Chapter 10

Autism and Diet: 
An Insight Approach

Komal Srivastava
Apollo Gleneagles Hospitals, India

ABSTRACT

The parents of children with autism spectrum disorder (ASD) often try alternative treatments to reduce their children’s symptoms, and one of the alternatives is a specialized diet. This diet is called gluten-free casein-free or GFCF diet. The GFCF diet has grown popular over the years. These children may be sensitive to the taste, smell, color, and texture of foods. They may limit or totally avoid some foods and even whole food groups. They may have difficulty focusing on one task for an extended period of time. It may be hard for a child to sit down and eat a meal from start to finish. The chapter highlights the impact of maternal nutrition, nutritional deficiencies, and GFCF diet in ASD.

INTRODUCTION

Nutrition plays a very important role in growth and development of the brain. Nutrients present in different food are required in sufficient amount for its development. There are a certain group of nutrients which are supposed to have an important role and thus making it more crucial. Brain development and function are affected by the timing of nutrient supplement and deficiency. For proper brain development and functional homeostasis, there must be a constant flow of nutrients across the blood-brain barrier, which is ensured by a group of transporters and regulator. It functions in such a way that brain receives neither too much nor too little of each nutrient (Fuglestad, Rao, & Georgieff, 2008).

IMPORTANCE OF MATERNAL NUTRITION

Various biological, socio-economic and demographic factors which vary in different population influence the complex association between maternal nutrition and birth outcome thus proving that nutrition plays an important role in maternal and child health (Villar, Merialdi, Gulmezoglu, Abalos, Carroli,
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Kulier, & de Onis, 2003). The significance of adequate nutrition during fetal life for long-term physical health is well documented (Barker, 1998; Harding, 2001). However, the relationship between maternal nutrition during pregnancy and child mental health is less established (Heindel & Vandenberg, 2015). The prenatal environment is crucial in relation to the cognitive development of the child, particularly during critical periods of brain development, which highlights that the fetus needs for optimal nutrition (Thapar, Cooper, Jefferies, & Stergiakouli, 2012). There are documented detrimental effects of severe maternal malnutrition during pregnancy (Roseboom, Painter, van Abeelen, Veenendaal, & de Rooij, 2011). Severe deficiencies of certain micronutrients, like iron and iodine (Prado & Dewey, 2014) has effects on child’s neurodevelopment and general cognitive functions, as well as severe deficiencies of folate and choline on child neural tube defects but the impact of more subtle variations in maternal diet quality on child neurodevelopment has received little attention until recently (Zeisel, 2008).

ROLE OF NUTRITION IN BRAIN DEVELOPMENT

Intelligence is the global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment. Intelligence Quotient (IQ) refers to general cognitive ability, such as learning aptitude, reasoning, and problem-solving qualities. Development of brain begins in the very early period of conception i.e as early as 18 days after fertilisation and tends to continue even after birth. The fastest growth of brain occurs in utero, a vulnerable and important period. Suboptimal nutrition during brain development may affect cognitive development and behavioral performance over time (Anjos, Altmäe, Emmett, Tiemeier, Closa-Monasterolo, Luque, & Egan, 2013; Rees & Inder, 2005; Thompson & Nelson, 2001).

During pregnancy, important neurologic functions are developing in the fetus (Rees & Inder, 2005). Brain development in the last trimester of gestation is particularly vulnerable to inadequacy in the mother’s diet (Anjos, Altmäe, Emmett, Tiemeier, Closa-Monasterolo, Luque, & Egan, 2013). Maternal diet has a long-term effect on their child’s neurodevelopment. It includes cognitive, psychomotor and mental development, IQ scores (verbal, verbal-executive function, and performance) and its effects on behavioral status. (Anjos, Altmäe, Emmett, Tiemeier, Closa-Monasterolo, Luque, & Egan, 2013; Hibbeln, Davis, Steer, Emmett, Rogers, Williams, & Golding, 2007; Gil & Gil, 2015; Starling, Charlton, McMahon, & Lucas, 2015). Intakes of specific food items, such as fish, during pregnancy, have shown positive associations with neurodevelopmental outcomes in childhood (Anjos, Altmäe, Emmett, Tiemeier, Closa-Monasterolo, Luque, & Egan, 2013; Gil & Gil, 2015; Starling, Charlton, McMahon, & Lucas, 2015).

Various cross-sectional studies conducted has shown relation between dietary patterns and cognitive outcomes, in childhood, in adolescence, and in the elderly (Gale, Martyn, Marriot, Limond, Crozier, & Inskip, 2009; Kim, Yu, Choi, Nam, Kim, Oh, & Yang, 2015; Leventakou, Roumeliotaki, Sarri, Koutra, Kampouri, Kyriklaki, & Chatzi, 2016; Northstone, Joinson, Emmett, Ness, & Paus, 2012; Nyaradi, Foster, Hickling, Li, Ambrosini, Jacques, & Oddy, 2014). Optimum intake of healthy foods such as fruits, vegetables, and fish was measured in these stages of life, are linked with better cognitive outcomes, including higher childhood IQ. In addition, unhealthy dietary patterns were found to be associated with poorer cognitive outcomes in childhood and adolescence (Gale, Martyn, Marriot, Limond, Crozier, & Inskip, 2009; Kim, Yu, Choi, Nam, Kim, Oh, & Yang, 2015; Leventakou, Roumeliotaki, Sarri, Koutra, Kampouri, Kyriklaki, & Chatzi, 2016; Northstone, Joinson, Emmett, Ness, & Paus, 2012; Nyaradi, Fos-