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Dietary intake and physical activity levels of male adolescents with autism spectrum disorder (ASD) and normal to high body mass index (BMI) – A case series study

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ABSTRACT

Background and objectives: The study aims to determine the daily energy and nutrient intake, eating behaviours and physical activity level of male adolescents with autism spectrum disorder (ASD) and normal to high body mass index (BMI)-for-age and compares them with an age-, gender- and BMI- matched group consisting of typically developing adolescents.

Methodology: Anthropometric measures were taken from 118 male adolescents with ASD (12–18 years) and classified as normal-weight, overweight and obese according to BMI and 97 typically developing adolescents living in the same area. Participants completed a socio-demographic survey, feeding assessment survey, 24-h food recall and International Physical Activity Questionnaire (IPAQ).

Results: Nutritional assessment of the adolescents with ASD and typical development revealed similar prevalence of inadequacy for most nutrients. Dietary fibre, vitamin D, calcium and folate were the main nutrients that the adolescents were taking inadequately. Intake levels of nearly all micronutrients were insufficient. Both groups consumed excess amounts of sodium and cholesterol. Energy intake of the normal-weight adolescents with ASD was significantly less than the other BMI categories. Energy intake and physical activity level (and their interaction) were found to be related to the BMI of the adolescents with ASD. No other factors studied seemed to explain the changes in the BMI.

Conclusions: In terms of nutrient intake, male adolescents with ASD were not at a greater risk when compared to the typically developing counterparts. Diets of the both groups need to be improved. Meeting daily physical activity requirements could be as important as monitoring dietary intake in adolescents with ASD.

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1. Introduction

Autism Spectrum Disorder (ASD) is a clinically heterogeneous neurodevelopmental disorder that manifests as persistent impairments in social interaction and communication, with repetitive or stereotyped behaviours that range from mild to severe (American Psychiatric Association, 2013). Although ASD prevalence has been reported as 2.4 per 1000 with relatively little variation among geographical regions (Baxter et al., 2015), the 14 Autism and Developmental Disabilities Monitoring

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(ADDM) Network reported the overall ASD prevalence as 1 in 88, with significantly higher rates among boys – in a ratio of approximately 5–1) (Centers for Disease Control and Prevention, 2012). Children with ASD exhibit symptoms and signs of hyperarousal state, such as anxiety, instantaneous rage that is often inappropriate, mood swings or heightened reactivity to sensory stimuli sometimes referred to as “sensory disintegration” in the new Diagnostic and Statistical Manual (DSM-V) (Ming, Patel, Kang, Chokroverty, & Julu, 2016). Furthermore, the DSM-V included “hyper or hypo reactivity to sensory input” as a symptom of ASD such as severe food selectivity (American Psychiatric Association, 2013; Kral, Eriksen, Souders, & Pinto-Martin, 2013).

It is well established that food selectivity may interfere with the nutritional adequacy of the diets of the children with ASD (Kral et al., 2013; Mari-Bauset, Zazpe, Mari-Sanchis, Llopis-González, & Suárez-Varela, 2015b; Zimmer et al., 2012). Limited diets due to food selectivity and aberrant eating may extend beyond early development and can place adolescents with ASD at risk for nutritional deficiencies (Kuschner et al., 2015; Mari-Bauset et al., 2015a, 2015b). However, unlike the studies investigating the dietary intake of children with ASD, there are limited number of studies exploring the dietary intake of adolescents (Alkazemi, Rahman, AlSaad, & Kubow, 2016; Bicer & Alsaffar, 2013, 2015).

Recent literature suggests that adolescents with autism spectrum disorders (ASD) are at an increased risk of being overweight/obese (Bicer & Alsaffar, 2013; Broder-Fingert, Brazauskas, Lindgren, Iannuzzi, & Van Cleave, 2014; Phillips et al., 2014; Rimmer, Yamaki, Lowry, Wang, & Vogel, 2010). Some of the reasons of overweight/obesity in individuals with ASD may include unusual diets or atypical eating patterns, limited physical activity, usage of antipsychotic medications which have the side effect of weight gain and severity of autism (Rimmer, Rowland, & Yamaki, 2007; Stigler, Potenza, Posey, & McDougle, 2004).

Therefore, this study firstly aimed to investigate the dietary intake of male adolescents with ASD and normal to high body mass index (BMI)-for-age. Different from our previous studies (Bicer & Alsaffar, 2013, 2015), this study included a control group, which consisted of typically developing adolescents that were matched for age, gender and BMI-for-age. Secondly, the study gathered data on the physical activity level of the participants in an attempt to determine the impact of physical activity on the BMI status of the adolescents with ASD and typical development (TDT). The interaction of dietary intake and physical activity levels on BMI was also assessed.

2. Methods

2.1. Participants

A subject group of 118 male adolescents (aged 12–18 years) with ASD and normal to high BMI-for-age (i.e. normal-weight, overweight and obese) was used. These individuals were randomly recruited from different autism rehabilitation centres in Istanbul, Turkey between December 2013 and December 2015. The individuals were previously diagnosed with ASD by a paediatrician, child neurologist or a child psychiatrist using the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV and DSM-V) (American Psychiatric Association, 2000, 2013). Additional information was provided by the assessment of gross and fine motor skills as well as the social and communication skills of the participants. Cognitive abilities of the participants were identified by the child psychiatrist to be ranging from severely impaired to middle-functioning.

Control group included age range- and gender- matched typically developing adolescents (as reported by parents, $n = 97$) with normal to high BMI-for-age values. These were recruited randomly in secondary and high schools that are in the vicinity of the autism rehabilitation centres. Response rate in this group was 62%.

Permission to conduct the study was granted by the Ethical Committee of the National Education Directorate of Istanbul. All parents and caregivers (i.e. either unpaid or paid individuals providing care in one's home or in a care setting) who volunteered to take part in the study gave written informed consent.

2.2. Anthropometric measurements

All participants ($n = 215$) were weighed and measured in light clothing without shoes using a portable scale (accuracy 50 g; Seca874, Seca Ltd., Birmingham) and mobile stadiometer (accuracy 1 mm; Seca 217, Seca Ltd., Birmingham). The BMI-for-age values were calculated using AnthroPlus Software version 1.0.4. BMI-for-age values were used to classify children into one of the following categories: normal-weight – more than 5th and less than 85th percentile; overweight – equal to 85th or less than 95th percentile and obese – equal to or more than 95th percentile.

2.3. Measures

Participants or their parents/caregivers were asked to complete two different questionnaires: (1) General questionnaire (2) Feeding assessment survey (FAS). Participants or their parents/caregivers also completed 24-h food recall.

2.3.1. General questionnaire

General questionnaire was prepared by the authors and included questions about the education level and occupation of the parents, number of individuals in the family and monthly income of the household.

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