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Original Research Article

Impact of diet on attention-deficit hyperactivity disorder in a tertiary care hospital of Rawalpindi

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ABSTRACT

Background: Attention-deficit hyperactivity disorder (ADHD) is a prevalent neuropsychiatric disorder of children that affects almost all aspects of the life. The role of diet in the management of the ADHD is understudied in Pakistan. This study aimed to assess the impact of different types of diet on the symptoms of ADHD among the children with ADHD.
Methods: This descriptive cross-sectional study was conducted among 58 children with ADHD in Rawalpindi. Ethical approval and informed consent were obtained. Patients' recruitment was done via developed criteria and Convenient sampling technique. Descriptive statistics and one-way ANOVA were used to determine the difference of ADHD severity among various frequencies of different included foods via Conner Parent rating scale-revised short form. Data analysis was performed by SPSS version 25.0.
Results: The difference in hyperactivity index, impulsivity, and learning problems score on CPR-RS among various frequencies of carbohydrate, protein rich and fat foods, was statistically significant and with the increase intake of carbohydrate and protein rich foods, the score on CPR-RS of hyperactivity index, impulsivity, and learning problems also goes up. Whereas, with the increase intake of fat rich foods, the score of hyperactivity index, impulsivity, and learning problems goes down.
Conclusions: In short, the high intake of carbohydrate and protein rich foods, increase the severity of the symptoms of ADHD, while, high intake of fat rich foods decreases the severity of the symptoms of ADHD among children.

Keywords: ADHD, Care, Diet, Hospital, Impact, Rawalpindi, Tertiary

INTRODUCTION

Attention-deficit hyperactivity disorder (ADHD) is a common neurodevelopmental psychiatric disorder in childhood around the globe and it almost affects the 5% of the child population in the world.[1] It is characterized by the excessive and impairing inattentive, hyperactive, and impulsive behavior among its patients.[2] It is diagnosed in early childhood and remain persistent in the adulthood. It affects adversely the academic performances, family relationships, and social activities of the children.[3]

Pathophysiology of the ADHD is still not clear, researches on ADHD indicated that the volume of brain among children with ADHD is reduced and specifically in the prefrontal cortex part of the left side.[2,4]

Different modalities have been used for the treatment of the ADHD such as psychoeducation, children behavioral therapy, parents training, and pharmacological drugs. Although pharmacological drugs are effective in the treatment of the ADHD, however, this modality has adverse side effects on patients as well.[5,6]

Another modality for ADHD treatment is diet modification. Several researches in all over the world have shown that diet modification can improve the symptoms of ADHD.[1-3] Results of diet impact on ADHD are different in studies. Some studies suggest that taking high energy food, carbohydrate rich food, and food with colours and preservatives, all increases the risk of ADHD. While some studies recommend that no relationship between these above-mentioned foods and ADHD.[1,7] Regarding protein rich diet research suggests that taking low amount of it is beneficial in the treatment of the ADHD.[8] Impact lipid rich diet on ADHD is also present in the literature, it has been noted that high intake of fat has great therapeutic role in various neurological disorders including ADHD.[9]

Impact of diet on the ADHD has been studied in various parts of the world, however, research work on the association between diet and ADHD in Pakistan is not up to the mark, that's why this research aimed to assess the impact of various diet groups on the ADHD symptoms among children in Rawalpindi, Pakistan.

METHODS

This descriptive cross-sectional study was performed in the pediatric department of a tertiary care hospital, Rawalpindi, among fifty-eight diagnosed child patients of attention deficit hyperactivity disorder (ADHD) for one year from January 2022 to January 2023. WHO calculator was used to determine the study sample size. Patients' enrollment in the study was performed by applying non-probability convenient sampling and established inclusion and exclusion criteria. ADHD diagnosis was made by DSM-5 (diagnostic and statistical manual of 5). The DSM-5 diagnosis criteria of ADHD, defined as a persistent pattern of inattention and or hyperactivity-impulsivity interfering with the development and presented in two or more settings such as at home, school, or work, and negatively effect on social, academic or occupational functioning. Only those children who had, an age range between 6 to 10 years, diagnosed with ADHD, and whose parents had will to take part in, were recruited in the study, while, those who had, age below 6 years or above 10 years and whose parents showed hesitation in taking the participation, were excluded from the study.

Before the start of the study ethical approval was waived and informed consent was also obtained from all participants before data collection.

Data was collected through a self-designed proforma. This questionnaire had two components. First was regarding socio-demographic features and diet intake of study population. Socio-demographic features included such as gender (male or female) and age. Diet part covers two questions which were about type of diet and frequency of the diet per week. Three major types of the diets were included in the study which were carbohydrate rich diet (breads, grains, pasta, potatoes, starchy vegetables, and fruits), protein rich diet (chicken, meat, egg, nuts, and seeds), and fat rich diet (butter, cheese, olives, whole eggs, and dark chocolates). Diet intake frequency was divided into lower (less than 3 times per week), moderate (3 to 6 times per week) and higher (more than 6 times per week) frequency based on number of meals per week of specific diet. While, the second part was about Conner Parent rating scale-revised short form (CPR-RS) was used for the assessment of the extent of the components of ADHD such as hyperactivity index, impulsivity, and learning problem. After data collection, data analysis was conducted by descriptive and inferential statistics in statistical Package for the Social Sciences (SPSS) version 25 (Armonk, NY: IBM Corp.). The frequency and percentage of qualitative data were measured, while means of quantitative data were calculated. One-way ANOVA was applied to determine the significant differences of scores of three major components of the among the three frequencies levels of included three specific foods types. P value less than 0.05 was considered as statistically significant.

RESULTS

Out of fifty-eight patients, thirty-eight (65.51%) were male children, whereas, twenty (34.49%) were female children. The mean of age of study population was 8.12 years with standard deviation (SD) of ±1.79 years.

Table 1: Comparison of CPR score among different frequencies of carbohydrate rich foods.

CPR-RS Subscales	Carbohydrate rich foods			One way ANOVA
	Low frequency	Moderate frequency	High frequency	P value
Hyperactivity index (mean±SD)	68.76±12.70	70.04±11.76	74.98±9.03	0.03
Impulsivity (mean±SD)	66.34±15.08	69.04±12.90	70.76±10.87	0.04
Learning problems (mean±SD)	67.98±12.98	70.17±11.10	73.18±10.02	0.02

Table 2: Comparison of CPR score among different frequencies of protein rich foods.

CPR-RS Subscales	Protein rich foods			One way ANOVA
	Low frequency	Moderate frequency	High frequency	P value
Hyperactivity index (mean±SD)	66.98±13.09	69.29±10.21	71.01±11.19	0.04
Impulsivity (mean±SD)	65.59±14.27	67.28±12.98	69.19±14.98	0.03
Learning problems (mean±SD)	66.57±13.91	69.20±11.43	70.10±13.92	0.05

Table 3: Comparison of CPR score among different frequencies of fat rich foods.

CPR-RS Subscales	Fat rich foods			One way ANOVA
	Low frequency	Moderate frequency	High frequency	P value
Hyperactivity index (mean±SD)	68.10±16.12	65.16±17.82	62.10±19.00	0.01
Impulsivity (mean±SD)	69.20±17.98	66.25±12.90	64.27±11.10	0.03
Learning problems (mean±SD)	66.99±1.00	64.09±16.18	62.10±13.18	0.04

Table 1 shows that difference in hyperactivity index, impulsivity, and learning problems score on CPR-RS among different frequencies of carbohydrate rich foods, was statistically significant and with the increase in carbohydrate rich foods intake, the score on CPR-RS of hyperactivity index, impulsivity, and learning problems also goes up.

Table 2 shows that difference in hyperactivity index, impulsivity, and learning problems score on CPR-RS among various frequencies of protein rich foods, was statistically significant and with the high intake of protein rich foods, the score on CPR-RS of hyperactivity index, impulsivity, and learning problems also increase

Table 3 indicates that difference in hyperactivity index, impulsivity, and learning problems score on CPR-RS among included frequencies of fat rich foods, was statistically significant and more intake of fat rich foods, lead to lower score on CPR-RS of hyperactivity index, impulsivity, and learning problems.

DISCUSSION

Although this study has given significant information regarding the impact of various diet types on the symptoms of attention-deficit hyperactivity disorder among children in Rawalpindi.

In the first phase data analysis, we noted that the ADHD is more common among male children as compare to the female children. Similar, finding was noted in a research study that was performed in Australia.[1]

In second phase of data analysis, we assessed the impact of diet on the ADHD symptoms among children. First, we observed that high intake of carbohydrate rich foods was associated with high score on CPR-RS subscales of hyperactivity index, impulsivity, and learning problems among the children. Consistent findings about the association of carbohydrate rich foods and ADHD symptoms have been presented in literature.[2] Various reasons have been suggested that is why carbohydrate rich foods are associated with ADHD symptoms. One of the reasons is that high intake of foods rich in glucose lead to fluctuating blood sugar levels that are shown in behavior, as blood sugar raises, and then decreases, initiating the release of stress hormones such as adrenaline and in the same time homeostasis of blood and cellular glucose is very crucial for the performance of the central nervous system (CNS).[10] Next, we noticed that protein rich foods also lead to high score of CPR-RS subscales of hyperactivity index, impulsivity, and learning problems among children. Another study in literature, presented identical link between protein rich foods and ADHD.[8] A study of Poland explains that the relationship between ADHD and protein rich foods could be due to allergic response to proteins included in diet that leads to changes in behavior.[11] Then we determined the effect of fat rich foods on ADHD, and we got to know that fat rich foods are protective against ADHD among children and it decreases the symptoms of ADHD. Alike results were also found in the studies of Egypt and Australia.[2,9]

Although, this study has highlighted very neglected topic among the children of Rawalpindi, however, this study has some limitations as well. These limitations include study design which was cross-sectional and no genetic analysis of children. Because of the cross-sectional design this study could not explain the temporal association between various groups of diet and ADHD among children. Due to these limitations, further research work is needed to elaborate that how diet could cause impact ADHD severity or development.

CONCLUSION

This study suggests that diet has great impact on hyperactivity, impulsivity, and learning problems among patients with ADHD. Carbohydrate and protein rich diet increases the severity of the ADHD, while fat rich diet does opposite and beneficial for ADHD patients in reducing the intensity of the ADHD. Health authorities

should educate the parents of children with ADHD about the role of diet in the management of the ADHD.

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REFERENCES

1. Howard AL, Robinson M, Smith GJ, Ambrosini GL, Piek JP, Oddy WH. ADHD is associated with a "Western" dietary pattern in adolescents. J Attent Disord. 2011;15(5):403-11.
2. Abd El Baaki OM, Abd El Hamid ER, Zaki ST, Alwakkad AS, Sabry RN, Elsheikh EM. Diet modification impact on ADHD outcome. Bull Nat Res Centre. 2021;45(1):1-8.
3. Zhou F, Wu F, Zou S, Chen Y, Feng C, Fan G. Dietary, nutrient patterns and blood essential elements in Chinese children with ADHD. Nutrients. 2016;8(6):352.
4. Sharma A, Couture J. A review of the pathophysiology, etiology, and treatment of attention-deficit hyperactivity disorder (ADHD). Ann Pharmacother. 2014;48(2):209-25.
5. Simonoff E, Taylor E, Baird G, Bernard S, Chadwick O, Liang H, et al. Randomized controlled double-blind trial of optimal dose methylphenidate in children and adolescents with severe attention deficit hyperactivity disorder and intellectual disability. J Child Psychol Psychiatr. 2013;54(5):527-35.
6. Feldman ME, Charach A, Bélanger SA. ADHD in children and youth: part 2- treatment. Paediatr Child Health. 2018;23(7):462-72.
7. Petra AI, Panagiotidou S, Hatziagelaki E, Stewart JM, Conti P, Theoharides TC. Gut-microbiota-brain axis and its effect on neuropsychiatric disorders with suspected immune dysregulation. Clin Therap. 2015;37(5):984-95.
8. Kim Y, Chang H. Correlation between attention deficit hyperactivity disorder and sugar consumption, quality of diet, and dietary behavior in school children. Nutr Res Pract. 2011;5(3):236-45.
9. Bostock EC, Kirkby KC, Taylor BV. The current status of the ketogenic diet in psychiatry. Front Psychiatr. 2017;8:43.
10. Akaltun I, Tayfun KA, Cayir A, Ayaydin H. Is there a relation between type 1 diabetes mellitus and ADHD and severity of ADHD in children and adolescents? A case-control study. Osmangazi Tıp Dergisi. 2019.
11. Czaja-Bulsa G. Non coeliac gluten sensitivity a new disease with gluten intolerance. Clin Nutr. 2015;34(2):189-94.

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