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Body mass index, dietary intake and feeding problems of Turkish children with autism spectrum disorder (ASD)

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ABSTRACT

The body mass index of 164 children (aged 4–18 years) attending four autism rehabilitation centers in Istanbul, Turkey, was determined and assessed using the BMI-for-age percentile charts by the World Health Organization (WHO). The mean intake of energy and nutrients of 115 children were calculated using three-day food records. The feeding assessment surveys filled in by the parents/caregivers indicated that the major feeding problem among children was food selectivity. The majority of the children were overweight or obese (58.5%). A total of 11% of children were found to be severely thin and thin. The calcium, zinc, vitamin B6 and folate intake of the majority of children were inadequate. The salt consumption in all age groups and cholesterol intake in normal, overweight and obese children were high.

1. Introduction

Autism spectrum disorders (ASDs) are a group of developmental disabilities with diagnostic features that include impairment in social interactions (e.g., lack of social reciprocity, marked impairment in eye-to-eye gaze, lack of joint attention), qualitative impairments in communication (e.g., lack of language development, echolalia, stereotyped and repetitive use of language) and restricted, repetitive and stereotyped patterns of behavior, interests and activities and these symptoms typically are apparent before age 3 years (American Psychiatric Association, 2000). ASDs occur in all racial, ethnic and socioeconomic groups and are almost three to five times more common among boys than among girls (Strock, 2007). It is estimated that about 1 in 88 children has been identified with an ASD (Centers for Disease Control and Prevention, 2012). Although there is no accurate prevalence data, this figure is estimated as 1 in 150 for Turkey (Otizm Platformu, 2008).

It is generally accepted that many children with ASD have idiosyncratic food preferences and unusual feeding behavior (Ahearn, 2002; Cornish, 1998; Rastam, 2008; Schreck and Williams, 2006). These children may display signs of preoccupation with particular smells and textures (Cuccaro et al., 2003; Matson & Wilkins, 2008; Matson, Wilkins, Boisjoli, & Smith, 2008; Szatmari et al., 2006), may have restricted food intake and ritualized eating habits (Ahearn, Castine, Nault, & Green, 2001; Schreck, Williams, & Smith, 2004) or they may refuse to eat (Wing, Leekam, Libby, Gould, & Larcombe, 2002). These attributes can have an impact on the individual's ability to feed effectively and receive adequate nutrition (Kral, Eriksen, Souders, & Pinto-Martin, 2013; Strickland, 2009). Food selectivity is defined to comprise food refusal, limited food repertoire and high frequency single food intake (Bandini et al., 2010). There are conflicting results from studies that

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investigated the relation between food selectivity and nutritional deficiencies. Some studies found that food selectivity did not appear to result in malnutrition (Emond, Emmett, Steer, & Golding, 2010; Erickson et al., 2005; Johnson, Handen, Mayer-Costa, & Sacco, 2008; Keen, 2008), whereas others suggested that selective eaters with ASD were at greater risk of inadequate nutrient intake (Kidd, 2003; Zimmer et al., 2012). A comprehensive review on food selectivity and nutritional adequacy in children with ASD can be found in Cermak, Curtin, and Bandini (2010). Different dietary patterns (affected by the unusual feeding behaviors listed above) and lifestyles (such as decreased access to opportunities for physical activity due to impaired communication and social interaction) that the children with ASD have can be associated with the development of under or overweight (Curtin, Anderson, Must, & Bandini, 2010; Xiong et al., 2009). Being underweight (Al-Farsi et al., 2011; Bölte, Ozkara, & Poutska, 2002; Mouridsen, Rich, & Isager, 2002), being overweight (Curtin, Bandini, Perrin, Tybor, & Must, 2005; Xiong et al., 2009) and being obese (Curtin et al., 2010; Ho, Eaves, & Peabody, 1997) were reported among the children with ASD.

There are few studies conducted on children with ASDs in Turkey. The existing studies focused on the biochemical aspects of ASDs such as plasma, erythrocyte and hair zinc levels (Yorbik et al., 2004), lead levels in hair samples (Yorbik et al., 2003), plasma levels of antioxidant enzymes (Yorbik, Sayal, Akay, Akbiyik, & Sohmen, 2002) and blood cholesterol levels of the children (Herguner & Herguner, 2011). At the time of writing, no published information was found about the weight status, dietary intake or feeding problems of Turkish children with ASD.

This study was undertaken to determine the weight status (using body mass index (BMI)-for-age percentiles) and assess the dietary intake of the Turkish children with ASD. A secondary purpose was to investigate the feeding problems of the children and strategies implemented by parents/caregivers to overcome these problems.

2. Methods

2.1. Participants

Participants in the study comprised 164 children aged 4 to 18, recruited from four autism rehabilitation centers in Istanbul, Turkey between February and May 2012. Istanbul is one of the largest cities in the world (with a population of approximately 17 million) and it acts as Turkey's economical, social and cultural center. All participants were previously diagnosed with ASD by the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV) by a pediatrician or a psychiatrist. Permission to conduct the study was granted by the Ethical Committee of the National Education Directorate of Istanbul and rehabilitation centers. 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. Children older than 7 years assented to participate in the study.

The majority of the participants were male and the ratio of males to females was approximately 4–1 (males 81% and females 19%). The children were divided into three age groups (4–8 years, 9–13 years and 14–18 years) to correspond to the age groups used in Dietary Reference Intake (DRI) tables. Most of the children (52%) were aged between 14 and 18 years; 31% were between 9 and 13 years and 17% were between 4 and 8 years.

2.2. Data collection

Children ($n = 164$) were weighed and measured in light clothing without shoes using a portable scale (accuracy 50 g; Seca 874, Seca Ltd., Birmingham) and mobile stadiometer (accuracy 1 mm; Seca 217, Seca Ltd., Birmingham). The measurements were taken in the rehabilitation centers by one of the authors, who was a final year student in a nutrition and dietetics undergraduate program. The BMI values were calculated and assessed using BMI-for-age percentile charts by the World Health Organization WHO (2007a, 2007b, 2007c). The BMI-for-age categories were given as follows: Severely thin <3rd percentile, Thin 3rd–15th percentile, Normal 15th–85th percentile, Overweight 85th–97th percentile and Obesity >97th percentile.

In the second part of the study, the parents/caregivers of 115 children from three centers (one center declined to give permission for the interviews) were asked to complete a general questionnaire, a feeding assessment survey and a three-day food record. One-to-one interviews at the centers were arranged in order for the parents/caregivers to complete the general questionnaire and feeding assessment survey. During these interviews, the parents/caregivers received training on food portion sizes. Food records were completed by the parents/caregivers at home.

2.3. Measures

A general questionnaire, feeding assessment survey and three-day food records were used. The items on the general questionnaire were constructed by the authors. Feeding assessment survey included questions selected from the 'Feeding History Questionnaire' by The Children's Hospital of Philedelphia (2013).

2.3.1. General questionnaire

The questionnaire included questions on the date of birth and weeks of gestation, type of delivery (normal or assisted), weight of the baby at birth and the medical history (including previous and current medications) of the child.