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Nutritional status and dietary patter, as an indicator for cell health in autism spectrum disorder- a case study assessment

Abstract

The prevalence of autism spectrum disorder (ASD) has increased within the past decade, which has increased the health authority concern due the higher demand for health services. Nutritional problems, such as food refusal, restricted dietary intake, nutritional deficiencies, food allergies and food intolerance, are known as common nutritional challenges among individuals with ASD. Unhealthy dietary pattern and their adverse health outcomes may affect individual's health and increase the risk of several health complications as a result. the result of unhealthy and restrict dietary pattern may be manifested in cell health, mitochondrial function and regulatory gene expression, which can predict the risk of cell damage, inflammation, oxidative stress and chronic disease. The purpose of this case study was to assess the relation between dietary intake using food recall, food frequency questionnaire (FFQ) and one-week food record with the level of TNF-α, IL-1 and IL-6 in a 10 years old high function girl diagnosed with ASD.

Keywords: autism spectrum disorder, nutrition, dietary pattern, cell function

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Introduction

Nutritional challenges including low dietary variety, food refusal, restrictive dietary pattern, food allergies and intolerance, are considered as common nutritional problems among individuals with autism spectrum disorder (ASD).[1–4] These challenges may lead to further nutrition-related health complications such as nutritional deficiencies which increase the risk for other complication in individual's future life.[5–7] Although there are a lot of therapeutic and management interventions recruited for ASD, nutritional problems may be considered less important, while it can be one of the important concerns among families and health professions, as nutritional status may also affect efficacy of other therapies.[7–12] The importance of nutrition in ASD community, has gained more attention within the past years and health professions and researchers are looking forward to find out more about the effective nutritional interventions in order to improve nutritional status to provide for families and individuals with ASD.[13–15] Adverse health outcomes of improper nutritional status can be categorized as shown in (Figure 1). Previous studies have indicated that individuals with ASD, seems to be at greater risk for systemic inflammation, oxidative stress and mitochondrial dysfunction, which can adversely affect cell health. As a result, they may have less antioxidant system capacity, less effective antioxidant enzyme and higher level of oxidative stress, which may affect health, from cells to organ. There are several underlying mechanisms for increase in oxidative stress resulted from poor dietary pattern including the increase in lipid peroxidation, cell protein damage, increase in tumor necrosing factor-α (TNF-α) and some interleukins including IL-1 and IL-6. The increase in oxidative biomarkers can be resulted from low variety in some food groups including fruits and vegetables which are considered as a good source of antioxidant due to restrictive dietary pattern and food refusal. Previous studies have suggested that the consumption of above-mentioned dietary sources is less in individuals with ASD in comparison to their neuro-typically developed (NTD) siblings. The purpose of this study was to evaluate the relation between dietary pattern and dietary. Intake with oxidative biomarkers including TNF-α, IL-1 and IL-6 in a 10 years old girl diagnosed with ASD at the age of 2.5.

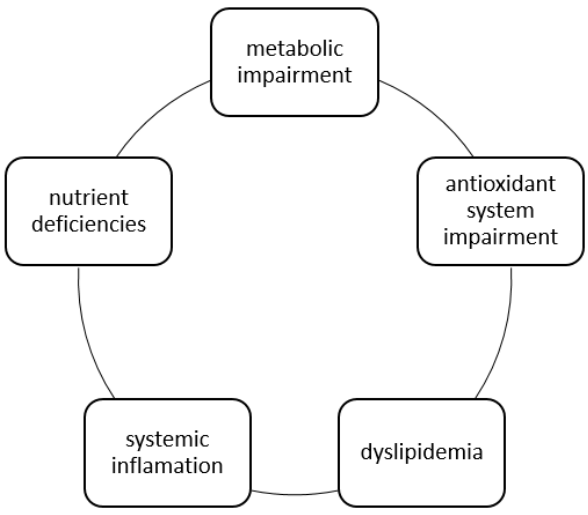

Figure 1 Possible health problems related to nutritional deficiencies

Methods

The participant of this study, was a 10 years old girl diagnosed with ASD, who were referred to nutritionist for an online nutritional assessment session. Despite it has been reported that the prevalence of ASD is more common among male individuals, our participant

for this study was a girl whose high function ASD was diagnosed by neurologist at the age of 2.5. At the first session, nutrition assessment was done by dietician using 24-hour recall, food frequency questionnaire (FFQ) and one-week food record. As the participants mother, was the main responsible person, all of the instructions for completing a one-week food record, was taught during the session. The caregiver was asked not to change any dietary routine and just record all the consumed foods during a week. The next session was set for a week later and the dietician was in contact as observer in order to follow up the process. After one week, the second session was set and one-week food record was received by the dietician. The nutritional assessment started by evaluating the results from the 3 nutritional assessment documents in the presence of the caregiver at the online session. For the next step and in order to assess oxidative biomarkers, the caregiver was referred to the laboratory for TNF-α, IL-1, IL-6 measurement and the blood test was completed using ELISA kit. The study procedure has been shown in Figure 2.

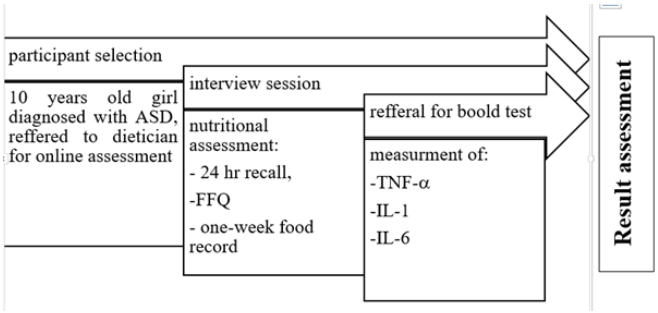

Figure 2 Study procedure and flowchart

Results

The results from this assessment, indicated that the consumption of fruit and vegetables groups, were less in comparison to the recommended servings according to the participant's age. This lower intake was due to food refusal and caregivers insist which increased the risk of food refusal from the participant. The results from food record assessment showed increased consumption in refined carbohydrate, fizzy drinks, and sweetened food products as snack which were usually offered during the therapy or learning session, as well as during the weekend when the participant usually spent time with other family members or went out for leisure. The results from the blood sample test for oxidative biomarkers, showed an increase in TNF-α, IL-1 and IL-6 in comparison to the normal range.

Conclusion

Poor dietary pattern is a common nutrition related challenges among ASD society which sometimes become ignored. As a result of poor dietary pattern which may be resulted from food refusal, food allergies, food intolerance and sensitivity to the food texture, aroma, color, flavor, and nutritional deficiencies may happen. On the other hand, due to higher food preference and more consumption of specific foods which may be mostly bring adverse effect to health, cellular pathways may shift to increase in lipid peroxidation, antioxidant defense deficiency and mitochondrial dysfunction which may result oxidative stress. Further studies are recommended in order to find out more about underlying causes and effective nutritional intervention for oxidative stress improvement.

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Conflicts of interest

The author declares that there is no conflicts of interest.

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