in English and Tagalog. The Tagalog translation of this questionnaire was pretested with a group of 15 parents prior to the formal conduct of the study in order to ensure the clarity of the questions. Technical issues with formatting and skip logic patterns of the web-based survey were also identified, and changes and improvements were included in the final version of the online survey questionnaire. Data collected from the pretest conducted were not included in the final data analysis.

Data Analysis

Descriptive statistics were employed to describe the demographic and clinical profile of the caregiver and child participants. Frequency counts and percentages were computed for qualitative variables such as: age (actual values), sex, and the presence of specific feeding difficulties, as well as the impacts of COVID-19 detailed in the questionnaire provided. Mean, standard deviation, were presented for quantitative variables such as the parents' and the children's ages. A total Mealtime Survey score was also computed based on the total positive responses to items associated with mealtime location, mealtime behaviors, and food preferences and restrictions. The incidence of parent-reported symptoms, medical conditions, and diet were also generated.

The pairwise (two variable at-a-time) associations between demographic and child factors, and presence of feeding difficulties were explored using the independent samples t-test (if one variable is qualitative with two levels and the other is quantitative) and one-way analysis of variance or one-way ANOVA (if one variable is qualitative with more than two levels and the other is quantitative). Pearson correlation coefficient was also used to correlate the total Mealtime Survey score with the children's ages.

To check for the effect/impact of COVID-19 on mealtime behaviors, the binomial test was done to test the hypothesis that the probability of a change in behavior is higher than the probability of no change. This is also equivalent to testing the hypothesis that the probability of a change in behavior is more than 0.5 (more than 50% chance). The idea behind this is that if COVID-19 does have an impact on mealtime behaviors, then an observed change cannot be attributed to chance alone (50% chance).

All tests were done using SPSS 21 and were computed using a 0.05 level of significance (α=0.05).

Ethical Considerations

This research study has been approved by the University of the Philippines Manila Research Ethics Board. Informed consent was obtained from the parent-participants prior to the study and patient data privacy was strictly enforced in accordance with the Data Privacy Act. All information gathered did not contain any identifying information and the electronic data of the list, data collection forms, and questionnaires are stored in a password protected computer and hard drive. All data will be destroyed and deleted, and any printed paper data will be shredded in a manner that leaves no possibility of reconstruction of information, five years after completion of the study.

RESULTS

Participants

A total of 128 parent and caregiver participants consented to participate in the study. Initial data screening was done, and 13 participants were excluded from the final data analysis due to several reasons; three respondents were not the primary caregiver of the child and were unable to answer the questionnaire completely, three had difficulty accessing the SurveyMonkey server, and seven incompletely filled up the mealtime questionnaire and were unavailable when contacted by the investigator to complete the missing data. The final number of respondents included in the data analysis was 115.

Child Characteristics

Of the 115 subjects, the majority were males (86.96%) (Table 1). These children's age ranged from 3 to 9 years old, with an average of 5.86 years.

Parent/Caregiver Characteristics

Parent and caregiver respondents had an average age of 31.9 years when the study was conducted (Table 2). Of the 115 respondents, most were female (93.04%) and mothers of the child subjects (92.17%), and came from the National Capital Region (71.30%). The respondents were predominantly college graduates (60.87%) and unemployed (59.13%). The average age of the respondent's partners was 38.02 years and most were also college graduates (57.55%), and a little more than half of them were employed (52.83%) as private employees.

Household Characteristics

Approximately one-third of the respondents (35.65%) had a household monthly income of Php 8,001 to Php 15,000 (Table 3). Employing the Roberto's scale, majority of the respondents were from the BC social group comprising a total of 66.95%.

Early Feeding History

More than half of the subjects were either breastfeeding or were breastfed (59.13%) and were described to have strong continuous sucking during their first three months of life (69.57%) (Table 4). Of those who reported strong continuous sucking, only a small percentage reported other eating behaviors (ranging from 2.5% to 6.3% of them).

In the first three years of life, the presence of feeding concerns exhibits an upward trend as the child grows older,

Table 1. Child Characteristics

Child Characteristics (N= 115)	Frequency (n)	Percentage (%)
Gender		
Male	100	86.96
Female	15	13.04
Mean Age (SD), years	5.86±1.98	
Age (in years)		
3	20	17.39
4	18	15.65
5	8	6.96
6	18	15.65
7	28	24.35
8	9	7.83
9	14	12.17

starting at 16.52% (below 1 year old), and steadily increasing to 65.22% (3 years to present). Looking at these data more closely, around three-quarters (78.9%) of respondents who reported feeding concerns at age less than 1 year old also reported feeding concerns at 1 year to 2 years, and at 2 years to 3 years. This percentage decreased to 68.4% at 3 years up to the survey period. On the other hand, almost all respondents (94.9%) who reported feeding concerns at 1 year to 2 years still reported feeding concerns at 2 years to 3 years. This declined to a little over three-quarters of them (79.5%) still reporting feeding concerns at 3 years up to the survey period. Lastly, a vast majority of those who reported feeding concerns at 2 years to 3 years (87.7%) still reported feeding concerns at 3 years up to the survey period.

Table 2. Parent/Caregiver Characteristics

Parent/Caregiver Characteristics (N = 115)	Frequency (n)	Percentage (%)
Gender		
Female	107	93.04
Male	8	6.96
Mean Age (SD), years	31.90±10.62	
Relationship to child		
Mother	106	92.17
Father	8	6.96
Grandmother	1	0.87
Region of Residence		
National Capital Region (NCR)	82	71.30
Region III (Central Luzon)	3	2.61
Region IV-A (CALABARZON)	29	25.22
MIMAROPA Region (Southern Tagalog)	1	0.87
Highest Educational Attainment		
No school	1	0.87
Elementary	1	0.87
High school	28	24.35
College	70	60.87
Higher education	0	0.00
Vocational course	15	13.04
Employment Status		
Unemployed	68	59.13
Self-employed (small scale business)	19	16.52
Self-employed (medium scale business)	2	1.74
Self-employed (large scale business)	0	0.00
Government-employed	8	6.96
Private Company Employee	18	15.65
Mean Age of Partner	38.02±7.40	
Partner's Educational Attainment		
No school	0	0.00
Elementary	2	1.89
High school	30	28.30
College	61	57.55
Higher education	4	3.77
Vocational course	9	8.49
Partner's Employment Status		
Unemployed	18	16.98
Self-employed (small scale business)	15	14.15
Self-employed (medium scale business)	4	3.77
Self-employed (large scale business)	1	0.94
Government-employed	11	10.38
Private Company Employee	56	52.83
Others	1	0.94

Mealtime Environment

A vast majority of the subjects were able to use the spoon independently (86.96%), however less than half were able to utilize the other utensils listed (Table 5). The mothers

Table 3. Household Characteristics

Household Characteristics (N = 115)	Frequency (n)	Percentage (%)
Household's Monthly Income		
PhP 8,000 or below	32	27.83
PhP 8,001 to PhP 15,000	41	35.65
PhP 15,001 to PhP 31,000	32	27.83
PhP 31,001 to PhP 78,000	10	8.70
Roberto Scale		
A (Well-furnished house with the roof and painted outer wall made of sturdy materials, with carpark and/or garden)	22	19.13
B (Well-furnished house made of strong materials but unpainted and has no carpark or garden)	42	36.52
C (House made of strong materials but unpainted and has no carpark or lawn)	35	30.43
D (House made of mixed but predominantly light materials with no concrete walls)	15	13.04
E (House made of makeshift or salvaged materials)	1	0.87
Mean Family Size (SD)	5.37±2.22	
Mean Number of Children	2.0±0.84	

Table 4. Early History

Item	Frequency (n)	Percentage (%)
Nursing		
Breastfeeding/Breastfed	68	59.13
Not breastfeeding/Not breastfed	47	40.87
Eating behaviors during first 3 months*		
Strong continuous sucking		
Strong sucking behavior but frequent breaks	80	69.57
Required frequent feedings	21	18.26
Unorganized sucking	14	12.17
Irritable eater	13	11.30
Gagging, choking, grimacing, and spitting up	7	6.09
	7	6.09
Parental report of feeding concerns at:*		
Below 1 year old	19	16.52
1 year to 2 years	39	33.91
2 years to 3 years	57	49.57
3 years to present	75	65.22

**Data derived from a multiple response (checkbox) question*

Table 5. Mealtime Environment

Item	Frequency (n)	Percentage (%)
Utensils Used*		
Bottle	42	36.52
Cup	52	45.22
Straw	38	33.04
Spoon	100	86.96
Fork	55	47.83
Others		
Bare hands	4	3.48
Chopsticks	1	0.87
Caregiver in charge of feeding		
Mother	67	58.26
Both mother and father	34	29.57
Father	1	0.87
Others		
Grandmother	6	5.22
Helper/Nanny	3	2.61
Grandfather	1	0.87
Aunt	1	0.87
Sister	1	0.87
Cousin	1	0.87
Mealtime Set-up*		
Chair with family	76	66.09
Feeder's lap	56	48.7
Chair by him/herself	13	11.3
High-chair	7	6.09
Others		
On the floor	6	5.22
Followed around by caregiver	5	4.35
On the bed	2	1.74
Beginning Feeding cues*		
Fed on demand	85	73.91
Fed at specified mealtimes	67	58.26
Fed when parent perceives child to be hungry	41	35.65
Fed when child appears hungry	34	29.57
Current parental strategies to get their child to eat*		
Coaxing	5	4.35
Positive reinforcement	41	35.65
Time-out for not eating	1	0.87
Ignoring non-eating behaviors	3	2.61
Pretending to eat and enjoy food	18	15.65
Putting food in child's mouth	42	36.52
Use of games	7	6.09
Use of hand over hand assistance	32	27.83
Child eats automatically	70	60.00
Others		
Parents eat together with child	1	0.87
Using gadgets/electronics	2	1.74
Having a routine before eating	1	0.87
Ending Feeding cues*		
Child verbally says "done"	55	47.83
Child turns face away	40	34.78
Child gestures "done"	33	28.70
Child stops opening mouth	31	26.96
Child begins to throw food	16	13.91
Others		
Child leaves the table	7	6.09
Child puts empty plate on the sink	5	4.35
Child empties his plate	3	2.61
Child drinks water	2	1.74
Child lies on the floor	1	0.87

**Data derived from a multiple response (checkbox) question*

were largely in charge of feeding (58.26%), and most of the subjects were noted to be able to feed on a chair together with their family (66.09%). With regard to beginning feeding cues, respondents said that their child was mostly fed on demand (73.91%) and/or at specified mealtimes (58.26%). Sixty percent (60%) of the respondents also indicated that their child was able to eat automatically, however strategies such as spoon-feeding/putting food directly into the child's mouth and positive reinforcement were still utilized by 36.52% and 35.65%, respectively, of the respondents to get their child to eat. Respondents also reported that almost half (47.83%) of the subjects were already able to verbally express that they were done.

Current Patterns of Feeding Difficulties and Behaviors

Mealtime Location Issues

Among the problems encountered by children with ASD are eating difficulties in different mealtime locations (Table 6). Although 40.87% of the respondents indicated that their children had no difficulty in eating at particular locations, several still reported having feeding difficulties while eating at a relative's home (35.65%), friend's home (29.57%), and at fast food restaurants (27.83%).

Mealtime Behaviors

Several problematic mealtime behaviors were also noted and among the most frequently observed were being a picky eater (61.74%), leaving the table frequently (37.99%), and resists sitting at the table (24.35%) (Table 7). Filipino children with ASD were also identified to have issues with routines and rituals such as eating the same food in a repetitive manner (44.35%) and requiring food to be prepared in a special way (29.56%).

Table 6. Mealtime Location Issues

Item	Frequency (n)	Percentage (%)
Mealtime location*		
Eating difficulty at relatives' homes	41	35.65
Eating difficulty at friends' homes	34	29.57
Eating difficulty at fast food restaurants	32	27.83
Eating difficulty at regular restaurants	28	24.35
Eating difficulty at home	21	18.26
Eating difficulty at school	20	17.39
Eating difficulty in other locations	11	9.57
Eats only in specific places	3	7.83

**Data derived from a multiple response (checkbox) question*

Food Preferences and Restrictions, and other Sensory Behaviors

As indicated in Table 8, majority of this study's subjects were described as picky eaters (61.74%). This is further elucidated in Table 9 where the subjects' food restrictions and preferences are outlined. A large majority of the respondents (80.87%) report that they encounter food resistance wherein their child avoids certain foods. Neophobia also common with 69.57% of the respondents reporting that their children would resist trying new foods. In fact, a relatively high frequency of limiting food intake to favorite foods (42.61%), favorite textures (33.04%), and preferred temperature (17.39%) were reported among the study's subjects. Additionally, other sensory behaviors such as smelling food before eating them (53.04%), mouthing nonfood items (38.26%), and swallowing nonfood items (17.39%) were also reported.

Mealtime Survey Score

The total Mealtime Survey score was computed based on the total positive responses to items listed in Tables 6, 7, and 8, which are associated with mealtime location, mealtime behaviors, and food preferences and restrictions. These items were identified by a panel of experts from the original study of Provost et al., to be feeding behaviors that were common for children with ASD based on literature. The possible range of score was 0 to 44. All subjects had at least a total score of 1, indicating that all subjects had at least one feeding difficulty or problematic feeding behavior. The mean mealtime survey score obtained was 10.85 with a standard deviation of 5.13, and the highest score obtained was 27.

Table 7. Mealtime Behaviors, Issues with Routines or Rituals and Eating Problems

Item	Frequency (n)	Percentage (%)
Mealtime Behaviors*		
Is a picky eater	71	61.74
Leaves table frequently	43	37.99
Resists sitting at table	28	24.35
Is an inconsistent eater	23	20.00
Restless but sits	19	16.52
Throws/dumps food	16	13.91
Uses only specific utensils	15	13.04
Spits food	15	13.04
Has frequent tantrums	14	12.17
Rocks during meals	9	7.83
Seems fearful sitting at table	3	2.61
Hits self while eating	3	2.61
Issues with Routines or Rituals*		
Eats same food in a repetitive manner	51	44.35
Requires food prepared in a special way	34	29.56
Has routines or rituals with food or eating	29	25.22
Needs food in specific place on plate	14	12.17
Is upset if routine is broken	10	8.70
Is a ritualistic eater	10	8.70
Eating problems*		
Problems with chewing	42	36.52
Problem with stuffing mouth or cheeks	30	26.09
Problems with gagging	19	16.52
Problem with throwing up	19	16.52
Problem with nausea	18	15.65
Problems with swallowing	16	13.91
Problems with sucking	14	12.17

**Data derived from a multiple response (checkbox) question*

Table 8. Food Preferences, Restrictions and other Sensory Behaviors

Item	Frequency (n)	Percentage (%)
Food restrictions*		
Food resistance/Child avoids certain foods	93	80.87
Neophobia/Resists trying new food	80	69.57
Child craves certain foods	79	68.70
Limits food to favorite foods	49	42.61
Limits food to favorite textures	38	33.04
Limits food to preferred temperature	20	17.39
Limits food to favorite colors	17	14.78
Limits food to preferred packaging	10	8.70
Sensory behaviors*		
Smells food before eating	61	53.04
Mouths nonfood items	44	38.26
Swallows nonfood items	20	17.39

**Data derived from a multiple response (checkbox) question*

Table 9. Parental Views and Perceptions

Item	Frequency (n)	Percentage (%)
Perception of Amount of Food Eaten		
Parents view their child to eat about right	79	68.70
Parents view their child to eat too much	22	19.13
Parents view their child to eat too little	14	12.17
Perception of Diet		
Fairly Balanced	51	44.35
Poorly Balanced	35	30.43
Balanced	29	25.22
Perception of Child Feeding Behaviors*		
Picky Eater	71	61.74
Eats a variety of food	34	29.57
Healthy Eater	29	25.22
Inconsistent Eater	23	20.00
Over Eater	18	15.65
Ritualistic Eater	10	8.70
Binge Eater	3	2.61
Parental View of Feeding		
Positive (Fun)	6	5.22
Neutral (Just okay)	76	66.09
Negative (Stressful)	33	28.70

**Data derived from a multiple response (checkbox) question*

Parental View and Perceptions

The parental view and perceptions regarding their child's eating behavior and difficulties were also obtained (Table 9). Although most viewed that their child ate the right amount of food (68.70%), only one-fourth of the respondents thought that their child's diet was balanced (25.22%).

Diet and Medical Conditions

Majority of the respondents did not follow any specific diet for their child with ASD in the past and at present (67.83% and 77.39%, respectively) (Table 10). As seen in Table 11, few also reported having medical conditions, with constipation topping the list at only 20%. Correlational analysis to the presence of current feeding difficulties were no longer performed due to the low frequency of these diet and medical conditions.

Comparing mealtime survey scores across demographic and early feeding history variables

Several analyses were done to compare the Mealtime Survey Score, which represents the presence of current feeding difficulties, to different demographic and early feeding history variables.

Child's Age

Correlation analysis using Pearson correlation coefficient reveals that the mealtime survey total score and the child's age is significantly linearly correlated with correlation coefficient r=-0.202 (p-value=0.031). The variables have a weak negative correlation, i.e., there is a weak tendency for the mealtime survey score to decrease as the child's age increases.

Highest educational attainment

A one-way analysis of variance (ANOVA) was done to check if the mean mealtime survey total score varies based on the highest educational attainment. Because only a single respondent falls under 'No schooling' and 'Elementary' each, they were grouped together with 'High school'. The analysis reveals that the mean mealtime survey score was comparable and were not clinically significant among groups (F(2,112)=4.326, p-value=0.15.

Caregiver's Occupation and Employment

Groupings of the respondent's current occupation were dichotomized to unemployed or employed given the small frequencies of some of the categories. An independent samples t-test was done to check if the mean mealtime survey

Table 10. Diet of Children with ASD

Item	Past		Present	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
No specific diet	78	67.83	89	77.39
Avoiding food additives/color	18	15.65	14	12.17
Sugar-free diet	6	5.22	5	4.35
Gluten-free diet	4	3.48	3	2.61
Casein-free diet	1	0.87	2	1.74
Anti-fungal diet	1	0.87	2	1.74
Lactose-free diet	7	6.09	0	0.00

Table 11. Medical Illnesses/Conditions

Item	Frequency (n)	Percentage (%)
Constipation	23	20.00
Food allergies	19	16.52
Holding bowel movement	18	15.65
Stomach problems	11	9.57
Having to take medications	10	8.70
Diarrhea	10	8.70
Asthma	6	5.22
Seizures	5	4.35
Ear Infections	4	3.48

Table 12. Impact of COVID-19 Pandemic on Mealtime Behaviors and Preferences

Behavior/Preference	Total Frequency (n)	No Change	Present but with Increased Severity	Present but with Decreased Severity	New onset preference/ behavior	p-value (binomial test)
Limits food to favorite food	49	24	8	14	3	0.5
Limits food to favorite texture	38	18	6	12	2	0.4357
Limits food to favorite color	17	9	2	4	2	0.6855
Limits food to preferred temperature	20	14	0	5	1	0.9793
Limits food to preferred packaging	10	5	1	4	0	0.6230
Craving or seeking out certain food	79	43	12	20	4	0.8159
Food resistance/ Avoidance of certain food	93	59	11	17	6	0.9967
Smelling food before eating it	61	33	7	14	7	0.7787
Resisting to try new foods	80	52	5	18	5	0.9976
Mouthing of non-food items	44	22	7	12	3	0.5598
Eating and swallowing non-food items	20	11	2	4	3	0.7483
Requiring food to be prepared a special way	34	22	3	6	3	0.9712
Eating same food in a repetitive manner	51	37	3	7	4	0.9997

total scores of the dichotomy differ. Results revealed that their means are comparable (t(113)=0.330, p-value=0.742). Similar to the respondent's occupation, the respondent's partner's occupation was also dichotomized into unemployed or employed. Independent samples t-test revealed that the mean mealtime survey total score of the two groups are comparable (t(103)=0.545, p-value=0.587).

Monthly income

One-way analysis of variance (ANOVA) revealed that the mean mealtime survey total scores of the monthly income groups are comparable/not significantly different (F(3,111)=1.172, p-value=0.324).

Roberto's Scale

Prior to analysis, categories D and E were combined because only a single respondent was grouped under E. ANOVA revealed that the mean mealtime total score of the categories do not significantly differ (F(3,111)=0.067, p-value=0.978).

Presence of Feeding Difficulties Below 1 Year of Age

Independent samples t-test revealed that the mean mealtime survey total score of those who indicated the presence of feeding difficulties below 1 year of age is comparable to the mean mealtime survey total score of those who did not report feeding difficulties during this time (t(113)=1.468, p-value=0.145). No significant association exists between the mealtime survey total score and the presence of feeding difficulties at 1 year old and below.

Presence of Feeding Difficulties Between 1 and 2 Years of Age

Results of the independent samples t-test revealed that the mean mealtime survey total score of those who indicated the presence of feeding difficulties between 1 and 2 years of age is significantly higher than the mean mealtime survey total score of those who did not report feeding difficulties during this time (t(113)=2.590, p-value=0.011).On the average, the total scores of the group with feeding difficulties at this time is higher than the group with no difficulties by 2.55 points. The results of the independent-samples t-test indicate a significant association between the mealtime survey total score and the presence of feeding difficulties between the age of 1 to 2 years old.

Presence of Feeding Difficulties Between 2 and 3 Years of Age

Independent samples t-test also revealed that the mean mealtime survey total score of those who indicated the presence of feeding difficulties between 2 and 3 years of age is significantly higher than the mean mealtime survey total score of those who did not have feeding difficulties at this time. On the average, the scores differ by 3.77. The results indicate a significant association between the mealtime survey total score and the presence of feeding difficulties between the age of 2 to 3 years old.

Number of Age Intervals with Reported Feeding Concern

To further explore the relationship of the presence of feeding concerns at different age intervals and mealtime survey scores, the number of age intervals with feeding concerns was derived from the original questions. Close to a quarter of the respondents (24.3%) did not report any feeding concerns in any of the age intervals covered by the questionnaire. A comparable percentage (26.1%) reported feeding concerns in exactly one of the four age intervals. A fifth of the respondents reported feeding concerns in two age intervals and in three age intervals (20.0% and 19.1%, respectively). Only 10.4% reported feeding concerns in all age intervals. Moreover, the mean mealtime survey total scores were found to significantly differ for at least one pair of comparison based on the number of age intervals with feeding concerns, (F(4, 110) = 8.174, p < .001). Post hoc tests using Bonferroni adjustment revealed that the mean mealtime survey total scores of the groups with feeding concerns in 1, 2, 3 and 4 age intervals were significantly different from the mean mealtime survey score of those with no reported feeding concern in any age interval (p = .006, p = .005, p < .001 and p < .001, respectively). Mean mealtime survey scores of groups with reported feeding concerns were deemed statistically comparable.

Impact of the COVID-19 Pandemic

To check for the effect/impact of COVID-19 on mealtime behaviors, binomial test was used to test the hypothesis that the probability of a change in behavior is higher than the probability of no change. This is also equivalent to testing the hypothesis that the probability of a change in behavior is more than 0.5 (more than 50% chance). The idea behind this is that if COVID-19 does have an impact on mealtime behaviors, then an observed change cannot be attributed to chance alone (50% chance). A binomial test was done for each mealtime behavior, and the results revealed that COVID-19 does not have a significant impact on any mealtime behavior (none of the p-values was less than 0.05) as seen in Table 12.

DISCUSSION

There have been very limited studies on the feeding difficulties of Filipino children with ASD. The current report of the patterns of feeding behaviors and difficulties is among the first to describe in detail the different food restrictions and preferences, sensory issues, and problematic feeding behaviors by this population of homogenous ethnicity. This is also the first to attempt to correlate the presence of early feeding issues and sociodemographic data to the presence of current feeding issues of Filipino children with ASD. In addition, this study also endeavored to investigate the possible impact

of the COVID-19 pandemic on the identified patterns of feeding behaviors and difficulties.

All of the study's subjects were identified to have at least one feeding difficulty or problematic feeding behavior as indicated by their total Mealtime Survey Score. Although estimates of the prevalence of feeding problems in ASD has been varied ranging from 46-89%[2], the high prevalence of feeding difficulties in our population was unexpected. This is even higher than the 92.5% prevalence showed by the unpublished study of Napalinga et al. among Filipino children with disabilities wherein 74 out of 80 children from the ASD subgroup were identified to have had feeding difficulties.[12] This difference in the prevalence was attributed to several factors. First is the nature of the sample size. Our study involved children from 3 to 9 years of age, an age group wherein feeding difficulties was identified to be commonly observed, while the study of Napalinga et al. involved a wider age group, with subjects aged 0 to 19 years old.[12] Second is the variability of the tools used to identify the presence of feeding difficulties. The Mealtime Survey questionnaire[24] utilized in our current study comprised of significantly more items and was used for the purpose of characterizing and describing the patterns of feeding behavior and difficulties in children with ASD, and not merely for screening per se. Nonetheless, the high prevalence of feeding difficulties identified in our subjects confirms the need for clinicians to routinely ask for, and screen children with ASD for feeding difficulties. This also highlights the need for further research in this area, particularly to identify other possible factors contributing to this high prevalence in our population.

Sociodemographic variables were also initially thought to play a role in the difference in the prevalence as well as the frequency of these feeding difficulties, however there were no comparable difference observed across various subgroups of parental employment, highest educational attainment, and socioeconomic status.

This study also showed that based on parental reports, the incidence of feeding difficulties increased from before 1 year of age to 3 years of age, increasing from 16.52% to 65.22%, respectively. Although previous studies on typically developing children show that feeding difficulties begin at 15 to 36 months of age and level off at around 5 years old,[25] our study's almost three-fold increase in the first three years of life was more similar to findings in studies of toddlers later diagnosed with ASD, wherein the frequency of feeding difficulties increased more rapidly compared to their typically developing counterparts.[10] Another study on the first two years of life of children eventually diagnosed with ASD also showed that the odds for an ASD child to have many (2 or more) consultations related to a regulatory feeding problem were about 4 times as high as for a child in the comparison group.[27] The opposite was however observed from this study's data trends, wherein increasing age had a negative correlation to the frequency of feeding difficulties, albeit weak. A longitudinal study done by Bandini et al., supports these findings when it also reported that the percentage of problematic mealtime behaviors among children with ASD, including food refusal behaviors, declined as these children grew older.[28] Similarly, a recent study among 396 preschool to school-age children showed that feeding problems in children with ASD decreased from the time of diagnosis to clinical insignificance by school age.[29] These findings further emphasize the need for early screening and intervention for feeding problems in order to catch them during their most burdensome time. Additionally, eliciting feeding issues in this age group may prove to be significant and helpful in screening for ASD in the younger age group. Commonly used ASD screening tools such as the Modified Checklist for Autism in Toddlers (MCHAT) and Quantified Checklist for Autism in Toddlers-10 (Q-CHAT 10) currently do not include items on feeding difficulties and the inclusion of these may increase the sensitivity of these screening tools.

Among those reported, selective eating has been identified as the most frequent problematic feeding behavior observed among Filipino children. Picky eating which is characterized by strong food preferences and an unwillingness to try and eat unfamiliar food was reported by 61.74% of the respondents. When asked in more detail, an even higher frequency of respondents reported that their child would crave certain foods (68.70%), resist trying new food (69.57%), and resist or avoid certain foods (80.87%) which confirms the gravity of this feeding problem among children with ASD. This is consistent with findings of a systematic review done by Mari-Bausset on studies about food selectivity in children with ASD from 1970-2013 wherein empirical evidence and an overall scientific consensus supported an association between food selectivity and ASD.[30] Researchers have posited that sensory sensitivity (also referred to as sensory defensiveness or sensory over-responsivity) which is a common concern among children with ASD, contribute to their food selectivity including but not limited to their difficulty with food textures.[31] Another frequent difficulty encountered pertained to keeping children with ASD in place while eating. Subjects were reported to leave the table frequently (37.99%), resist sitting at the table (24.35%) or appears restless when sitting (16.52%). These are clinically significant since these could guide clinicians and therapists in the targeted development of feeding programs.

Another noteworthy finding in this research is the parental perception of their child's feeding difficulties. A very small minority of parents and caregivers had positive views regarding mealtimes and feeding their child (5.22%). Most of them only had neutral perceptions (66.09%) while some perceived feeding their child as a negative or stressful experience (28.70%). Although not statistically significant, this finding is clinically significant since parental stress plays a role in a child's feeding experience and may be contributory to the increased frequency of feeding problems and difficulties observed in our population. Interestingly, despite the relatively neutral perceptions of the respondents, the study also showed

that majority of the parent respondents perceived that the amount of food their child eats is adequate (68.70%) and that they were able to receive a fairly balanced diet (44.35%). This is contrary to findings of previous studies wherein parents of children with ASD had generally more negative perceptions of their children's dietary behaviors compared to the parents of typically developing children.[32] Parental education and counselling may thus also be incorporated in the development of programs geared towards improving and addressing a child's feeding difficulties and problematic behaviors.

Lastly, this study did not find any significant changes on any of the participant's problematic mealtime behaviors during the first six months of the COVID-19 pandemic. Although there have been several anecdotal reports regarding changes in food consumer patterns and feeding behaviors in the general population[33] and changes in child behavioral problems brought about by food insecurity[34], this did not hold true for the specific population of Filipino children with ASD in our study. It is a possibility that the lack of a significant change in their feeding behavior is secondary to the inherent resistance of children with ASD to adapt to changes in their environment. However, due to the rapidly evolving and fluid circumstances surrounding the COVID-19 pandemic, assessing its effects on feeding and feeding behavior of children with ASD may still be better understood through further continuous research.

CONCLUSION

There is a high prevalence of feeding difficulties and problematic feeding behavior among Filipino children with ASD, however this study was unable to document statistically significant changes in these feeding behaviors and difficulties during the first six months of the COVID-19 pandemic. Present feeding difficulties and behaviors were found to be associated with history of early feeding difficulties, highlighting the need to include feeding difficulties in screening tools, and early training programs and interventions for children with ASD.

Recommendations and Limitations of the Study

Caution is needed in interpreting the results of this study due to the presence of several methodological and researcher limitations. The accuracy of reporting information in cross-sectional survey studies such as this are subject to recall bias, particularly when answering items pertaining to early historical data. Longitudinal studies using a tool and questionnaire validated specifically for use in the Filipino population may be employed in future research studies in order to more objectively illustrate the trajectory of feeding difficulties in Filipino children with ASD. Longitudinal studies will also give a wider perspective on the possible impacts and effects of the pandemic since these are time-sensitive and potentially compounding. Randomized sampling would also have been ideal, however due to the limitations during the COVID-19 pandemic lockdown, a limited number of patients were available during the period of the study. Additionally, since feeding difficulties are also common among typically developing children, future researches on the Filipino population are recommended to include a control group of age-matched typically developing children.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

All authors declared no conflicts of interest.

Funding Source

None.

REFERENCES

1. Colizzi M, Sironi E, Antonini F, Ciceri ML, Bovo C, Zoccante L. Psychosocial and behavioral impact of COVID-19 in autism spectrum disorder: An online parent survey. Brain Sci. 2020 Jun;10(6):341. doi: 10.3390/brainsci10060341.
2. Ledford JR, Gast DL. Feeding problems in children with autism spectrum disorders: a review. Focus Autism Other Dev Disabl. 2006; 21(3):153-66. doi: 10.1177/10883576060210030401
3. Mayes SD, Zickgraf H. Atypical eating behaviors in children and adolescents with autism, ADHD, other disorders, and typical development. Res Autism Spectr Disord. 2019 Aug; 64,76–83. doi: 10.1016/j.rasd.2019.04.002
4. Berlin KS, Davies WH, Silverman AH, Woods DW, Fischer EA, Rudolph CD. Assessing children's mealtime problems with the Mealtime Behavior Questionnaire. Child Health Care. 2010; 39(2): 142-56. doi: 10.1080/02739611003679956
5. Dela Osa N, Barraza R, Ezpeleta L. The influence of parenting practices on feeding problems in preschoolers. Acción Psicológica. 2015 Dec;12(2):143-54.
6. Hubbard KL, Anderson SE, Curtin C, Must A, Bandini LG. A comparison of food refusal related to characteristics of food in children with autism spectrum disorder and typically developing children. J Acad Nutr Diet. 2014 Dec;114(12):1981-7. doi: 10.1016/j.jand.2014.04.017.
7. Bandini LG, Anderson SE, Curtin C, Cermak S, Evans EW, Scampini R, et al. Food selectivity in children with autism spectrum disorders and typically developing children. J Pediatr. 2010 Aug;157(2):259-64. doi: 10.1016/j.jpeds.2010.02.013.
8. Sharp WG, Berry RC, McCracken C, Nuhu NN, Marvel E, Saulnier CA, et al. Feeding problems and nutrient intake in children with autism spectrum disorders: a meta-analysis and comprehensive review of the literature. J Autism Dev Disord. 2013 Sep;43(9):2159-73. doi: 10.1007/s10803-013-1771-5.
9. Cermak SA, Curtin C, Bandini LG. Food selectivity and sensory sensitivity in children with autism spectrum disorders. J Am Diet Assoc. 2010 Feb;110(2):238-46. doi: 10.1016/j.jada.2009.10.032.
10. Ashley K, Steinfeld MB, Young GS, Ozonoff S. Onset, trajectory, and pattern of feeding difficulties in toddlers later diagnosed with autism. J Dev Behav Pediatr. 2020 Apr;41(3):165-71. doi: 10.1097/DBP.0000000000000757.
11. Martins Y, Young RL, Robson DC. Feeding and eating behaviors in children with autism and typically developing children. J Autism Dev Disord. 2008 Nov;38(10):1878-87. doi: 10.1007/s10803-008-0583-5.

12. Napalinga K, Navarro JO, Ambatali-Reodica A. Feeding difficulties in children with developmental disabilities. Paper presented at: Transdisciplinary Intervention: Ideas in Action. 3rd International Developmental Pediatrics Association Congress and 10th Philippine Society for Developmental and Behavioral Pediatrics Biennial Convention; 2019 Dec 9-12; Manila, Philippines.
13. Scaglioni S, De Cosmi V, Ciappolino V, Parazzini F, Brambilla P, Agostoni C. Factors influencing children's eating behaviours. Nutrients. 2018 May;10(6):706. doi: 10.3390/nu10060706.
14. De Cosmi V, Scaglioni S, Agostoni C. Early taste experiences and later food choices. Nutrients. 2017 Feb;9(2):107. doi: 10.3390/nu9020107.
15. United Nations System Standing Committee on Nutrition, The COVID-19 pandemic is disrupting people's food environments: A resource list on food systems and nutrition responses [Internet]. 2020 [cited 2020 Jul]. Available from: https://www.unscn.org/en/news-events/recent-news?idnews=2039.
16. World Vision, The impact of COVID-19 to children and their families: A rapid assessment in the Philippines [Internet]. 2020 [cited 2020 Jul]. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/WV%20Phlippines%20COVID-19%20Rapid%20Assessment.pdf.
17. EconPapers, Household Food Security in the United States, 2008, No 55953, Economic Research Report, United States Department of Agriculture, Economic Research Service [Internet]. 2009 [cited 2020 Jul]. Available from: https://econpapers.repec.org/paper/agsuersrr/55953.htm.
18. Hamelin AM, Habicht JP, Beaudry M. Food insecurity: consequences for the household and broader social implications. J Nutr. 1999 Feb;129(2S Suppl):525S-528S. doi: 10.1093/jn/129.2.525S.
19. Marshall J, Hill RJ, Ziviani J, Dodrill P. Features of feeding difficulty in children with Autism Spectrum Disorder. Int J Speech Lang Pathol. 2014 Apr;16(2):151-8. doi: 10.3109/17549507.2013.808700.
20. Malhi P, Venkatesh L, Bharti B, Singhi P. Feeding problems and nutrient intake in children with and without autism: a comparative study. Indian J Pediatr. 2017 Apr;84(4):283-288. doi: 10.1007/s12098-016-2285-x.
21. Rogers LG, Magill-Evans J, Rempel GR. Mothers' challenges in feeding their children with autism spectrum disorder—managing more than just picky eating. J. Dev. Phys. Disabil. 2012;24:19–33.
22. Solmi F, Bentivegna F, Bould H, Mandy W, Kothari R, Rai D, et al. Trajectories of autistic social traits in childhood and adolescence and disordered eating behaviours at age 14 years: A UK general population cohort study. J Child Psychol Psychiatry. 2021 Jan;62(1):75-85. doi: 10.1111/jcpp.13255.
23. Lazaro CP, Caron J Ponde MP. Scales assessing eating behavior in autism spectrum disorder. Revista Psicologia: Teoria e Prática, 2018;20(3): 42-59. doi: 10.5935/1980-6906/psicologia.v20n3p42-59
24. Provost B, Crowe TK, Osbourn PL, McClain C, Skipper BJ. Mealtime behaviors of preschool children: comparison of children with autism spectrum disorder and children with typical development. Phys Occup Ther Pediatr. 2010 Aug;30(3):220-33. doi: 10.3109/01942631003757669.
25. Mascola AJ, Bryson SW, Agras WS. Picky eating during childhood: a longitudinal study to age 11 years. Eat Behav. 2010 Dec;11(4):253-7. doi: 10.1016/j.eatbeh.2010.05.006.
26. Hyman SL, Levy SE, Myers SM; Council on Children with Disabilities, Section on Developmental and Behavioral Pediatrics. Identification, evaluation, and management of children with autism spectrum disorder. Pediatrics. 2020 Jan;145(1):e20193447. doi: 10.1542/peds.2019-3447.
27. Barnevik Olsson M, Carlsson LH, Westerlund J, Gillberg C, Fernell E. Autism before diagnosis: crying, feeding and sleeping problems in the first two years of life. Acta Paediatr. 2013 Jun;102(6):635-9. doi: 10.1111/apa.12229.
28. Bandini LG, Curtin C, Phillips S, Anderson SE, Maslin M, Must A. Changes in food selectivity in children with autism spectrum disorder. J Autism Dev Disord. 2017 Feb;47(2):439-46. doi: 10.1007/s10803-016-2963-6.
29. Peverill S, Smith IM, Duku E, Szatmari P, Mirenda P, Vaillancourt T, et al. Developmental trajectories of feeding problems in children with autism spectrum disorder. J Pediatr Psychol. 2019 Sep;44(8):988-98. doi: 10.1093/jpepsy/jsz033.
30. Marí-Bauset S, Zazpe I, Mari-Sanchis A, Llopis-González A, Morales-Suárez-Varela M. Food selectivity in autism spectrum disorders: a systematic review. J Child Neurol. 2014 Nov;29(11):1554-61. doi: 10.1177/0883073813498821.
31. Zobel-Lachiusa J, Andrianopoulos MV, Mailloux Z, Cermak SA. Sensory differences and mealtime behavior in children with autism. Am J Occup Ther. 2015 Sep-Oct;69(5):6905185050. doi: 10.5014/ajot.2015.016790.
32. Lockner DW, Crowe TK, Skipper BJ. Dietary intake and parents' perception of mealtime behaviors in preschool-age children with autism spectrum disorder and in typically developing children. J Am Diet Assoc. 2008 Aug;108(8):1360-3. doi: 10.1016/j.jada.2008.05.003.
33. Khosravi M. The challenges ahead for patients with feeding and eating disorders during the COVID-19 pandemic. J Eat Disord. 2020 Sep;8:43. doi: 10.1186/s40337-020-00322-3.
34. Huang J, Vaughn MG. Household food insecurity and children's behaviour problems: New evidence from a trajectories-based study. Br J Soc Work. 2016 Jun;46(4):993-1008. doi: 10.1093/bjsw/bcv033.