

# Differences in Growth of Children with Autism and Normal in Surabaya, Indonesia

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# Differences in Growth of Children with Autism and Normal in Surabaya, Indonesia

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## ABSTRACT

**Background:** Children with syndrome spectrum disorder wherein danger of a compromised dietary intake and biological process standing that might impact growth over each the short and long run. Children and youth with a disability were deemed to be at greater risk of obesity due to lower levels of physical activity, inappropriate behaviors associated with their disability, medication and related chronic health conditions.

**Aim:** To evaluate the growth status of children who were diagnosed with ASD in comparison with healthy controls.

**Method:** This research was a cross-sectional analytic study using questionnaire instruments to guardians and also direct measurements to respondents. The number of respondents for the group of children who have autism was 30 children and normal groups of children as many as 60 children. The independent variables in this study were children, autism and socio-economic, while the variables depend on body weight according to age, height according to age and head circumference according to age. This data was analyzed using the Mann Whitney U test.

**Results:** The results of the study of 30 children with autism and 60 normal children obtained a percentage of children suffering from autism and normal children in the same good nutritional status as many as 76.67%. Height according to age for children suffering from autism in normal conditions is 66.66% and normal children are larger 83.33%, while for head circumference according to age children with autism and normal children are 100% normal. After statistical tests using SPSS 23 with  $\alpha = 0.05$ ,  $p = 0.987$  was found for body weight according to age,  $p = 0.650$  for height according to age and  $p = 1$  for head circumference according to age.

**Conclusion:** There was no difference in body weight, height, and head circumference according to age between children with autism and normal so that it could be said that children who have limitations in this case autism have normal growth like other children.

**Keywords:** Autism, Body weight, Height, Head circumference, Growth.

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## Introduction

Autism spectrum disorder (ASD) was a neurodevelopmental disorder defined by deficits in

social interaction and communication, yet as restricted, repetitive or stereotypic behavior, with Associate in Nursing onset before three years older<sup>(1-3)</sup>. Children with syndrome spectrum disorder wherein danger of a compromised dietary intake and biological process standing that might impact growth over each the short and long run. The restricted body of revealed analysis addressing this concern has been contradictory and inconclusive to this point<sup>(1,4)</sup>. Children and youth with a disability were deemed to be at greater risk of obesity due to lower levels of physical activity, inappropriate behaviors associated with their disability, medication and related chronic health conditions<sup>(2,5)</sup>.

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Centers for Disease Control and Prevention (CDC) found that US boys were almost five times more likely to receive an ASD diagnosis than girls, indicating that approximately one in 42 boys is currently diagnosed with ASD<sup>(4)</sup>. Patients with ASD may also suffer from the leaky gut syndrome, which was caused by inflammation of the intestinal mucosa and abnormal bacterial overgrowth leading to a disorder of bowel motility<sup>(6-8)</sup>. Two factors that were known to be risks in ASD and potentially influence growth were food selectivity behavior and gastrointestinal health status. Selective dietary intake could play a significant role in the growth status of children with ASD. Children with ASD were more likely to have food selectivity and feeding issues resulting in challenging behaviors surrounding food intake than their typically developing peers<sup>(1,2,9,10)</sup>. Food selectivity continues to be highly reported in children with ASD and was simply defined as the consumption of an abnormally limited variety of food<sup>(1,11)</sup>. This behavior affects food choices, which, in turn, could affect nutritional status and growth. For children with food selectivity behavior, a refusal to consume one or more food groups is common, and anxiety and tantrums could be associated with the introduction of new foods<sup>(1,12)</sup>.

Anthropometric measurements, including height, weight, and head circumference were an effective method of evaluating dietary intake, growth status and nutritional status in children with ASD<sup>(1)</sup>. As noted, the effects of gastrointestinal symptoms and food selectivity could lead to inadequate dietary intake, resulting in abnormal anthropometric measurements<sup>(1,6,13)</sup>. In some studies, no differences in BMI were reported between children with ASD and their typically developing peers, whereas other studies have reported higher rates of underweight children with ASD compared to their typically developing peers. For these reasons, we chose to evaluate the physical status of children with ASD by

means of detailed dietary evaluation and anthropometric assessment. The present study aimed to evaluate the growth status of children who were diagnosed with ASD in comparison with healthy controls.

## Method

The type of this research used analytic observational research that used a case-control research design. This study compared between the case group and the control group. This research was conducted in the special school of Chakra, Agca autism and normal children who were in Ceria, Diponegoro, and Darmahusada Children's Kindergarten. The inclusion criteria for the autism group in the study were autistic children who had not entered adolescence (women <12 years, men <14 years) and guardians of autistic children who were willing to become research samples, while the exclusion criteria were autistic children suffering from congenital abnormalities and other diseases which affects growth and autism children who were not in place when measuring growth. In the control group had the inclusion criteria for normal children who had the same age range as autistic children and guardians of normal children who were willing to be the study sample, while the exclusion criteria were normal children suffering from congenital abnormalities and other diseases that affected growth and normal children who were not in place when measuring growth. The sampling technique used in this study was using saturated sampling or census means that the entire population was examined, this applies to the group of children with autism. However, for the control group using the random sampling method. The independent variables in this study were children, autism and socio-economic, while the dependent variable was body weight according to age, height according to age and head circumference according to age. This data analyzed using the Mann Whitney U test.

## Result

Table 1: Characteristics of participant

Characteristics	Autism		Normal	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
<b>Age (years old)</b>				
>2-3	1	3.33	1	1.67
>3-4	1	3.33	2	3.33
>4-5	6	20	7	11.67

Conted...

>5-6	12	40	24	40
>6-7	8	26.67	17	28.33
>7	2	6.67	9	15
<b>Gender</b>				
Boy	21	70	42	70
Girl	9	30	18	30
<b>Income</b>				
<Regional minimum wage (standard)	4	13.33	10	16.67
> Regional minimum wage (standard)	26	86.67	50	83.33
<b>Nutrition intake based on recall food method 24</b>				
Deficient	24	80	8	13.33
Good	6	20	52	86.67

In this study, the study sample was boys less than fourteen years old and women less than twelve years old. In this study, it is also known about the income of parents who have an average parent’s income above the Regional minimum wage(standard) and nutritional intake for children because they were considered to provide an important role in the growth of children. The method used in determining the amount of nutrient intake was using the 24-hour recall food method so that it known the amount of nutrition eaten.

**Growth:** The growth of children in this study was grouped into three according to the main purpose of looking for differences in growth which were classified into body weight, height and head circumference per age. The results of the growth of autism and normal children could be seen in table 2.

**Table 2: Distribution samples based on the growth of autism and normal children**

Characteristics	Autism		Normal		p value
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
<b>Body weight per age</b>					
Severe thinness	1	3.33	0	0	0.986
Thinness	2	6.67	5	8.33	
Normal	23	76.67	46	76.67	
Overweight	4	13.33	9	15	
<b>Height per age</b>					
Severe short	5	16.67	0	0	0.650
short	8	26.67	2	3.34	
Normal	17	56.67	50	83.33	
Tall	0	0	8	13.33	
<b>Head circumference per age</b>					
Normal	30	100	60	100	1

Based on the table above, it was explained that there was no difference between the group of autistic children and the normal ones. Body weight in both groups was dominated by normal results, height and head circumference of both groups also within normal limits.

**Discussion**

Our first hypothesis was that children with ASD would have significantly lower anthropometric values, but this is no confirmed by our results. There was no consensus

among previous research comparing the anthropometric values of children with ASD and TD children found that prevalence of overweight and obesity was significantly higher among young children (2–5 years of age) and adolescents (12–17 years of age) with ASD compared with the matched controls. However, for ages 6–11 years, no prevalence differences were found<sup>(13)</sup>. Children aged 2–5 years with ASD had more overweight and obesity and children aged 6–11 years had more underweight than the NHANES-matched cohort<sup>(14)</sup>.

The exact reason why the weight would be unhealthy among children with ASD was not clear. Among schoolchildren of the age studied herein, growth was highly sensitive to the balance between energy intake and total energy expenditure. However, the energy intake estimates in children with ASD and TD children were similar<sup>(13,15)</sup>. Likewise, ASD and TD groups could present different patterns of growth throughout the time life. In any case, although BMI was an important indicator of a healthy weight, it was not necessarily a good indicator of nutrient status<sup>(7,13)respectively</sup>. We chose to fully evaluate the nutritional and growth status of children with ASD and their typically developing peers given the limited amount of data available regarding this topic, incomplete work in prior datasets, and the conflicting results that have been reported to date

Parents of children with ASD reported a greater prevalence of food refusals based on the texture of food, mixtures, brand, shape, and taste/smell than did TD children. Contrary to expectations, a similar prevalence of food refusal based on temperature, foods touching other foods, and the color was found between children with ASD and TD children. Parents of children with ASD reported more reasons for food refusal, with over one-third of parents reporting refusal based on three or more characteristics of food<sup>(10)</sup>. Gluten-free/casein-free and lactose-free diets are followed by some children with ASD. Because children who adhere to these diets restrict all dairy products<sup>(9)</sup>.

One such eating pattern, selective eating, was characterized by a diet that lacks variety and has been associated with inadequate consumption of foods low in energy density such as fruits and vegetables, lean protein-rich foods, and foods high in fiber. Although not uncommon in typically developing children, selective or “picky” eating appears to be more prevalent in children with autism spectrum disorders and may persist beyond

the early childhood period. Children with ASD who exhibit food selectivity have been found to have sensory sensitivity with concomitant aversions to specific colors, smells, temperatures, and textures, and preferences for energy-dense foods. Thus, children with ASD who exhibit sensory sensitivity may be predisposed to diets with a limited variety that was high in energy-dense foods and low in fruits, vegetables, and fiber, putting them at increased risk for overweight and obesity<sup>(3,11–13,16)</sup>.

There was no evidence of statistical interaction between any of the dietary patterns and BMI z-score with autism status<sup>(12)</sup>. According to the anthropometric data, there was no difference in body weight, height, and head circumference according to age between children with autism and normal. The results of the present study showed no significant differences between both groups regarding the contribution of energy intake from dietary carbohydrate, protein, and fat in daily diets. Also, no significant differences between both groups in relation to energy, carbohydrates, and fats intake were observed. Furthermore, children with autistic disorder showed significant low protein intake and high fiber intake compared to healthy controls. Overall, the results of the present study indicate that anthropometric measurements of children with ASD are similar to those of healthy peer controls. There were no significant differences in measurements of height, weight and head circumference across participants in this study.

## Conclusion

There was no difference in body weight, height, and head circumference according to age between children with autism and normal, so that it could be said that children who have limitations in this case autism have normal growth like other children. Further research was needed to determine the acceleration of growth in both groups and the factors that influence it. Comprehensive physical and anthropometric assessment should be completed for all children with ASD in a primary care setting as a baseline measurement to evaluate the need for referral for more specialized evaluation and potential intervention on a case-by-case basis

**Ethical Clearance:** The study protocol approved by the Ethics Committee of Faculty of Medicine, Universitas Airlangga, Indonesia

**Conflict of Interest:** The author reports no conflict of interest in this work.

**Source of Funding:** This study is done with individual funding.

## REFERENCES

1. Barnhill K, Marediya Z, Marti CN, Hewitson L, Gutierrez A, Ghossainy M. Growth status of children with autism spectrum disorder: a case-control study. *J Hum Nutr Diet.* 2016;30(1):59–65.
2. 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):337–342.
3. Perry IS, Baronio D, Gottfried C, Faccioli LS, Riesgo R, Castro K. Feeding behavior and dietary intake of male children and adolescents with autism spectrum disorder: A case-control study. *Int J Dev Neurosci.* 2016;53:68–74.
4. Baio J, Wiggins L, Christensen DL, Maenner MJ, Daniels J, Warren Z, et al. Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. *MMWR Surveill Summ.* 2018 Apr 27 [cited 2019 Mar 10];67(6):1–23.
5. Hinckson EA, Dickinson A, Water T, Sands M, Penman L. Physical activity, dietary habits and overall health in overweight and obese children and youth with intellectual disability or autism. *Res Dev Disabil.* 2013;34(4):1170–1178.
6. Meguid NA, Anwar M, Björklund G, Hashish A, Chirumbolo S, Hemimi M, et al. Dietary adequacy of Egyptian children with autism spectrum disorder compared to healthy developing children. *Metab Brain Dis.* 2017;32(2):607–615.
7. Hill AP, Zuckerman KE, Fombonne E. Obesity and Autism. *Pediatrics.* 2015;136(6):1051–1061.
8. Hou N, Liu X, Li T, Liang X, Xiong X, Liu J, et al. Correlation between Nutrition and Symptoms: Nutritional Survey of Children with Autism Spectrum Disorder in Chongqing, China. *Nutrients.* 2016;8(5):294.
9. 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.* 2014;154(11):2262–2265.
10. Hubbard KL, Anderson SE, Curtin C, Must A, Bandini LG. A Comparison of Food Refusal Related characteristics of Food in Children with autism spectrum Disorder and Typically Developing Children. *J Acad Nutr Diet.* 2014;114(12):1981–1987.
11. Dovey TM, Staples PA, Gibson EL, Halford JCG. Food neophobia and “picky/fussy” eating in children: A review. *Appetite.* 2008; 50(2–3):181–193.
12. Evans EW, Must A, Anderson SE, Curtin C, Scampini R, Maslin M, et al. Dietary Patterns and Body Mass Index in Children with Autism and Typically Developing Children. *Res Autism Spectr Disord.* 2014;7(11):3831–3840.
13. Marí-Bauset S, Llopis-González A, Zazpe I, Marí-Sanchis A, Morales Suárez-Varela M. Comparison of nutritional status between children with autism spectrum disorder and typically developing children in the Mediterranean Region (Valencia, Spain). *Autism.* 2017;21(3):310–322.
14. Hyman SL, Schmidt B, Johnson C, Molloy C, Peck R, Reynolds A, et al. Nutrient Intake From Food in Children With Autism. *Pediatrics.* 2012;130:145–153.
15. Esteban-Figuerola P, Canals J, Fernández-Cao JC, Arijá Val V. Differences in food consumption and nutritional intake between children with autism spectrum disorders and typically developing children: A meta-analysis. *Autism.* 2018.
16. Siddiqi S, Urooj A, D’Souza MJ. Dietary Patterns and Anthropometric Measures of Indian Children with Autism Spectrum Disorder. *J Autism Dev Disord.* 2018.

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