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Nutritional Assessment of Autism Spectrum Disorder in Benghazi

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Abstract **Original Research Article**

Autism spectrum disorder (ASD) is a neurodevelopment condition characterized by persistent deficits in social communication and social interaction, as well as restricted and repetitive patterns of behavior that present during early development and result in clinically significant impairment. The study was carried on (62) male and (23) female their age group range from (< 5year to >14 year) who are assessed through distribution of detailed questionnaires. The participant was selected by communicating with their parents and caregivers by a sent copy of questionnaires. Weight and height was measured after completion of the questionnaire. The laboratory tests were obtained from medical records of participants. Data set was exported to SPSS for complete analysis. In the present study, the total number of subjects involved was 85 with ages ranging from <5 years to >14 years old and average age was2.5 years. The peak of autism ages was shown at age group 5y-10y (44.7%); Autism was significantly increases among male than female, but are not consider consistent; the most onset of strange behaviors among autism between age group 1y-3y (48.2%). Autism subjects were shown mostly complains of GIT symptoms and anemia. This data together suggested that hyperactivity, eating difficulty, food sensitivity, and certain medications, in addition to limited fiscal access could play part in the dietary pattern choice, feeding practice and body weight changes among autism.

Keywords: strange behaviors, GIT symptoms, anemia, hyperactivity, vitamin D, restricted diets, body weight.

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by persistent deficits in social communication and social interaction, as well as restricted and repetitive patterns of behavior that present during early development and result in clinically significant impairment [1]. Autism spectrum disorder (ASD) is a serious problem and present particular challenges for any discipline of medicine [2]. Repetitive behaviors and restricted interests, are core feature of autism, and may play a role in dietary selectivity. Children with ASD often resist novel experiences, which may include tasting new foods .In addition; many children with ASD have sensory hypersensitivities and may reject foods due to an aversion to texture, temperature or other characteristics of the food [3]. Research has shown that children with ASD tend to have more gastrointestinal (GI) symptoms than their typically developing peers [4-5], especially for constipation, diarrhea, and abdominal pain [4, 6, 7]. Recently attention has focused on the relationship between metabolic, nutritional disturbances and developmental disorders as ASD [8]. Therefore, targeted, individualized nutritional therapy is crucial to managing the complexity of patients with chronic persistent problems like autism as May influences the severity, presentation or dynamics of disease [9]. Nevertheless, accurate understanding of the unique nutritional risk of children with ASD is important to clinicians who are responsible for nutritional surveillance and to parents who concerned about the effects of limited or restricted diets. Children with ASD are also often at an increases risk for becoming obese or overweight than children with typical development (TD) [10-12]. These BMI levels are associated with adverse health outcomes, including insulin resistance, diabetes, heart disease, and certain cancers [13, 14]. Obesity in childhood can also adversely affect physical, emotional, and social functioning, as well as academic performance [15], which might compound disability and reduced quality of life associated with ASD. Some known factors that may play a mediating role in the higher rates of obesity observed in children with ASD include eating behaviors [16], lifestyle [17], secondary co-morbidity [18], and medication usage [19]. However, it is yet not clear whether and to what extent these emerging factors are contributors for unhealthy weight gain and obesity among children with ASD. Preventing unhealthy weight gain and obesity among

children with ASD is crucial, as obesity affects overall children's health and wellbeing and often persists into adulthood [20]. Many individuals with ASD have used complementary and alternative medicine (CAM) approaches, including dietary changes, as part of their treatment for the core ASD symptoms, as well as GI disturbances, sleep problems, or in the promotion of general health [21]. As such, changes in diet may affects GI functioning in ASD. Some studies have shown that children with ASD may be deficient in micro-a- and macronutrients [22-23], as well as iron [24], which could result from altered GI function and/or potentially impact GI symptoms. Furthermore, many parents and caretakers have employed the use of gluten- and casein-free (GFCF) diets [25] that seem to have mixed effects on core ASD symptoms [26] and GI symptoms [27-29]. The global prevalence of ASD is estimated at 1 in 160 children [30]. In 2010, CDC reported the incidence of autism disorder in United States as 1 in 68 and this indicates 78% increase in the incidence level compared with 2002. In Iran the incidence of this disorder is estimated as 90-250 in 10,000 children [31-32]. Another study in Italy reported 1000 children and adolescents between 0 and 17 years were detected with ASD [33, 35]. The most common early signs involve joint attention, eye contact, orienting to verbal call, facial expression, social smile and deficit or poor quality of movements.

Few studies have investigated autistic features in the neonatal period [36, 38]. Different data are reported about the age at onset of early signs: for example, in Italy; the first decline of social interactions may occur between 2 and 6 months [39]; more generic alteration in sleep, feeding and temperament may occur during the first year in children at risk for ASD [40-46]. Behaviors related to hyper- or hypo-reactivity to sound; visual stimuli and light, smell, touch, pain, heat and cold are very common in younger children with autism [47, 48]. It is noteworthy and at present must be always consider that epilepsy and intellectual disability (ID) or both, may be frequently associated in children with ASD [49-51]. This association may be not casual and it is not sufficiently clear if these three variables (ASD, epilepsy and ID) have a special relationship. Reported rates of a typical behavior related to sensory experiences are high among children with ASD [52]. A study in Canada, compared to sex- and age matched controls, found individuals with autism aged 3 to 56 years old exhibited an abnormal oral sensory processing, characterized by either greater oral seeking (e.g., child putting everything into their mouth) or oral defensiveness (e.g., avoidance of certain textures and tastes and/or only eating limited variety of foods) [53, 54]. Another finding in Canada; identified that children with ASD experienced about five times more feeding problems and exhibited lower intake of calcium with ASD may be at risk of inadequate micronutrient intake [55-58]. However, studies based on prospective thee-day food records generally demonstrate no differences in the intake of vegetables or fruits between children with ASD and TD children [59, 60], with both groups consuming below the recommendations for vegetables intake [60]. In Canada also a study found no significant association between dietary pattern and BMI with ASD aged 3-11 years [61]. Moreover, in China; a study found that children with ASD actually had lower mean BMI [62]. Thus, although children may be eating a limited variety of foods, these may be unhealthier overall (driving weight gain). However, picky eating could also result in weight loss [63]. For example, in Japan, feeding problems related to picky eating are commonly observed among children with autism, and inadequate nutrient intake due to picky eating has been also reported [64-67]. Overall total energy intake and macronutrient distribution could also contribute to weight gain among children with ASD. It is also important to consider macronutrient distribution, which can lead to variation in body weight and cardio-metabolic risk profiles [68, 69]. However, the optimal macronutrient distribution for improving the weight status of children and adolescents is not yet understood [70]. In Canada a data from same two meta-analyses that examined energy intake also assessed macronutrient intake, finding no significant differences in the intake of carbohydrates and fats between children with ASD and TD children. Intake also tended to be within the acceptable macronutrients distribution range (AMDR). Canadian children with ASD consumed less protein than TD children, but both groups were consuming more protein than currently recommended for a healthy diet [71-73]. Additionally, researchers should further elucidate differences in dietary intake within the ASD group based on oral sensitivities, dietary restrictions, and secondary comorbidities (e.g., GI disorders), and into account age-and possibly sex-related differences. Eating disorders, such as anorexia nervosa, can also impact feeding behaviors and studies in Canada have found comorbidities between eating disorders and ASD, specifically among females [74, 75]. In Canada; children with ASD are often placed on restrictive diets, such as the gluten-free, casein free (GFCF) diet [76], which may reduce intake of certain micronutrient. GFCF diets have been considered as a possible therapeutic intervention for some of the behavioral symptoms of ASD; however, evidence is lacking [77]. Evidence suggests that deficiencies of vitamin A, vitamin D, B-complex vitamins, calcium, and zinc may be associated with increased fat deposition [78]. However, the causality in relationship between micronutrient intake and fat deposition remains un-established [78]. Frequent nutritional screening and assessment of children with ASD is an important clinical consideration as they may have multiple risk factors that could amplify the prevalence of nutrient deficiencies. Those children often exhibit nutrition-related medical issues including gastrointestinal discomfort, bowel inflammation, diarrhea, constipation, and acid reflux [79]. Some studies have shown that children with ASD may be deficient in micro-a- and

macronutrients [22-23], as well as iron [24], which could result from altered GI function and/or potentially impact GI symptoms. For example; in United State, a research has shown that children with ASD tend to have more gastrointestinal (GI) symptoms than typically developing peers [4-5], especially for constipation, diarrhea, and abdominal pain [4, 6, 7]. Furthermore, many parents and caretakers have employed the use of gluten-and casein-free (GFCF) diets [25] that seem to have mixed effects on core ASD symptoms [26] and GI symptoms [27-28] in ASD. The findings of numerous studies showed that vitamin D deficiency is one of the risk factors of evolutional neuropsychological disorders such as autism [80]. However, studies on the relationship between vitamin D and autism in different parts of the world such as Sweden [81], Egypt [82], Saudi Arabia [83], and china [84-85] indicate lower 25 (OH) D level of patients with ASD in different ages compared with the control group. Vitamin D is a neuroactive steroid affecting brain development and function. It plays essential role in myelination, which is important for connectivity in the brain. A study in Iran has shown that decreased vitamin D levels during pregnancy might increase the risk of ASD. In Canada findings from a meta-analysis confirm intake deficiencies in calcium and vitamin D in children with ASD relative to TD children and dietary intake recommendation [33]. In United State, many individuals with ASD have used complementary and alternative medicine (CAM) approaches, including dietary changes, as part of their treatment for the core ASD symptoms, as well as GI disturbances, sleep problems, or in the promotion of general health [21]. In addition, many families also administer omega-3- fatty acids in hope of deriving benefit, but the results from randomized, controlled clinical trial of omega-3-supplementation in ASD are also mixed in most cases. The aim of this study is to study the general features, attitudes and behaviors of autistic children, and to: a. Assess nutritional status, nutritional deficiency and sensitivity of autistic children. b. Investigate their anthropometric indices as index of nutritional status.

METHODOLOGY

The study was a cross sectional study carried out from Jan 2020 to March 2020 in autism center in Benghazi. The study was carried on 85 participants: (62) male and (23) female their age group ranges from (<5year to >14 year) who are assessed through distribution of detailed questionnaires. The participant was selected by communicating with their parents and caregivers by a sent copy of questionnaires. The questionnaire of this study divided into nine sections. It contained questions about demographic and socioeconomic data, nutritional and social behaviors of autism, food composition and food intake, medical health problems, biochemical investigation, and anthropometric measurements. Weight and height was measured after completion of the questionnaire. Calculated BMI compared by used age and BMI percentile according to WHO growth charts for children for determined body weight categories. The laboratory tests was obtained from participants include testing of CBC, serum ferritin, vitamin B12, Ca, and vitamin D. the data was collected from medical records of participants in autism center. Data set was exported to SPSS for complete analysis. Statistical analysis was carried out for the complete sample and frequencies for each categorical variable was calculated for each group as well. The correlation between the variables was determined and Chi-square was performed. This study was granted approval by the local Ethics Committee of the medical faculties of Benghazi University. Informed written consent was obtained through a consent form that was given to the parents of participants along with the questionnaires.

RESULTS

The age of participants ranges from (<5y to >14y) with an average age was (2.5) years. The peak age of autism at age group 5y-10y (44.7%) was shown in (figure1). A significant increase of autism among male than female (72.9 %) was shown in (figure2). In the (figure3) shown there is a strange behavior noted on autism (80%). In figure (4); shown the age stage of the onset of strange behaviors of autism, in which the most onsets of strange behaviors noted on autism between age group 1y-3y (48.2%). There is a follow-up of the autism center routinely (80%), was shown in figure (5). In figure (6); shown there is a favored meal of autistic children (78.8% vs 21.2%), and lower food sensitivity among autistic (31.8% vs 68.2%) was shown in figure (7) Figure (8); shown consumption of dietary supplements among autistic (27.1% vs72.9 %). Figure (9): shown side effects of treatment among autism (10.6%). Figure (10) shows the body weight among autism; which most of autism have normal body weight (38.8%), (29.4%) overweight, (18.8%) underweight and (12.9%) obese. Table (1): shown the correlation between education level of father and the extent of his knowledge about the autism ($p<0.05$); in which (28.6%) of uneducated father have low extent of knowledge about the autism. Table (2): shown the correlation between education level of mother and the extent of her knowledge about the autism ($p<0.05$); in which (35.7%) of uneducated mother have low extent of knowledge about the autism. Chi-square test was performed and considered significant at correlation<0.05. The food sensitivity among autism and following of restricted diets; in which (74.1%) of children with food sensitivity followed casein restricted diet ($p<0.05$) was shown in table (3); while (66.7%) of those with food sensitivity followed gluten restricted diet ($p<0.05$) table (4). The table (5) shown the nutritional behaviors among autism; in which (54.1%) of autism prefers white and red colored food, (65.9%) prefers solid and liquid food, (49.4%) prefers eating alone, (52.9%) have eating difficulty and (60%) have special cup or plate. In the table (6) shown social behaviors among autism; in which (70.6%) of autism have hyperactivity, (61.2%)

watching T.V overly, (45.9%) have inimical behaviors, (80%) have language disturbances, and (68.2%) have social disturbances. The table (7A) shown the number of servings of protein and milk among autism; in which (47.1%) of autism consume one serving of white meats per day, (31.8%) never consume red meats, and (49.4%) consume one serving of milk and milk products per day. The number of servings of starch, fat, and sweet foods among autism was shown in table (7B); in which (44.7%) of autism consume one serving of starchiness per day, (36.5%) consume one serving of fat rich food per week, and (76.5%) consume two serving of sweets and sugary foods per day. In the table (7C): shown the number of servings of vegetables, fruits, and ready meals among autism; in which (61.2%) of autism consume one serving of vegetables per day, (56.5%) consume one serving of fruits per day, and (40%) never consume ready meals. The table (8); was shown the GIT symptoms and anemia among autism; in which (14.1%) of autism suffer from chronic diarrhea, (29.4%) suffer from constipation, (34.1%) suffer from gastric pain, (9.4%) suffer from vomiting, and (30.6%) suffer from anemia. Table (9); was shown the biochemical tests of autism; in which (91.8%) of autism with normal CBC, (58.8%) with normal serum ferritin, (74.1%) with normal vitamin B.12, (42.4%) with normal calcium, and (5.9%) with normal vitamin D.

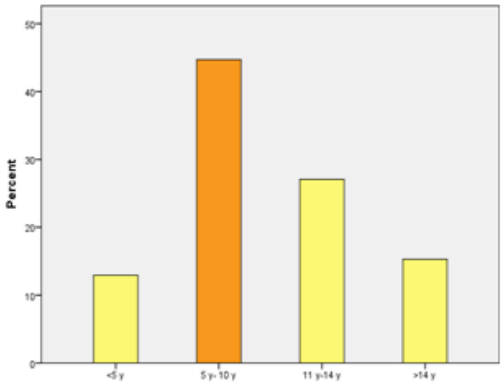

Figure 1: Age of Subjects

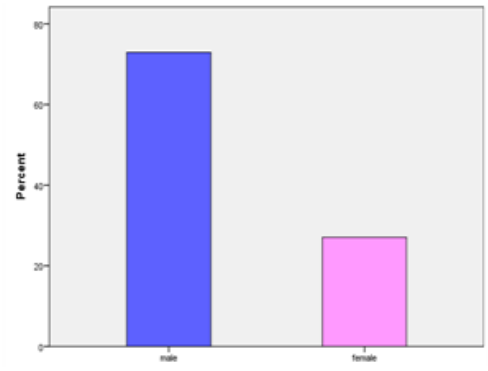

Figure 2: Sex of Subjects

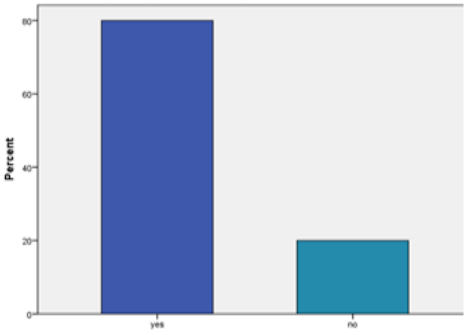

Figure 3:The strange behavior notic on autism

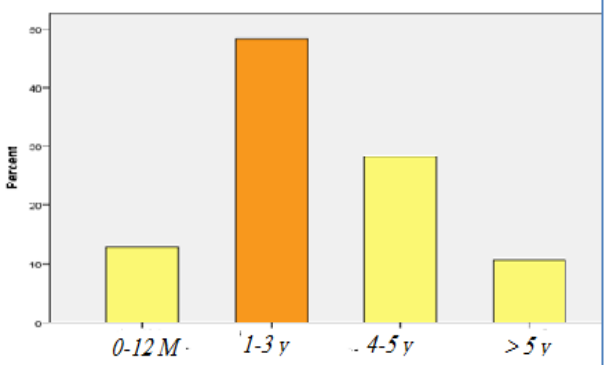

Figure 4: Age of strange behavior notic on autism

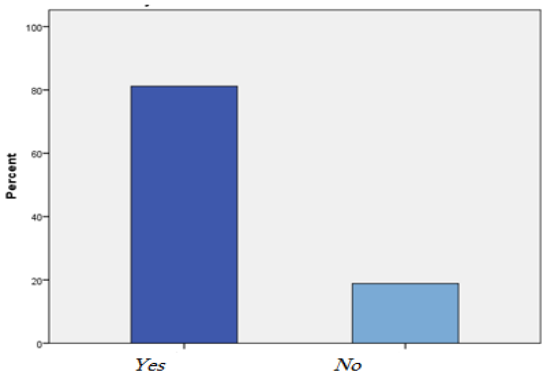

Figure 5: Followup of autism center

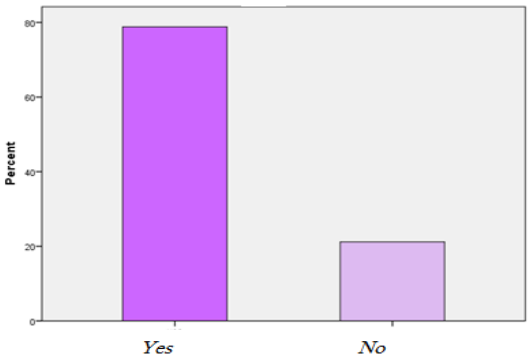

Figure 6: Favored meals of autism

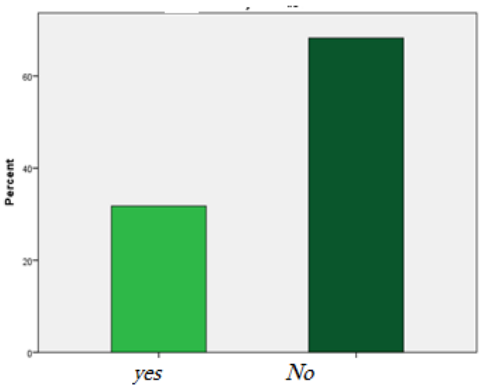

Figure 7:Food sensitivity of autism

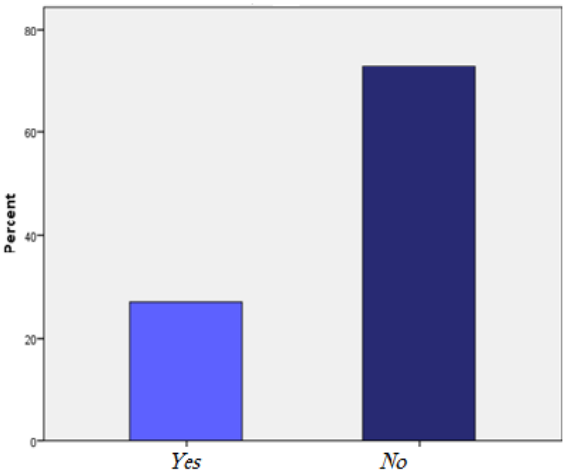

Figure 8: Dietary supplement

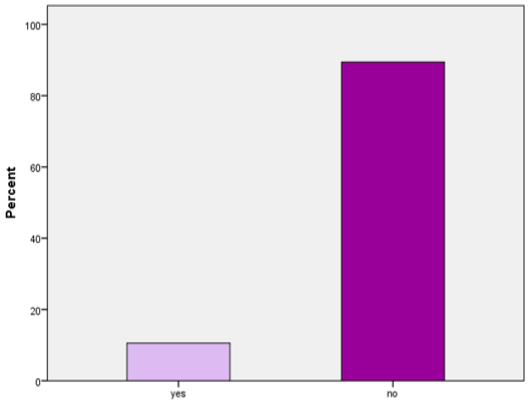

Figure 9: Side effects of treatment

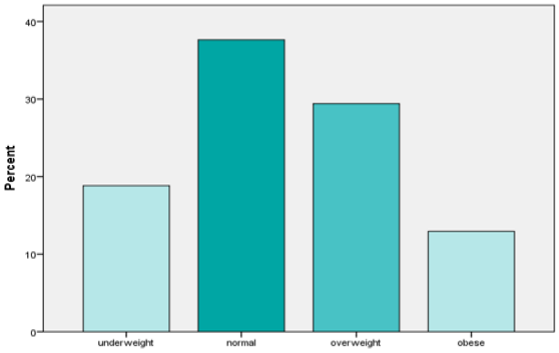

Figure 10: Body mass index

Table-1: Correlation between father education and knowledge about autism

Education level of father		The extent of your knowledge about the autism			Total
		low	medium	High	
Not educated	Count	4	2	2	8
	%	28.6%	5.6%	5.7%	9.4%
Primary	Count	1	13	1	15
	%	7.1%	36.1%	2.9%	17.6%
High school	Count	4	7	15	26
	%	28.6%	19.4%	42.9%	30.6%
University and above	Count	5	14	17	36
	%	35.7%	38.9%	48.6%	42.4%
Total	Count	14	36	35	85
	%	100.0%	100.0%	100.0%	100.0%

Table-2: Correlation between education level of mother and her knowledge about autism

Education level of mother		the extent of your knowledge about the autism			Total
		low	medium	High	
not educated	Count	5	3	0	8
	%	35.7%	8.3%	0.0%	9.4%
primary	Count	4	13	2	19
	%	28.6%	36.1%	5.7%	22.4%
high school	Count	3	6	16	25
	%	21.4%	16.7%	45.7%	29.4%
university and above	Count	2	14	17	33
	%	14.3%	38.9%	48.6%	38.8%
Total	Count	14	36	35	85
	%	100.0%	100.0%	100.0%	100.0%

Table-3: Correlation between food sensitivity and casein free diet

			Food sensitivity of autistic		Total
			Yes	No	
Casein free diets	Yes	Count	20	1	21
		%	74.1%	1.7%	24.7%
	No	Count	7	57	64
		%	25.9%	98.3%	75.3%
Total		Count	27	58	85
		%	100.0%	100.0%	100.0%

Table-4: correlation between food sensitivity and gluten free diet

			food sensitivity of autistic		Total
			yes	no	
gluten free diets	yes	Count	18	1	19
		%	66.7%	1.7%	22.4%
	no	Count	9	57	66
		%	33.3%	98.3%	77.6%
Total		Count	27	58	85
		%	100.0%	100.0%	100.0%

Table-5: The nutritional behavior among autism

categories		N	%
color of food	white	12	14.1
	red	27	31.8
	both	46	54.1
	total	85	100
texture of food	solid	14	16.5
	liquid	15	17.6
	both	56	65.9
	total	85	100
prefers eating alone	yes	42	49.4
	no	43	50.6
	total	85	100
eating difficulty	yes	45	52.9
	no	40	47.1
	total	85	100
special cup or plate	yes	51	60
	no	34	40
	total	85	100

Table-6: The social behavior among autism

categories		N	%
hyperactivity	yes	60	70.6
	no	25	29.4
	total	85	100
waching T.V overly	yes	52	61.2
	no	33	38.8
	total	85	100
inimical behaviores	yes	39	45.9
	no	46	54.1
	total	85	100
language disturbance	yes	68	80
	no	17	20
	total	85	100
social disturbances	yes	58	68.2
	no	27	31.8
	total	85	100

Table-7A: The number of servings of meats and milk

categories/servings		N	%
white meats	never eat	19	22.4
	one/day	40	47.1
	two/day	10	11.8
	one/week	15	17.6
	one/month	1	1.2
	total	85	100
red meats	never eat	27	31.8
	one/day	22	25.9
	two/day	20	23.5
	one/week	9	10.6
	one/month	7	8.2
	total	85	100
milk and milk product	never eat	19	22.4
	one/day	42	49.4
	two/day	18	21.2
	one/week	6	7.1
	one/month	0	0
	total	85	100

Table-7B: The number of servings of starch, fat, and sweets

categories/servings		N	%
starchiness	never eat	2	2.4
	one/day	38	44.7
	two/day	20	23.5
	one/week	23	27.1
	one/month	2	2.4
	total	85	100
fat rich food	never eat	8	9.4
	one/day	25	29.4
	two/day	15	17.6
	one/week	31	36.5
	one/month	6	7.1
	total	85	100
sweets and sugar	never eat	1	1.2
	one/day	11	12.9
	two/day	65	76.5
	one/week	5	5.9
	one/month	3	3.5
	total	85	100

Table-7C: The number of servings of vegetables, fruits and ready meals

categories/servings		N	%
vegetables	never eat	10	11.8
	one/day	52	61.2
	two/day	19	22.4
	one/week	4	4.7
	one/month	0	0
	total	85	100
fruits	never eat	10	11.8
	one/day	48	56.5
	two/day	15	17.6
	one/week	12	14.1
	one/month	0	0
	total	85	100
ready meals	never eat	34	40
	one/day	23	27.1
	two/day	6	7.1
	one/week	12	14.1
	one/month	10	11.8
	total	85	100

Table-8: The GIT symptoms and anemia among autism

categories		N	%
chronic diarrhea	yes	12	14.1
	no	73	85.9
	total	85	100
constipation	yes	25	29.4
	no	60	70.6
	total	85	100
abdominal pain	yes	29	34.1
	no	56	65.9
	total	85	100
vomiting	yes	8	9.4
	no	77	90.6
	total	85	100
anemia	yes	26	30.6
	no	59	69.4
	total	85	100

Table-9: The biochemical tests of autism

categories		N	%
CBC	normal	78	91.8
	deficiency	7	8.2
	total	85	100
S.ferritin	normal	50	58.8
	deficiency	35	41.2
	total	85	100
Vit.B12	normal	63	74.1
	deficiency	22	25.9
	total	85	100
Ca	normal	36	42.4
	deficiency	49	57.6
	total	85	100
ViT.D	normal	5	5.9
	deficiency	80	94.1
	total	85	100

DISCUSSION

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by persistent deficits in social communication and social interaction, as well as restricted and repetitive patterns of behavior that present during early development and result in clinically significant impairment. In the present study, the total number of participants involved was 85 and their ages ranging from <5 years to >14 years old was detected with ASD and with average age was2.5 years. The peak age of autism was shown at age group 5y-10y (44.7%). Autism was significantly increase among male than female (72.9 % vs 27.1%), but are not consider consistent. In our study we further investigated the strange behaviors of autism and the age stage of onset of this behaviors, in which the most onset of strange behaviors was shown between age group 1y-3y (48.2%); and the most common behaviors noted among autism at this age stage are language disturbance (80%), hyperactivity (70.6%), social disturbance (68.2%), watching T.V overly (61.2%), and eating difficulty (52.9%), and this findings was agree with a study in United State that investigate about the impairment in language and social development that is usually evident during the first 3 years of life; and agree with another study in Italy. The food sensitivity and selectivity are common among children with ASD; we investigate about the most sensitive foods among autism and their effects on the nutritional status, some of children have sensitivity from milk, cheese (casein), gluten (celiac disease) and other foods like tomato, cucumber and peanut butter, and for this reason we investigate about the restricted diet followed by autism and we found (74.1%) of autism with food sensitivity following casein free diet, and (66.7%) with food sensitivity following gluten free diet. Autism subjects was shown mostly complain of GIT symptoms, such as chronic diarrhea (14.1%), gastric pain (34.1%), constipation (29.4%), and vomiting (9.4%), and for this reason many of autism following GFCF diet that seem to have mixed effect on ASD symptoms and GIT symptoms, this findings was agree with studies in United State and Canada. The autism subjects are also complaining from anemia (30.6%), in which (48.6%) of subject with anemia is related to serum ferritin deficiency, and (72.7%) are related to vitamin B.12 deficiency. Some of autism with anemia suffers from GIT symptoms, such as abdominal pain and chronic diarrhea, and this finding was agreed with a study in United State. Because the role of vitamin D in neuropsychological disorders, and vitamin D deficiency is one of the risk factor of evolutional neuropsychological disorders such as autism, for this reason we investigate the laboratory tests of calcium and vitamin D, and found greater deficiency of vitamin D among autism (94.1%), and calcium (57.6%), and this finding was agree with many number of studies in different parts of the world such as Sweden (29), Egypt (20), Saudi Arabia (30), and china (31-32) that indicate lower 25 (OH) D level of patients with ASD in different ages. Another approach of our investigation is food intake among autism, most of autism consume recommended levels of carbohydrate and fat, but the intake of protein is less than the recommended level, see table (7A) and this finding about the protein intake was disagree with the finding in Canada; most of autism tend to consume greater amount of sweets, sugary foods, pastries, crackers and soft drinks and this was limited their intake of variety of fruits and vegetables; this overall findings was significantly agree with study in Canada. The picky eating was also noted among some autism and this was also result in incidence of nutritional deficiency, this finding was agreed with a study in Japan. Another investigation was between dietary intake and obesity rates among autism, but no correlation was detected in our study, this is because most of autism with normal body weight (38.8%), and this result was agreed with studies in Canada and disagrees with a study in Brazil. Some of autism may taste new foods and may reject others due to the texture, color, and taste, and this also factor contribute to affect the dietary intake among autism, but this is not clear in our study, in which (54.1%) of autism prefers white and red colored food, (65.9%) prefers solid and liquid food (Table 5). Another factors will affect the dietary patterns and choices of autism are limited income and education level of parents about the autism, this will increase their awareness about the most important nutritional requirements of autism; for this reason we investigate the extent of knowledge of parents about the autism and their education level and found parents who are not educated have low extent of knowledge about the autism ($p<0.05$). In addition, some of autism was use certain medications and drugs for sleeping problems,

epilepsy and other conditions, but in our study we investigate about other medication which gives to autistic children by their parents in a hope to relief GIT symptoms and improve their nutritional status and general health (such as iron, calcium, vitamin D and omega-3- fatty acid supplements) may also has effect on their appetite and GIT symptoms, but this remain unclear, this findings about the use of complementary medicine was agrees with a finding in United State.

CONCLUSION

The present study was shown the peak ages of autism at age group 5years-105years (44.7%), and with average age was 2.5 years. Autism was significantly increase among male than female (72.9 % vs 27.1%), but are not consider consistent. The most onset of strange behaviors noted on autistic children was between age groups 15years -35years (48.2%), the study was also shown the food sensitivity among autism and the effect of GFCF (gluten free and casein free) diets on their sensitivity. The subjects with autism also shown particular complications and the most common complications were GIT symptoms and anemia. Most of autism children tend to consume greater amounts of sweets, pastries and sugars in contrast to protein, vegetable and fruit. For biochemical laboratory tests there was found lower levels of serum ferritin, calcium and vitamin D concentration among autism. The findings suggested that hyperactivity, eating difficulty, food sensitivity, certain medications, in addition to limited income could play part in the dietary pattern choice, feeding practice and body weight changes among autism.

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