

Attention Deficit Hyperactivity Disorder (ADHD) in Children Consuming Junk Food

Bakht Rawan¹, Muhammad Tariq Masood Khan¹, Abid Ali¹, Ejaz Ahmed Khan², Shujaat Ali Khan²

¹Northwest School of Medicine, Peshawar, Pakistan, ²Khyber Institute of Medical Sciences, Kohat, Pakistan

Correspondence:

Dr. Bakht Rawan,
Northwest School of Medicine,
Peshawar
Email: drbakhtmrpc@gmail.com
Mob#+92-300-5888867

LMRJ.2020

Doi: 10.38106/LMRJ.2020.2.4-02

Abstract:

Objective: The current study was aimed to determine relationship between junk food consumption and Attention Deficit Hyperactivity Disorder (ADHD) in school going children.

Methods: Standard questionnaires for the diagnosis of ADHD, junk food consumption among children and their mothers during pregnancy and lactation were distributed among children and parents of enrolled students.

Results: Parents of 84 students were contacted, of whom 47 were enrolled into the study. A total of 8 (17.02%) student were found to have ADHD, with a higher frequency in male students. Junk food consumption was found to have an association with ADHD.

Conclusion: ADHD is a common finding in school going children of district Kohat. The frequency is particularly high in male children and is strongly associated junk food consumption.

Key words: Attention Deficit Hyperactivity Disorder, Junk food, District Kohat, Artificial Food Colours

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a neuro-developmental disorder, characterized by impairment in the executive functions of brain that include inattention, hyperactivity and impulsivity.¹ ADHD is diagnosed before the age of six years. In around 60% of the cases the individuals carry ADHD symptoms in their adulthood.² ADHD is a predisposing factor for other psychiatric conditions such as antisocial personality disorder, substance abuse, low educational level and tendency towards criminality.^{3, 4} Several genetic and environmental factors have been implicated in the pathogenicity of ADHD.⁵ It has recently been found that Artificial Food Colors (AFCs) and preservatives have a role in the development of ADHD among children in the general population.⁶ The strength of association between the two is, however, still a subject of debate.⁷ AFCs are frequently used in junk foods. The term junk food was first coined by Michael Jacobson (1972) for certain food categories with little or no nutritional value, or the ones which contain unhealthy ingredients (AFCs, preservatives etc.) as well.⁸

Junk foods also interfere with the neuronal activity of brain and have an addictive potential.⁹ The neuronal pathways affected are seriously interrupted by the in-utero exposure of fetus to junk food which increases the offspring's preference for junk food leading to its overuse of junk food in later life.^{10, 11.} A study conducted on rats reported that the fetal exposure of maternal junk food significantly interrupts the neuronal pathways of the mesolimbic reward center by altering the receptor expression in these specialized areas of brain resulting in increased preference for junk food in the offsprings.⁹ Studies supporting this hypothesis in the humans are lacking. This study elicits the inter-relationship of junk food preference in the children with that of mothers during pregnancy. The study also determines frequency of ADHD among children who prefer junk food.

METHODOLOGY

This school based study was conducted from October 2011 to February 2012 on 150 children (4–7 years old) in three schools, namely the Educators, Beacon House School System, The Islamic Happy land Montessori School System, and the Pakistan Foundation Academy, all located in Kohat city, Khyber Pakhtunkhwa province of Pakistan. The approval was taken from the Institutional Review Board for Bioethics, KMU Institute of Medical Sciences. Letters were sent to the principals of the above mentioned schools explaining the objectives, methodology, and the duration of the study. After approval, a research team visited the schools and distributed the consent forms and self-reporting questionnaires among the class teachers of the study subjects. Another consent form and three different questionnaires were sent to the parents of students from the respective schools.

The questionnaires used in this study was translated bilingually from English to Urdu and then from Urdu to English by three language experts separately, to establish reliability. The questionnaire distributed among the school teachers was the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV) diagnostic criteria for the diagnosis of ADHD. It consisted of 18 items, for the teacher rating of children hyperactivity level. Three different types of questionnaires were distributed among parents. The first questionnaire encompassed the demographic details and a detailed dietary history during their respective pregnancies, specifying the food taken during the first, second and third trimester. The second questionnaire delineated food preferences of the children towards healthy or junk food items. The third questionnaire was the DSM-IV diagnostic criteria for the parental rating of children hyperactivity. The questionnaires were collected after one month of distribution. The hyperactivity scores recorded at the school (by teachers) and at homes (by the parents), were compared for determining the ADHD status. All the children labeled as ADHD or hyperactive but below the threshold of ADHD were examined by the psychiatrist for the confirmation of the hyperactivity. Finally, the hyperactivity level was compared with the food preferences among the children.

RESULTS

Initially, parents of a total of 84 students were contacted of whom only 47 consented and were enrolled into the study. These included 21 female and 26 male students. The mean age of students enrolled was 5.7 years (age range: 4-7 years). It was found that 9 (19.15%) students were mild, 11 (23.40%) were moderate and 27 (57.45%) were excessive junk food users (Figure 1).

A total of 27 students were found to be consuming junk foods; a majority of these were males (Table 1). Among children with mild junk food preferences, only one (11.11%) had ADHD (Figure 1). In the moderate junk food consuming group of children, 2 (18.18%) had ADHD, a male and a female child. Similarly, among excessive junk food consuming students 5 (18.52%) had ADHD. It was found that among the study participants ADHD had a propensity for male gender, The maternal feedback depicting dietary histories in pregnancy and at the time of lactation was very poor; none of the mother could recall dietary history with certainty. This segment of research project was hence left unprocessed. The common coloring agents used in the junk food items found in this study included E122 (Carmoisine), E129 (Allura Red), E133 (Brilliant Blue) and E150.

Figure 1 Activity status among junk food using children. ADHD, Attention Deficit Hyperactivity Disorder

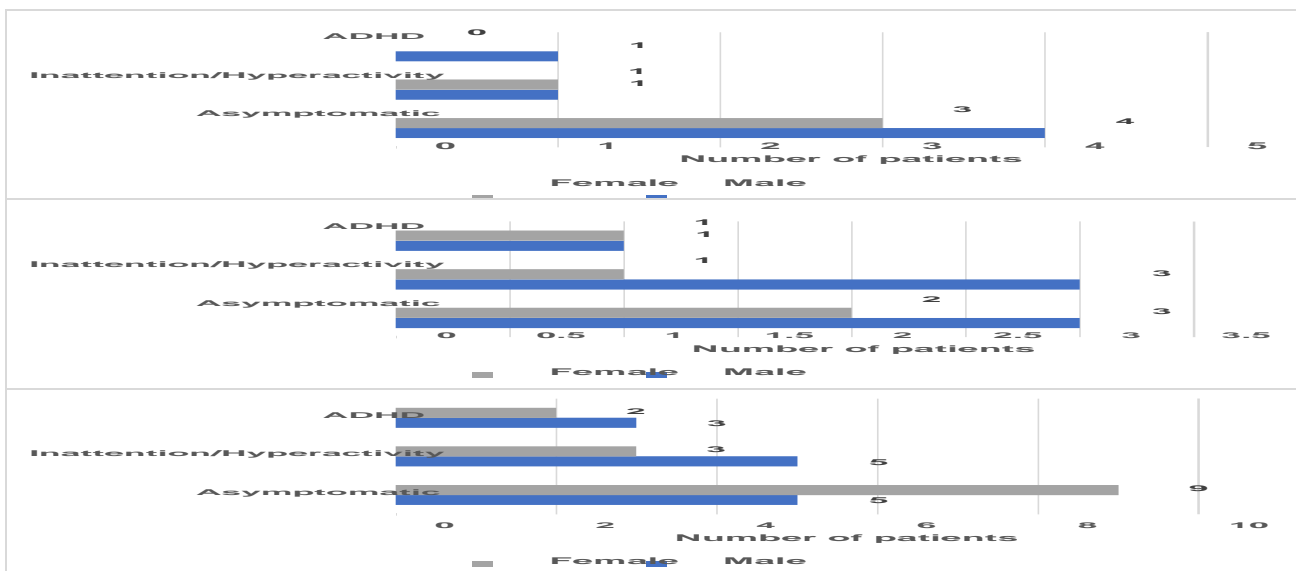


Table 1. Gender wise distribution of study participants in various junk food usage categories

	Junk Food Usage		
	Mild n (%)	Moderate n (%)	Excessive n (%)
Male	6 (12.76)	7 (14.89)	15 (31.94)
Female	4 (10.64)	4 (8.51)	12 (25.54)
Total	9 (19.14)	11 (23.40)	27 (57.44)

n, number of patients

DISCUSSION

In the current study, among 47 students, 8 (17.04%) were found to have ADHD. In a study conducted in the US, the ADHD prevalence rate among school going children was found to be 6.9%¹². In another study from Germany, a prevalence rate of 4.8% was found.¹³ This significant disparity may be attributed to the geographical, cultural, and social differences.

An increased propensity of ADHD for male gender was identified in the current study. Previously studies have also reported similar findings of increased frequency in male children.^{14, 15} It has been found that the decreased frequency among female children is mainly due to the relatively vague expression of the disorder.¹⁶ Another contributing factor is the frequent occurrence of co-morbid psychiatric conditions in female children which may have a masking effect on ADHD.¹⁷

The study was delimited by small sample size. Initially parents of 84 students were contacted, however, most of them (n = 37) denied to participate in the study. This higher frequency of denial may relate to the native cultural dilemma of strict traditional practices which prevents females from disclosing whereabouts of their pregnancies and lactation period. Among those who consented, recall bias compromised the data generated. The segment of study encompassing dietary details among mothers at the time of pregnancy and lactation was hence omitted. It is, however, strongly suggested that a prospective study addressing these limitations be carried out in larger set of students. It is also suggested that comprehensive questionnaires, encompassing the dietary histories in detail, discerning the quality, quantity and timing of meals be prepared while carrying out such studies. In addition, we could not correlate the ingredients in junk foods with the psychiatric clinical outcome. We suggest studies elucidating the relationship of these agents with level of hyperactivity in students.

CONCLUSION

ADHD is a common psychiatric disorder among school going children of district Kohat. Males are affected more frequently by the disease as compared to females. ADHD is strongly correlated with junk food consumption. Abstinance of children from such food items is therefore warranted.

ACKNOWLEDGMENT

We acknowledge the help and support provided by Saddique Aslam, Ejaz Ahmed Khan, Siddique Akbar and Muhammad Asif of KIMS Kohat.

REFERENCES

1. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Diseases (DSMIV). 4th ed. Washington DC: American Psychiatric Publishing; 1994.
2. Valdizan JR, Izaguerri-Gracia AC. [Attention deficit hyperactivity disorder in adults]. Rev Neurol 2009; 48 Suppl 2:S95-9.
3. Wilens TE. Attention- Deficit/Hyperactivity Disorder in Adults. JAMA 2004; 292:619.
4. Patterns of psychiatric comorbidity, cognition, and psychosocial functioning in adults with attention deficit hyperactivity disorder. American Journal of Psychiatry 1993; 150:1792-8.
5. What causes ADHD?: understanding what goes wrong and why. Choice Reviews Online 2006; 44:44-1816-44

6. McCann D, Barrett A, Cooper A, Crumpler D, Dalen L, Grimshaw K, et al. Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial. *The Lancet* 2007; 370:1560-7.
7. Diet and attention deficit hyperactivity disorder. *Harvard Mental Health Letter*. [cited 2011 June 11].
8. Naeem Z. Increasing trend of Junk food use in Saudi Arabia and health implications. *International Journal of Health Sciences* 2012; 6:V-VI.
9. Johnson PM, Kenny PJ. Dopamine D2 receptors in addiction-like reward dysfunction and compulsive eating in obese rats. *Nat Neurosci* 2010; 13:635-41.
10. Bayol SA, Farrington SJ, Stickland NC. A maternal 'junk food' diet in pregnancy and lactation promotes an exacerbated taste for 'junk food' and a greater propensity for obesity in rat offspring. *British Journal of Nutrition* 2007; 98.
11. Ong ZY, Muhlhausler BS. Maternal "junk-food" feeding of rat dams alters food choices and development of the mesolimbic reward pathway in the offspring. *The FASEB Journal* 2011; 25:2167-79.
12. Brown RT, Freeman WS, Perrin JM, Stein MT, Amler RW, Feldman HM, et al. Prevalence and assessment of attention-deficit/hyperactivity disorder in primary care settings. *Pediatrics* 2001; 107:E43.
13. Schlack R, Holling H, Kurth BM, Huss M. [The prevalence of attention-deficit/hyperactivity disorder (ADHD) among children and adolescents in Germany. Initial results from the German Health Interview and Examination Survey for Children and Adolescents (KiGGS)]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2007; 50:827-35.
14. Meysamie A, Fard MD, Mohammadi MR. Prevalence of Attention-Deficit/Hyperactivity Disorder Symptoms in Preschool-aged Iranian Children. *Iranian Journal of Pediatrics* 2011; 21:467-72.
15. Rucklidge JJ. Gender differences in attention-deficit/hyperactivity disorder. *Psychiatr Clin North Am* 2010; 33:357-73.
16. Skogli EW, Teicher MH, Andersen PN, Hovik KT, Øie M. ADHD in girls and boys – gender differences in co-existing symptoms and executive function measures. *BMC Psychiatry* 2013; 13:298
17. Quinn PO. Attention-deficit/hyperactivity disorder and its comorbidities in women and girls: an evolving picture. *Curr Psychiatry Rep* 2008; 10:419-23.