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REVIEW ARTICLE

Assessment of Dietary Pattern and Anthropometric Measures in Attention Deficit Hyperactive Disorder Children.

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ABSTRACT

Background: Attention deficit hyperactivity disorder (ADHD) is considered one of the most diagnosed neurobehavioral disorders in childhood, and it often lasts into adulthood. Some psychopathological mechanisms connecting ADHD to obesity have been hypothesized ADHD and obesity.

Methods: This was a case control study. Target sample comprised 45 of ADHD children (study group) of age ranged from (6 - 12 years) selected from the Psychiatric and Paediatric Outpatient Clinics Zagazig University Hospitals. 45 apparently healthy children (control group) matched with the study group for age and sex. A questionnaire performed for collection of personal, sociodemographic and clinical data, clinical examination and dietetic history.

Results: Mean weight and Body mass index values in children with ADHD were higher than those reported in the control group. Intelligence Quotient was statistically significantly lower among ADHD group than control group. There is high significant difference between the studied groups as regard foods containing colours and preservatives administration times. It was higher among ADHD group than control group.

Conclusion: More cases of the ADHD have positive family history. Children from lower socioeconomic status are more likely diagnosed with ADHD than children from higher socioeconomic status There is high significant difference between the studied groups as regard essential fatty acid supply. It was lower among ADHD group than control group.

Key words:ADHD, body mass index, dietary pattern.

INTRODUCTION

ADHD is now known as one of the most common behavioral disorder of Childhood affecting nearly approximately 9% - 20% in Egyptian Children ages 4–17 years. **[1]**

Symptoms of ADHD typically start in early childhood have a chronic course and may affect the educational level and social relationships of affected individuals.**[2]**

Nearly two-thirds of individuals have at least one presenting developmental or psychiatric condition,.[3]

In school, children with ADHD are more likely to increased learning problems, school absences, troublesome interactions with peers and increase rate of medical visits. As adults, these risks and associated problems result in 33% reduced learning and 15% increase in use of social help among those with ADHD. **[4]**

There are three types of ADHD: combined, inattentive, and hyperactive-impulsive. Children with this disorder have problems with self-esteem, educational problems, significantly impaired family and peer relationships, and an overall decrease in quality of life. **[5]** Cognitive effects of polyunsaturated fatty acids in children with attention deficit hyperactivity disorder symptoms, amino acid deficiencies, and B-vitamin deficiencies have been reported to have adverse effects on behavior.[5]

Aim of the study: To evaluate nutritional growth status and evaluate weight/age, height/age and BMI/age and asses impact of good nutrition on decrease incidence of development of ADHD and

effect of false habits of diet on increasing incidence of development of ADHD. Asses how ADHD affects on BMI and predisposes to obesity and overweight

METHODS

This was a case control study. The study was performed in Psychiatric and Pediatric Outpatient Clinics Zagazig University Hospitals. It's performed from January 2018 to January 2019.Total sample size included 90 divided in two groups 45 cases of ADHD and 45 controls. The study group who are newly diagnosed ADHD from 6-12 years old selected from those attending psychiatric outpatient and who are newly diagnosed ADHD who have poor attention, distractibility, hyperactivity, impulsiveness, poor academic performance or behavioral problems at home or at school. The control group are children who lack the diagnostic criteria of ADHD. The sample size was calculated using Open EPI, info package version 6.04, confidence interval C.I 95%, and power 80%.

Inclusion criteria: School aged children 6-12 years, both sexes were included and who were newly diagnosed ADHD.

Exclusion criteria: Children with history of major prenatal complications such as prematurity, low birth weight, any past or present psychosis, comorbid Tourette syndrome, celiac, phenylketonuria, neurological disorders, autism, other persistent developmental disorders or mental retardation.

birth date, presence of perinatal complication or not, NICU incubation or not, family history of ADHD. Diagnoses of the ADHD based on DSM IV(Diagnostic and Statistical Manual of Mental Disorders 4th edition). We used the ADHD scale (Conner) and the IQ Stanford bennet to exclude MR, genetic disorders. Dietary intake was conducted in order to obtain qualitative and quantitative information about the different items of food and beverage consumed by every child using food frequency questionnaire which showed consumption of foods containing colors and preservatives in ADHD children and consumption of foods containing essential fatty acid sources and vitamin B complex sources in control group. Anthropometric measures as body weight was measured without heavy closes using electronic scales, approximated to the nearest 0.1 kg. Height was measured to the nearest 1cm using an extensible table and was measured standing upright.Body mass index: weight in kg divided by height in meter square.

Ethical declaration Approval will be taken from the research ethical committee and the institutional review board (IRB) of Faculty of Medicine, Zagazig University. The work will be carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. Informed written consent was obtained from each participant in the study.

Statistical analysis:

The collected data were tabulated and analyzed using SPSS version 24 software (Spss Inc, Chicago, ILL Company). Categorical data were presented as number and percentages. Chi square test (X2), was used to analyze categorical variables. Quantitative data were expressed as mean ± standard deviation, median and range. Student "t" test was used to analyze normally distributed variables among 2 independent groups, the accepted level of significance in this work was stated at 0.05 (P <0.05 was considered significant).

RESULTS

Mean weight and BMI values in children with ADHD were higher than those reported in the control group. More cases of the ADHD have positive family history. Children from lower socioeconomic status are more likely diagnosed with ADHD than children from higher socioeconomic status.

Table (1) shows distribution of the studied groups as regard demographic data. In terms of age and gender, all cases and controls are balanced properly. Between the two classes there were no statistically significant differences (P>0.05).

Table (2) shows distribution of the studied groups as regard anthropometric measurements. There were statistically significant differences in the weight, BMI and of cases.

Table (3)shows perinatal risk factors of the studied groups. there is significant difference between the studied groups as regard family history (more cases of the ADHD have positive family history), while there is non-significant difference between the studied groups as regard the remaining risk factors.

Table (4) shows ADHD types and Co-morbidity of the studied cases assessed by Conner rating scale.Proved that the most prominent co-morbidity was Combined / Oppositional by a percent of 24.4%.

Table (5) shows Comparison between cases and control groups as regard socioeconomic level. There is significant difference between the studied groups as regard socioeconomic status. It is observed that ADHD more common in moderate and low socioeconomic status.

Table 1: Studying of demographic data in between the studied groups:

Variable	ADHD group (n=45)		Control group (n=45)		T test	P value
Age: (years):						
Mean ± SD Range	8.26 ± 1.8 6-12		8.28±1.7 6-12		0.059	0.953
	No.	**%**	**No.**	**%**	χ^2	**P value**
Sex:						
Female Male	21 24	46.7 53.3	22 23	48.9 51.1	0.045	0.833 (NS)

The collected data were tabulated and analyzed using SPSS version 24 software.
Chi square test (x^2) was used to analyze categorical variables.

Table (2):Anthropometric measures of the studied groups:

Variable	ADHD group (n=45)	Control group (n=45)	T test	P value
weight: (kg):				
Mean ± SD Range	31.47 ±6.7 19-45	27.93±6.1 20-45	2.62	<0.05 (S)
Height: m^2				
Mean ± SD Range	1.23±0.08 1.14-1.5	1.25±0.1 1.13-1.46	1.25	0.21 (NS)
BMI:kg/m^2				
Mean ± SD Range	19.86±3.1 14-26	17.66±1.7 14.7-22.7	4.1	**<0.001** **(HS)**

M^2 = square meter
BMI = body mass index

Table (3): perinatal risk factors of the studied groups:

Variable	ADHD group (n=45)		Control group (n=45)		χ^2	P value
	No.	**%**	**No.**	**%**		
Mode of delivery:						
NVD CS	18 27	40 60	20 25	44.4 55.6	0.182	0.67
NICU admission:						
Absent Present	34 11	75.6 24.4	34 11	75.6 24.4	0.00	1 (NS)
Family history of ADHD :						
Absent Present	33 12	73.3 26.7	43 2	95.6 4.4	8.45	**0.05** **(S)**
Prematurity:						
Absent Present	39 6	86.4 13.6	40 5	88.9 11.1	0.104	0.748 (NS)
HIE:						
Absent Present	45 0	100 0.0	45 0	100 0.0	Fisher test	1 (NS)
Neonatal jaundice:						
Absent Present	31 15	68.9 31.1	33 12	73.3 26.7	0.216	0.642 (NS)

= neonatal incubation unit NICU
HIE = hypoxic ischemic encephaloathy

Table (4): ADHD types and Co-morbidity of the studied cases assessed by Conner rating scale:

	No.(45)	%
Combined / Conduct D	6	13.3
Combined / Emotional D	4	8.9
Combined / learning D	2	4.4
Combined / Oppositional	11	24.4
Hyperactive / Conduct D	1	2.2
Hyperactive / Emotional D	2	4.4
Hyperactive / learning D	3	6.7
Hyperactive / Oppositional	5	11.1
Inattentive / Conduct D	2	4.4
Inattentive / learning D	7	15.6
Inattentive / Oppositional	2	4.4

Table (5): Comparison between cases and control groups as regard socioeconomic level:

Variable	ADHD group (n=45)		Control group (n=45)		χ^2	P value
	No.	%	No.	%		
Socioeconomic:						
Low Moderate High	18 25 2	40.0 55.6 4.4	11 24 10	24.4 53.322. 2	7.043	<0.05 (S)

DISCUSSION

Attention deficit hyperactivity disorder (ADHD) is one of the most commonly diagnosed Psychiatric disorders in childhood, and it may lasts into adulthood. ADHD prevalence rates vary by age, sex, and ethnicity. Worldwide, the overall prevalence of ADHD/hyperkinetic disorder (HD) was found to be 5.29% in a pooled analysis. **[6]**

This study showed that, there was no significant difference between the studied groups as regard age and sex. This agrees with Woo and colleagues who aimed to identify dietary patterns associated with attention deficit hyperactivity disorder (ADHD). The study included 192 elementary school students aged seven to 12 years. (96 students with ADHD and 96 healthy controls). They found that, there was no significant difference between the studied groups as regard age and sex.**[6]**

Venkata and Panickern found that there was a significant difference in the prevalence of ADHD between malesand females, the ratio being 3:1**[7]**. The study of Cortese and Vincenzi showed that the mean weight and BMI values in children with ADHD were higher than those reported in the control group.**[8]**

The relationship between ADHD and weight and BMI has been viewed in many studies. In a study by Kiddie and colleagues, it was shown that ADHD children were heavier and taller than normal children.**[9]** as ADHD could lead to impairment of balance between energy intake and expenditure by influencing physical activity, metabolism, and eating habits Impulsivity and poor behavioral regulation due to illness contribute to changes in dietary pattern and the development of obesity

However,Trave and Gallinas showed that the mean weight, height, and BMI values of ADHD children were significantly lower than those of the control group. **[10]**

In the present study, there was significant difference between the studied groups as regard family history (more cases of the ADHD have positive family history). This was agreed with the results of Farahat and colleagues who aimed to estimate the prevalence of ADHD and to determine its risk factors. A cross-section comparative study was conducted in a randomly selected four primary schools in Menoufia governorate, Egypt. The sample was divided into cases and controls to study the risk factors. They found positive family history was more among ADHD cases.**[11]**

In the present study, there was non-significant difference between the studied groups as regard the remaining risk factors. This agrees with the results of the study of Farahat and colleagues**[11]** which showed that, types of ADHD and co-morbidity assessed by Conner rating scale subscales in the studied group that the most prominent co-morbidity wasCombined / Oppositional by a percent of 24.4%. This agrees with Fenollar and Fuentes.**[12]**

Yuce and colleaguesfound that the most frequent psychiatric comorbid disorder was oppositional defiant disorder (69.4%). Important family, social, and school- related problems are observed in

ADHD cases accompanied by oppositional defiant disorder. These children are more punished and exposed to negative stimulus. This study showed that, there was significant difference between the studied groups as regard socioeconomic status. It was observed that ADHD was more common in moderate and low socioeconomic status.**[13]**

This is in agreement with the results of Saadi and colleagues who found that, children from lower socioeconomic status are more likely diagnosed with ADHD than children from higher socioeconomic status. **[14]**

Limitations of study: Uncooperative parents or patients who refused to give the consent of sharing in the study , small sample size and short duration.

CONCLUSION

Mean weight and BMI values in children with ADHD were higher than those reported in the control group. There is non-significant difference between the studied groups as regarding height. More cases of the ADHD have positive family history .Children from lower socioeconomic status are more likely diagnosed with ADHD than children from higher socioeconomic status. IQ was statistically significantly lower among ADHD group than control group. There is high significant difference between the studied groups as regard essential fatty acid supply. It was lower among ADHD group than control group. There is high significant difference between the studied groups as regard Vitamin B complex sources supply. It was lower among ADHD group than control group. There is high significant difference between the studied groups as regard foods containing colors and preservatives administration times. It was higher among ADHD group than control group.

RECOMMENDATIONS:

We can suggest that an adequate and well-balanced diet is the most appropriate way to promote healthy physical, intellectual and social development in school-age children. Therefore, medication and psychosocial treatment should not be used as the only intervention in the treatment of children with ADHD. Instead, their overall nutritional status and eating habits should be evaluated by a dietician, and dietary modifications should be made on an individualized basis for each patient. In addition, parents should be educated about balanced and healthy nutrition of these children. It is a must to void maternal smoking, alcohol, drug use and stress/anxiety in pregnancy. Omega-3 application early in life is mandatory. Physicians should be attentive to patients and guardians concerns about academic performance and behavioral problems.

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