



Factors Influencing Food Selectivity and Food Preferences of Children with Autism Spectrum Disorder

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To determine the Food Preferences and factors influencing food selectivity for children with Autism Spectrum Disorders.

Study Design: It was a cross-sectional survey.

Place and Duration of Study: Data was collected within the time frame of six months from February 2019 to July 2019. Data was collected from different educational centers, rehabilitation centers, clinics and special education schools in Lahore, Pakistan.

Methodology: A cross-sectional survey was conducted using convenient sampling technique. Data was collected from parents of children with Autism by using a questionnaire. Data was collected within the time frame of six months from February 2019 to July 2019. Data was collected from different educational centers, rehabilitation centers, clinics and special education schools in Lahore, Pakistan.

Results: In sample of 68 children 22 (32.4%) were female and 46 (67.6%) were male. Out of 68 children, 55(80.8%) liked rice, 40(58.8%) liked junk food, 41(60.2%) liked bread, 38(55.8%) liked crunchy food and 36(53%) liked fruits. Out of 68 children 32(47%) didn't need certain silverware or

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temperature to eat food, 33(48%) didn't prefer to sit with specific person or chair at meals, 31(.5%) didn't show any behavior like crying and screaming, 30(44.1%) didn't refuse food if not in a presentable way and 30(44.1%) disagreed to eat single food three times.

Conclusion: This study significantly shows that children with Autism Spectrum Disorder has some food preferences. They like to eat soft food like rice and bread rather than churchy one, they like fruits, vegetable, junk food. They show behaviors like throw food while eating and refuses to self-feed. They prefer to watch TV or any electronic device at mealtime. Due to their sensory issues they refuse to taste new food. The result indicates that autistic child has food preferences and they show limited acceptance towards food.

Keywords: Autism, feeding problem, food preferences, sensory sensitivity, mealtime problems.

1. INTRODUCTION

Autism Spectrum Disorder (ASD) can be explained by occurrence of repetitive and inappropriate behavior and decrement of emotional congruence, lack of sociality, sensory, behavioral problems and manifests limited verbal and non-verbal skills [1].

As per the there should be abnormalities in these three areas for the diagnosis of autism and should be there before age 3. Normal developing children compared with children having other disabilities might display autistic symptoms yet don't fulfill the criteria for an ASD. Along these lines, one might get confuse inappropriate behaviors as a feature of their problem, instead of familiarizing them as behavior free of conditions [2].

Dr. Leo Kanner, portray about the condition Autism for the first time. He introduced eleven contextual investigations in a paper about kids showing these conducts. He additionally noted that families of these children have high intellectual level. He explicitly noticed these traits are inborn in nature instead of environmental. Shockingly, this theory was not found in the year passed. All things being equal, the emphasis was more on the guardians; explicitly 'frozen mother' which he believes is the reason for disorder [3]. The cerebrum related research for reason of ASD is as yet not apparent. In reality, any anatomical abnormalities regarding autism are very tough to demonstrate. According to the research, there is no role of genes that can affect abnormalities in the anatomical structure of brain and tissue changes. It is believed that the brain anomaly is due to hyper and hypo association in brain despite restricted lesion of brains. Still it is obscure that cognitive abilities are influenced by developmental cycles in brain [4]. Guardians and clinicians frequently report that children with ASD are excessively particular of their eating styles;

they eat less diverse diets with only a few fruits and vegetables [5]. A Child with Autism Spectrum Disorder (ASD) experience broadly more prominent eating habits than normally developing kids, and food selectivity is of main concern [6]. Another investigation demonstrate that higher levels of feeding issues in early childhood have been referenced among kids who have been subsequently determined to have ASD in contrast with the ones without an ASD diagnosis [7].

Intellectual and psychological development can influence kids with ASD. Behavior issues plays a powerful part in dietary patterns of kids with ASD. Child with Autism Spectrum Disorder (ASDs) are referenced to have food aversions and repeating eating behavior [8]. Aversion or preferences for specific sort of food sources are normal eating practices of these children. Color and taste of food, texture of food, the way food is introduced, temperature of food either hot/cold, also the packaging, the presentation of dish, sort of utensils utilized are the normal elements included. Alternately, in a portion of the cases, physiological factors either immediate or indirect are the reason for certain eating and conduct issues, involving oral motor problems like biting and gulping. Sensory processing disorder and gastric problems are additionally important for it [9].

A study was conducted to introduce alternative therapies for children with ASD other than speech therapy, occupational therapy etc. This study claims that conventional treatment for the treatment of ASD is by using herbal medicines. A combination of herbal treatment with other strategies can help in the betterment of ASD known as complementary and alternative medicines (CAM) [10].

As per the study manifesting in Penn-State University-Harrisburg, USA, child with Autism

show more feeding issues as compared to typically developing children of their age. The goal of the study was to find out the eating habits of family, a kind of feeding issue, likeness of certain food, and the connection of feeding problem of child with that of family eating habits. Also, they want to find out the connection of stereotypical characteristics of a child with autism to their feeding problems. The conclusion of the study was that a child with autism don't like certain food and like other kind of food as compared with their family members. Nonetheless, food preference of family seemed to impact food selectivity more than symptomatic qualities of Autism [11].

The investigation led in 2008 by Yolanda Martins, Robyn L. Youthful, and Danielle C. Robson clarified feeding and eating practices in ASD and commonly growing peers. A tool surveying feeding and eating conduct were filled by mothers (guardian) of children age range two to twelve years. Three groups were made. The outcomes clarify that a child with were bound to show fastidious eating conduct than their age group. Conventional feeding problems were equal in every group in spite of the fact that kids with ASD were bound to show hazardous eating and feeding behaviors [12].

An investigation by Len Levin and Edward G. Carr explained about behavior issues and selection of food in children with different disabilities. Distinctive food items were introduced to children Among the evaluation with the most favored food sources and the most unfavored food sources, the prepared food sources like chocolate, chips, egg puddings were bound to be OK while the regular consumable food like sandwiches, fruits and curd were minimum favored food [13].

This study helps to determine the food preferences of Children with Autism as this is of prime importance. Sensory issues are always related to a child with autism and mostly they are picky eaters. This research will give greater insight and knowledge regarding the factors that give rise to eating and feeding difficulties.

2. MATERIALS AND METHODS

A quantitative cross-sectional study was conducted using convenient sampling technique. Data was collected from parents of children with Autism Spectrum Disorder by using questionnaire. The children who were included for research purpose had different age groups.

The sample size computed was 68. Total population was 3,45,600. The online sample calculator was used to calculate the sample using 90% confidence interval and 10% level of significance [14]. Data was collected through Performa generated through literature review and expert opinion and Content Validity and Reliability was found out by content analysis. Data was collected from different educational centers, rehabilitation centers, clinics and special education schools in Lahore, Pakistan. Study was completed within the time frame of six months from February 2019 to July 2019. Convenient sampling technique was used in this study. The participant satisfying the inclusion and exclusion criteria was recruited in this study after informed consent. Parents of children with autism spectrum disorder (ASD) of age range 2-11 onwards was included in the study and children having other feeding and eating problems due to other disorders were excluded from the study. Data was analyzed using SPSS software and endnote was used for references.

3. RESULTS AND DISCUSSION

The total sample was 68 children with ASD, in which 22 (32.4%) were female and 46 (67.6%) were male. Out of 68 children, 55(80.8%) preferred rice, 40(58.8%) enjoyed junk food, 41(60.2%) loved bread, 38(55.8%) loved crispy food and 36(53%) loved fruits.

Among 68 participants, 32(47%) didn't require certain temperature or specific utensil to eat food. 33(48%) were not agree to sit with particular individual or seat at suppers, 31(.5%) didn't show any conduct like crying and shouting, 30(44.1%) didn't decline food if not in a presentable manner and 30(44.1%) differ to eat one specific food item multiple times.

This graph indicates age range of children with autism spectrum disorder. In which there were 35 kids with age range two to six years. 24 children fall into age range 6-11 years while 9 children were above 11.

This graph shows the gender of children with autism spectrum disorder. 46 (67.6%) were boys while 22 (32.4%) were girls.

4. DISCUSSION

In this study food preferences of children with autism spectrum disorder were identified. Those factors that influence food selection in children

with ASD was also focused. Parents of 68 children was included. Out of 68 children 22 were girls and 46 were boys, and the age range was two years to above eleven years.

Because of their feeding issues related to food selection, it is believed to cause some affect their overall health and diet [15].

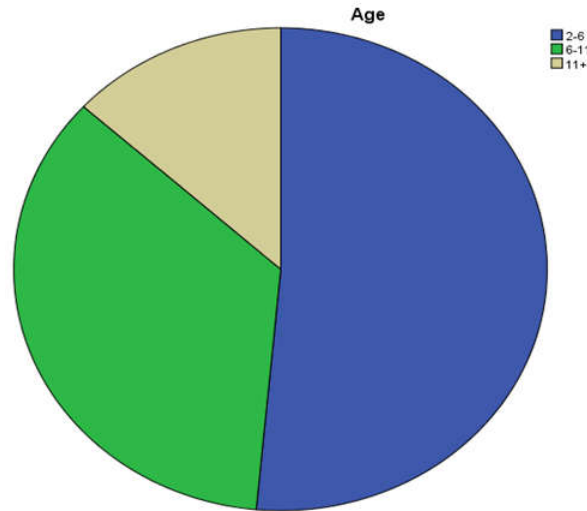


Fig. 1. Age range of children with ASD

Table 1. Factors influencing food selectivity and food preferences of children with Autism Spectrum Disorder

Questions	Agree	Neutral	Disagree
1. Don't want to eat if meal is not at particular temperature	25 (36.7%)	20 (29.4%)	23(33.8%)
2. Prefer specific brands to eat	31(45.6%)	9 (13.2%)	28 (41.1%)
3. Child want certain utensil or temperature of food to eat	21(30.9%)	15(22.1%)	32 (47.1%)
4. Likes to eat rice	55 (80.9%)	5 (7.4%)	8 (11.8%)
5. Likes to eat junk food	40 (58.8%)	13 (19.1%)	15 (22%)
6. Like to eat bread	41 (60.3%)	16 (23.5%)	11 (16.2%)
7. Like to eat vegetables.	30 (44.2%)	20 (29.4%)	18 (26.5%)
8. Like to eat fruits.	36 (52.9%)	16 (23.5%)	16 (23.5%)
9. Wants to eat with specific person or chair.	20 (29.4%)	15 (22.1%)	33 (48.5%)
10. Used to throw food.	27 (39.8%)	14(20.6%)	24 (39.7%)
11. Spit food out of mouth.	23 (33.8%)	18 (26.5%)	27 (39.7%)
12. Cry or shout during mealtime	25 (36.8%)	12 (17.6%)	31 (45.6%)
13. Don't want to eat by self	27 (39.7%)	21 (30.9%)	20 (29.4%)
14. Left table before finishing food.	30 (44.1%)	12 (17.6%)	25 (36.8%)
15. Eats according to the environment.	22 (32.3%)	21 (30.9%)	25 (36.7%)
16. Prefer crispy food items.	38 (55.9%)	16 (23.5%)	14 (20.6%)
17. Don't want to eat food if not decorated much.	23 (33.8%)	15 (22.1%)	30 (44.1%)
18. Don't want to eat one kind of food item multiple times	23 (33.8%)	15 (22.1%)	30 (44.2%)
19. Watches TV or electronic device at meals.	32 (47.1%)	15 (22.1%)	21 (30.9%)
20. Refuses to eat if new food item is introduced,	34 (50%)	14 (20.6%)	20 (29.4%)

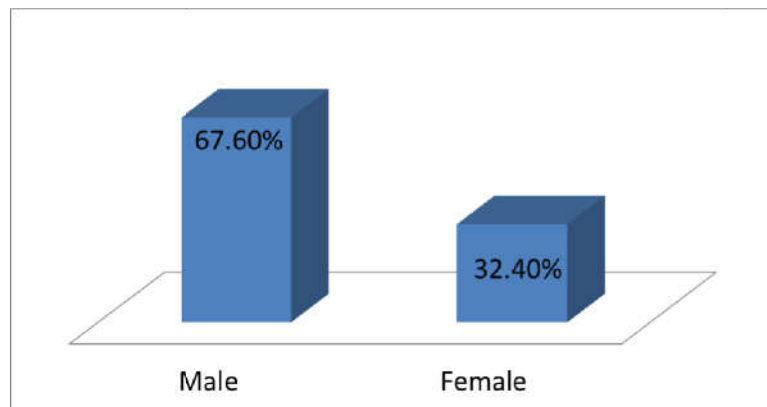


Fig. 2. Gender of children with ASD

This shows that a child with Autism have certain food preferences like prefer specific brands. They love eating delicate food i.e rice and bread as compared to crispy one. They prefer fruits over vegetables. They love eating junk food. They tend to throw meals during mealtime and don't want to eat food by self. They leave table before finishing meal. While eating they tend to watch poems or anything at television or want any electronic gadget. They don't try new food because of their sensory problems [16].

A child with autism doesn't like to eat food in specific utensil. They even don't like to eat with some specific person or confined chair. While eating they doesn't spit out food. Enormous number of parents differ that their child cries or shout at suppers. Their eating didn't shift as indicated by the climate. They don't show any conduct if the food isn't in a satisfactory manner. They don't lean toward eating one kind of food multiple times.

This investigation was contrasted with one more examination that was directed as kids with ASD display more taking care of issue than their commonly creating peers. The consequence of this examination clarifies that child with autism spectrum disorder have particular food inclinations and different factors were additionally remembered for choice and refusal of food things [11].

A study conducted by Michelle Ann Suarez and Kristin Marria Crinion in USA in 2015. The study aimed to describe the specific fruits and vegetable that parents of children with ASD reported their child ate and to define the specific presentation of food they do in order to make the child eat what they are giving. The results of the

study show that vegetable and fruits had less percentage and they accepted 20 or less foods of the total diet, and a greater percentage of dairy and grain/potato/snack foods than children with greater than 20 foods. Though, parents who document that their child refuses food primarily based on texture did no longer record extra "specific presentation" necessities for popular meals [17].

One more investigation directed at University in Canada, 2011. The point of the examination is to analyze whether youngsters with Autism spectrum disorder have more supper time issues than their developing peer and regardless of whether age and sex are related with supper time issues. 48 families took part and finished a survey for their children with ASD, 3 to 12 years old. Out of 48 children, 44 were male and they are more likely to have autism 44 (91.7%) and feeding problems than their siblings 20 (41.7%). Age range doesn't have any significance. Eating and feeding problems were significant in this study [18].

A prior study by Alan Emond investigate about eating, diet and overall growth of children with ASD. The outcomes of this prospective study show that kids on the autism spectrum proven feeding signs and symptoms from infancy and had a progressively less varied food regimen from 15 months of age. However, strength intake and increase had been no longer impaired [19].

This investigation is contrasted with one more examination regarding feeding behavior of autistic children. The study was led to contrast eating conduct among youngsters and without autism. The outcomes demonstrate youngsters with chemical imbalance showed additional

eating issues and have smaller scope of food sources than kids without autism. Furthermore, the aftereffects of my examination likewise demonstrated that they have eating issues and food inclinations with respect to food [20].

In one study, it is seen that children with Autism are at risk of low nutrition and medical related issues if their feeding issues are not given importance at first place. [21].

5. CONCLUSION

The end result of this study was that children with autism shows some kind of food aversions. They prefer certain food items to eat. Food items that are easy to chew like rice and bread were most preferred food item. Junk, fruits and vegetable are also their favorite one. As they have sensory issues so they don't like crunchy or crispy food and also don't want to taste new food item when introduced. They also manifest some kind of behaviors while eating like throw food if don't want to eat and leaving table while eating.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this article.

ETHICAL APPROVAL

All experiments have been examined and approved by the appropriate ethics committee".

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Marí-Bauset S, Llopis-González A, Zazpe-García I, Marí-Sanchis A, Morales-Suárez-Varela M. Nutritional status of children with autism spectrum disorders (ASDs): a case-control study. *Journal of autism and developmental disorders*. 2015;45(1):203-12.
2. Lord C, Rutter M, Le Couteur A. Autism Diagnostic Interview-Revised: a revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of autism and developmental disorders*. 1994;24(5):659-85.
3. Carl F, Hardan AY. Autism spectrum disorders. *Handbook of Developmental Psychiatry*. 2011;463.
4. Frith U, Happé F. Autism spectrum disorder. *Current Biology*. 2005;15(19):R786-R90.
5. Chistol LT, Bandini LG, Must A, Phillips S, Cermak SA, Curtin C. Sensory Sensitivity and Food Selectivity in Children with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*. 2018;48(2):583-91.
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. *Journal of the Academy of Nutrition and Dietetics*. 2014;114(12):1981-7.
7. Bandini LG, Curtin C, Phillips S, Anderson SE, Maslin M, Must AJJoa, et al. Changes in food selectivity in children with autism spectrum disorder. 2017;47(2):439-46.
8. Hyman SL, Stewart PA, Schmidt B, Cain U, Lemcke N, Foley JT, et al. Nutrient Intake From Food in Children With Autism. *Pediatrics*. 2012;130(Supplement 2):S145-S53.
9. Marí-Bauset S, Zazpe I, Mari-Sanchis A, Llopis-González A, Morales-Suárez-Varela M. Food selectivity in autism spectrum disorders: a systematic review. *Journal of child neurology*. 2014;29(11):1554-61.
10. Govindaraju A, Lakshminarayanan P, Sabarathinam S, Meganathan H. Alternative therapies for children's with autism spectrum disorder. *International Journal of Contemporary Pediatrics*. 2020; 7(12):2421-2428.
11. Schreck KA, Williams K. Food preferences and factors influencing food selectivity for children with autism spectrum disorders. *Research in Developmental Disabilities*. 2006;27(4):353-63.
12. Martins Y, Young RL, Robson DC. Feeding and eating behaviors in children with autism and typically developing children. *Journal of Autism and Developmental Disorders*. 2008;38(10):1878-87.
13. Levin L, Carr EG. Food selectivity and problem behavior in children with developmental disabilities: Analysis and intervention. *Behavior Modification*. 2001; 25(3):443-70.
14. Sample Size Calculator 2012 [Sample Size Calculator - Confidence Level, Confidence Interval, Sample Size, Population Size,

- Relevant Population - Creative Research Systems]. Available: <https://www.surveysystem.com/s-scalc.htm>.
15. Al-Kindi NM, Al-Farsi YM, Al-Bulushi B, Ali A, Rizvi SGA, Essa MM. Food Selection and Preferences of Omani Autistic Children. Personalized Food Intervention and Therapy for Autism Spectrum Disorder Management: Springer. 2020;505-23.
 16. Levin L, Carr EGJBM. Food selectivity and problem behavior in children with developmental disabilities: Analysis and intervention. 2001;25(3):443-70.
 17. Suarez MA, Crinion KM. Food Choices of Children With Autism Spectrum Disorders. International Journal of School Health. 2015;2(3).
 18. Nadon G, Feldman DE, Dunn W, Gisel E. Mealtime problems in children with autism spectrum disorder and their typically developing siblings: A comparison study. Autism. 2011;15(1):98-113.
 19. Emond A, Emmett P, Steer C, Golding J. Feeding Symptoms, Dietary Patterns, and Growth in Young Children With Autism Spectrum Disorders. Pediatrics. 2010; 126(2):e337-e42.
 20. Nadon G, Feldman DE, Dunn W, Gisel E. Association of sensory processing and eating problems in children with autism spectrum disorders. Autism Research and Treatment. 2011;2011.

ANNEXURE 1

Factors influencing food selectivity and food preferences of children with Autism Spectrum Disorder

QUESTIONNAIRE

Child Name: _____
 Mother name: _____
 Birth order: _____

Age: _____
 Father name: _____
 No. of siblings: _____

Instructions: Below are statements that you may agree or disagree with. Using the 1 - 5 scale below, please select the most appropriate number to show your agreement or disagreement with each statement. Please be open and honest in your responses.

Questions	Strongly agree	Agree	Neutral	Strongly disagree	Disagree
1. My child refuses food if not at a certain temperature.					
2. My child eats only certain brands.					
3. My child must have a certain temperature or silverware to eat.					
4. My child likes to eat rice.					
5. My child likes to eat junk food.					
6. My child likes to eat bread.					
7. My child likes vegetables.					
8. My child likes fruits.					
9. My child prefers to eat on a specific chair or person.					
10. My child throws food during meal.					
11. My child spits out food					
12. My child cries or screams at meal.					
13. My child refuses to self-feed.					
14. My child leaves table before finished.					
15. My child's eating varies depending on his environment.					
16. My child like crunchy food.					
17. My child refuses food if not in a presentable way.					
18. My child eats single food 3 times.					
19. My child watches tv at meals.					
20. My child refuses to eat or taste new food.					

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