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Review

Anthropometric measurements and nutritional assessment in autism spectrum disorders: A systematic review



Salvador Marí-Bauset^{a,b,*}, Itziar Zazpe^{c,d}, Amelia Marí-Sanchis^e, Agustín Llopis-González^{a,b,f}, María Morales Suárez-Varela^{a,b,f}

^a Unit of Public Health and Environmental Care, Department of Preventive Medicine, University of Valencia, Valencia, Spain

^b Biomedical Research Centre Network on Epidemiology and Public Health (CIBERESP), Institute of Health Carlos III, Madrid, Spain

^c Biomedical Research Centre Network on Obesity and Nutrition (CIBERObn), Physiopathology of Obesity and Nutrition, Institute of Health Carlos III, Madrid, Spain

^d Department of Nutrition and Food Sciences and Physiology, University of Navarra, Navarra, Spain

^e Clinical Nutrition and Dietetics Unit, Navarra Hospital Complex, Navarra, Spain

^f Center for Public Health Research (CSISP), Valencia, Spain

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ABSTRACT

Adequate nutrient intake is essential for health. Due to food selectivity and restrictive diets, people with autism spectrum disorder (ASD) may have impaired nutritional status, which could affect their growth. We present a systematic review of publications (1970–2013) on anthropometric measurements and nutritional assessment in this population.

The limited research published on growth and nutritional status has found contradictory results. Nutritional assessment has indicated limited food variety in the ASD population but has not confirmed significant differences with respect to recommended intakes or controls.

In addition to the lack of control groups, studies in this area have suffered from methodological weaknesses, including unclear selection criteria, analysis of single individuals or small or age-heterogeneous samples, and failure to consider phenotypic variability between individuals or alternative explanations. Therefore, further research is warranted, particularly randomized controlled trials with larger sample sizes.

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* Corresponding author at: Unit of Public Health and Environmental Care, Department of Preventive Medicine, University of Valencia, Valencia, Spain. Tel.: +34 625385300.

E-mail addresses: salvador.mari@uv.es (S. Marí-Bauset), izazpe@unav.es (I. Zazpe), amarisanchis@gmail.com (A. Marí-Sanchis), agustin.llopis@uv.es (A. Llopis-González), maria.m.morales@uv.es (M.M. Suárez-Varela).

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1. Introduction

Autism spectrum disorder (ASD) comprises a complex set of behaviorally defined neurodevelopmental abnormalities in two core areas: deficits in social communication and fixated or restricted, repetitive or stereotyped behaviors and interests, including food selectivity (American Psychiatric Association, 2013).

1.1. Anthropometric measurements

Atypical feeding behaviors, the adoption of gluten-free casein-free (GFCF) diets, and aberrant behavior patterns (with different levels of physical activity as well as idiosyncratic social skills and poor social interaction) are factors that imply risks of both excessive and insufficient intake. Excessive and insufficient intake would tend to lead to abnormal anthropometric measurements, and though they truly reflect the balance between energy intake and output, such measurements can be an effective (although indirect) method of assessing nutritional status (Gordon, Chumlea, & Roche, 1988; Roche & Malina, 1983).

Despite the fact that these concerns were first raised more than 50 years ago (Kanner, 1943) and the discussion about problematic eating behaviors in ASD has been ongoing since that time, several authors (Herndon, Di Guiseppi, Johnson, Leiferman, & Reynolds, 2009; Keen, 2008) have asserted that abnormal growth seems to be relatively rare, with no differences in BMI observed between ASD and typically developing (TD) children. However, Hyman et al. (2012), in the largest study of nutrient intake from food in children with ASD to date, observed overweight or obesity in children with ASD aged 2–5 years; and proportionately more children with ASD aged 6–11 years were underweight than in the matched cohort. Further, Xiong et al. (2009) found that children with ASD had high values of height, weight and BMI. On the other hand, Marí-Bauset, Zazpe, Mari-Sanchis, Llopis-González, and Morales-Suárez-Varela (2013), among others, have found more individuals to be underweight among ASD compared with TD children.

1.2. Food selectivity

Behavior problems at meal times have been observed in many studies over the years, in concert with parental concerns. Specifically, parents of children with ASD commonly report feeding problems, including food selectivity (Ahearn, Castine, Nault, & Green, 2001; Ahearn, 2003; Beighley, Matson, Rieske, & Adams, 2013; Buckley, Strunck, & Newchok, 2005; Clark, Rhoden, & Turner, 1993; Cornish, 1998; Emond, Emmett, Steer, & Golding, 2010; Evans et al., 2012; Johnson, Handen, Mayer-Costa, & Sacco, 2008; Luiselli, Ricciardi, & Gilligan, 2005; Martins, Young, & Robson, 2008; Maskey, Warnell, Parr, Le Couteur, & McConachie, 2012; Nadon, Feldman, Dunn, & Gisel, 2011; Najdowsky, Wallace, Doney, & Ghezzi, 2003; Raiten & Massaro, 1986; Schreck & Williams, 2006; Schreck, Williams, & Smith, 2004; Zimmer et al., 2012).

Comprehensive reviews of food selectivity in ASD children are found in Cermak, Curtin, and Bandini (2010) and Marí-Bauset, Zazpe, Marí, Llopis, and Morales (2013). However, it is important to recognize that the food selectivity described in the literature has multiple meanings, with the same term used to refer to a range of concepts including food refusal, a limited repertoire of accepted foods, and high-frequency single food intake.

In some cases, an organic etiology can be identified such as abnormal sensory processing (Twachtman-Reilly, Amaral, & Zebrowski, 2008); oromotor difficulties (Matson, Matson, & Beighley, 2011); or gastrointestinal problems including constipation, diarrhea, stomach bloating or gastroesophageal reflux (Cory et al., 2012; Horvath & Perman, 2002; Horvath, Papadimitriou, Rabsztyl, Drachenberg, & Tildon, 1999). In others, it seems reasonable that food selectivity is a manifestation of the restricted interests and behavioral rigidity that are characteristic of ASD (Ledford & Gast, 2006). Notably, Ibrahim, Voigt, Katusic, Weaver, and Barbaresi (2009), after grouping the symptoms that characterize GI disorders (constipation, diarrhea, abdominal distension, gastroesophageal reflux and food selectivity), only found statistically significant differences for constipation and food selectivity, both attributable to the neurobehavioral disorder ASD rather than to a primary digestive problem.

The combination of organic problems and/or problematic eating behaviors in ASD implies a greater risk of nutritional inadequacy (Schreck et al., 2004; Twachtman-Reilly et al., 2008). Additionally, interventions related to food intake,

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