

How Food Industry can help Individuals with Autism Spectrum Disorder and Healthcare System-An opinion

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Abstract

This article provides an opinion about how food industry can help individuals with Autism Spectrum Disorder and healthcare system. Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder accompanied by social interaction impairment which is usually accompanied by health-related challenges, especially food and nutritional problems. ASD prevalence has gained a growing trend with in the past years which may increase health care system requirements. It can be suggested that there is a chain between family, healthcare system and food industries which are in relation with each other and can modify ASD symptoms and improve its managements by more cooperation. Healthcare system can put updated knowledge derived from scientific researches into both family and food industries hands in order to improve dietary pattern and provide nutritional requirements in ASD. Food additives modification and/or food products enrichment with required nutrients may be an effective strategy for ASD. Moreover, food industries may be invited to modify or reduce the artificial additives, as much as possible, or enrich the food products with more organic, bioactive and nutrient dense compounds. Food industries are highly recommended to inform public about the consumed ingredients via appropriate food labels.

Keywords: Autism spectrum disorder; Nutrition; Food industry; Nutrients; Diet

Introduction

Autism Spectrum disorder (ASD), is a neurodevelopmental disorder mainly characterized by social communication impairment. Individuals with ASD may experience several health-related challenges during their lives which make them vulnerable against chronic diseases including metabolic syndrome, diabetes type 2, dyslipidemia, overweight or obesity and/or some cancers. Food and nutrition-related problems are considered as critical challenges in ASD. It is estimated that food and eating disorders have higher prevalence in ASD society in comparison with typically developed (TD) individuals which may be due to sensory impairments, food selectivity, restrict dietary intake, appetite problems and some other behavioral challenges [1,2]. Food and nutrition-related problems has gain a lot of attention in ASD society, as it is estimated that the prevalence of food problems, are five times higher than TD individuals [3] which can be due to higher sensitivity to food texture. This, may lead to limited and more restrictive dietary intake which can decrease dietary variety and nutrient deficiencies. It is suggested that food selectivity in ASD, usually cause calorie-dense and nutrient-deficient foods selection which may lead to more health problems in individuals with

ASD [4]. Nutritional problems in ASD, can lead to weight and body mass index (BMI) impairments such as low weight for age, overweight or obesity due to limited dietary intake. This restrictive food intake may increase the necessity of food supplementation in order to provide nutrient requirements. Caregivers, play a crucial role in nutritional support for their children, as they are the main food providers [5]. In this way, it is suggested to plan and recruit appropriate intervention by caregivers, healthcare team, health professions and food industries in order to improve dietary intake and overall health in ASD individuals. This cooperation for improving ASD dietary pattern will become more important, as food allergies and gut microbiota impairment is more prevalent in ASD. Food allergies may induce autism-like behaviors [6]. Recent studies, have suggested that gut microbiota, food and brain health is associated with each other which are new aspect in this area. Nutrition and food can affect gut microbiota and can modify the microbiota which may improve brain function by microbiota modulation [7]. This relation has led to several studies on the effect of food and diet in ASD. It has been suggested that gut microbiota imbalance and intestinal brain dysfunction, is more prevalent in ASD which seems to be modified by both foods and food products such as probiotics, herbal or natural ingredients including honeybee [8]. The purpose of this ingredients which can be used in industry or added to food products is modification immune system function, nervous system and endocrine system both directly or indirectly [9].

Material and Methods

This study has aimed to assess some challenges in ASD society with may be related to food industry and can be managed by cooperation of healthcare system, food industry and ASD families. For this reason, we assessed some of the recent researches in ASD, nutritional challenges, dietary problems and the potential role of food industry in ASD food and nutrition related challenges management with the target of improving general health and providing better health services.

Discussion

Although ASD is a long-life disorder which can affect quality of life caused by several impairments, diet can help to improve some symptoms. There are some bioactive components which can be derived from plants and some herbs. It is believed that these bioactive components can have neuroprotective effects and can be used in ASD symptoms managements.

Curcumin, luteolin and resveratrol are plant-based bioactive components with are assumed to improve ASD symptoms [10].

The role of bioactive components on ASD managements:

As mentioned previously, there are some bioactive components which may be used in food industry and provided for ASD society which seems to improve ASD related management and symptoms.

Curcumin found in turmeric, is assumed to have beneficial effects for neuro-psychiatric disorders such as ASD. Moreover, it seems that curcumin can improve immune system function, reduce inflammatory agents and gut inflammation in ASD [11-16].

Resveratrol is another bioactive component which has anti-inflammatory effects especially in neurological disorders and can improve ASD related impairments [16,17].

Isothiocyanates is another bioactive component which is derived from broccoli sprouts, assumed to improve ASD symptoms including oxidative phosphorylation, lipid peroxidation, neuron inflammation and mitochondrial dysfunction [18].

Other micronutrients for ASD

Although there are several nutritional and dietary patterns introduced for ASD, such as gluten/casein free diet or oligogenic diets and ketogenic diet, there are some micronutrients which are suggested to be effective for ASD. These include vitamins, minerals, omega-3 and elimination of some food additives in food industry. Some nutrient deficiencies are common among individuals with ASD which may be a reason of the disorder or can be enhanced due to the ASD challenges which are related to dietary intake. Among the assessed micronutrients, omega-3 and omega-6 fatty acids are two nutrients which are believed to improve cognitive function and development in ASD [18]. Moreover, Omega-3 and omega-6 may be prescribed as supplementation for ASD, but further studies are required to assess their efficacy when added as additives to food products. This food products enrichment, can be applied in parallel with elimination of some artificial additives, depends on their applicability, as elimination of some additives may not be possible due to food product shelf life or preservation against harmful agents' growth.

Conclusion

ASD is a neuro-developmental disorder which may be accompanied by several health-related challenges which can be modified by dietary and food modifications. Food industry can play a crucial role, as there are several plants based bioactive compounds which are introduced to be effective for ASD due to their neuro-protective effects. As caregivers and parents are the main food providers of ASD individuals, food industry can help caregivers, healthcare system and individuals with ASD by adding approved bioactive compounds to their products. Food labeling and related education, seems to be another effective step which can be introduced to ASD society as a strategy. Educating caregivers by healthcare system and health professional may be suggested to improve their knowledge about beneficial food products and dietary components produced by food industry. Moreover, it is suggested to keep food industries principles up to date with new scientific data regarding beneficial and neuro-protective compounds which are effective for ASD symptoms improvement.

According to the effect of some ingredients such as probiotics, herbal and plant-derived phyto-bioactives, more researches are required to indicate more accurate mechanisms and pathways and also suggest the way that food industry can use these components in order to bring more benefits for ASD individuals. Health professionals and researches should put more focus on the effective component which can modulate gut microbiota and gut-brain axis which can improve ASD symptoms.

References

1. Castro K, Faccioli LS, Baronio D, Gottfried C, Perry IS, Riesgo R. 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. doi: 10.1016/j.ijdevneu.2016.07.003
2. Bourne L, Mandy W, Bryant-Waugh R. Avoidant/restrictive food intake disorder and severe food selectivity in children and young people with autism: A scoping review. *Dev Med Child Neurol*. 2022; 64(6): 691-700. doi: 10.1111/dmcn.15139
3. Zulkifli MN, Kadar M, Fenech M, Hamzaid NH. Interrelation of food selectivity, oral sensory sensitivity, and nutrient intake in children with autism spectrum disorder: A scoping review. *Research in Autism Spectrum Disorders*. 2022; 93: 101928. doi: 10.1016/j.rasd.2022.101928
4. Nadeau MV, Richard E, Wallace GL. The combination of food approach and food avoidant behaviors in children with autism spectrum disorder: Selective overeating. *J Autism Dev Disord*. 2022; 52(3): 987-994. doi: 10.1007/s10803-021-04945-6
5. Demir AÇ, Özcan Ö. The nutritional behavior of children with autism spectrum disorder, parental feeding styles, and anthropometric measurements. *Nord J Psychiatry*. 2022; 76(1): 64-70. doi: 10.1080/08039488.2021
6. Cao LH, He HJ, Zhao YY, et al. Food Allergy-Induced Autism-Like Behavior is Associated with Gut Microbiota and Brain mTOR Signaling. *J Asthma Allergy*. 2022; 16(15): 645-664. doi: 10.2147/JAA.S348609
7. Shanmugam H, Ganguly S, Priya B. Plant food bioactives and its effects on gut microbiota profile modulation for better brain health and functioning in Autism Spectrum Disorder individuals: A review. *Food Frontiers*. 2022; 3(1): 124-141. doi: 10.1002/fft2.125
8. Zhang Z, Mu X, Shi Y, Zheng H. Distinct Roles of Honeybee Gut Bacteria on Host Metabolism and Neurological Processes. *Microbiology Spectrum*. 2022; 10(2): e02438-21. doi: 10.1128/spectrum.02438-21
9. Cruz-Martins N, Quispe C, Kirkin C, et al. Paving Plant-Food-Derived Bioactives as Effective Therapeutic Agents in Autism Spectrum Disorder. *Oxid Med Cell Longev*. 2021; 2021: 1131280. doi: 10.1155/2021/1131280
10. Deb S, Phukan BC, Dutta A, et al. Natural products and their therapeutic effect on autism spectrum disorder. *Adv Neurobiol*. 2020; 24: 601-614. doi: 10.1007/978-3-030-30402-7_22
11. Lopresti AL. Curcumin for neuropsychiatric disorders: a review of in vitro, animal and human studies. *J Psychopharmacol*. 2017; 31(3): 287-302. doi: 10.1177/0269881116686883.
12. Vanduchova A, Anzenbacher P, Anzenbacherova E. Isothiocyanate from broccoli, sulforaphane, and its properties. *J Med Food*. 2019; 22(2): 121-126. doi: 10.1089/jmf.2018.0024
13. Bhandari R, Kuhad A. Neuropsychopharmacotherapeutic efficacy of curcumin in experimental paradigm of autism spectrum disorders. *Life Sci*. 2015; 141: 156-69. doi: 10.1016/j.lfs.2015.09.012
14. Al-Askar M, Bhat RS, Selim M, Al-Ayadhi L, El-Ansary A. Postnatal treatment using curcumin supplements to amend the damage in VPA-induced rodent models of autism. *BMC Complement Altern Med*. 2017; 17: 259. doi: 10.1186/s12906-017-1763-7
15. Zuiki M, Chiyonobu T, Yoshida M, et al. Luteolin attenuates interleukin-6-mediated astrogliosis in human iPSC-derived neural aggregates: A candidate preventive substance for maternal immune activation-induced abnormalities. *Neurosci Lett*. 2017; 653: 296-301. doi: 10.1016/j.neulet.2017.06.004
16. Bhandari R, Kuhad A. Resveratrol suppresses neuroinflammation in the experimental paradigm of autism spectrum disorders. *Neurochem Int*. 2017; 103: 8-23. doi: 10.1016/j.neuint.2016.12.012
17. James SJ, Melnyk S, Fuchs G, et al. Efficacy of methylcobalamin and folic acid treatment on glutathione redox status in children with autism. *Am J Clin Nutr*. 2009; 89(1): 425-30. doi: 10.3945/ajcn.2008.26615
18. Taha Z, Abdalhai KA. A review of the efficacy of the dietary intervention in autism spectrum disorder. *Open Access Macedonian Journal of Medical Sciences*. 2021; 9: 88. doi: 10.3889/oamjms.2021.5743