Eating Behaviour in Children with Attention-Deficit Hyperactivity Disorder and its Comparison with Normally Developing Children

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Abstract :
Objective: To study eating behaviour in patients with ADHD, To compare the eating behaviour of children with ADHD with typically developing children, To compare the eating behaviour among ADHD subtypes. **Material & Methods**: This case-control study was conducted with 30 children with ADHD in the case group and 30 typically developing children as the control group. Children were then assessed for eating behaviour patterns using the Child Eating Behaviour Questionnaire (CEBQ). **Results:** Participants in the case study group showed a statistically significant difference in enjoyment of food and food responsiveness sub-scales of CEBQ as compared to participants in the control group. **Conclusion:** Our findings suggested that emotional undereating was more prevalent in the combined subtype, and emotional overeating behaviour was positively associated with ADHD severity

Keywords: ADHD, eating behaviour, children, CEBQ

Introduction:

Attention deficit hyperactivity disorder (ADHD) is the most prevalent neurodevelopmental disorder, characterized by deficient attention, hyperactivity, and impulsivity. Children with ADHD face difficulties because of inadequate attention and problem-solving, easy distractibility, difficulty in sustaining attention, poor impulse control, and reduced self-inhibitory capacity[1]. Motor over-activity and motor restlessness can lead to academic underachievement, problems with interpersonal and interactive relationships with family members and peers, and low self-esteem[2].

Attention deficit hyperactivity disorder (ADHD) puts children at higher obesity risk, possibly due to abnormal functioning of the dopamine pathway that leads to decreased physical activity and increased sedentary lifestyle.[3] This makes them prone to have common respiratory, gastrointestinal, dermatological, and neurological conditions/symptoms.[4]

The findings of the study by Gorgu and Aykutlu et al. provided a piece of evidence that children who are newly diagnosed with ADHD could have impaired eating behaviors, high rates of obesity, and be overweight.[5,6]Emotional eating subsets of eating behaviour showed a significant difference when compared to others between children with ADHD and underweight healthy children. Fast eating behaviour, low eating at the time of fatigue, and activity rate in children with ADHD.[7] The evidence that children with ADHD can have abnormal eating behaviors is mainly from the Western European subcontinent, and to the best of our knowledge, not much work has been done in this area in the Indian subcontinent. Also, the relation of type and severity of ADHD to eating behavior remains unexplored. Keeping this in mind, this study was planned.

Material & Methods:

This case-control study was conducted with a total of 30 children aged 6 to 11 years diagnosed with ADHD as per DSM-5 criteria, who constituted the case group. Only drug-naïve children were included in the case group. Thirty typically developing children, matched for age, gender, and family income, constituted the control group. Children with cerebral palsy, physical handicap, intellectual disability, chronic physical illness, and those with prescribed dietary control were excluded from the study.

Assent from children and consent from parents were duly taken, and it was ensured that participating parent(s) was not actively suffering from any mental illness at the time of the interview.

The study was conducted after getting ethical clearance from the institution's Biomedical Research Ethics Committee. The approval was taken on 01-04-2021.

Tools:

Apart from various socio-demographic and clinical details of each participant , the following three scales were applied.

Vanderbilt ADHD Parent Rating Scale (VADPRS)[8] to assess the disruptive problems associated with ADHD. It comprises 47 items covering all the 18 criteria for ADHD, which are rated on a 4-point scale with responses as never, occasionally, often, and very often. The VADPRS has two components: symptom assessment and impairment of performance at home, in school, and in social settings.

Conner's Parent 10-item abbreviated index[9] is an abbreviated version of the Conner's Parent Rating Scale (CPRS). Parents rate their child's symptoms from zero to 3 (0= not at all present, 1=just a little present, 2=pretty much present, 3=very much present), which yields a range of possible total scores between 0 and 30.

Child Eating Behavior Questionnaire (CEBQ)[10] is a 35-item parent-reported tool for assessment of eight dimensions of eating style in children. These include food-

approaching behaviors (responsiveness to food, enjoyment of food, emotional overeating, and desire for drinks) and food-avoiding behaviors (slowness in eating, food fussiness, emotional under-eating, and satiety responsiveness). Subjects need to respond to each item of the scale on a 5-point Likert scale from 1 to 5 (1=never, 2=rarely, 3=sometimes, 4=often, 5 = always).

Statistical Analysis:

The data was analysed using SPSS v23 (IBM corp). The statistical significance of different tests was calculated at $p<0.05$.

Data was analysed using paired t-test and ANOVA/Friedman test for the comparison of continuous variables. Wilcoxon Signed Rank test was used for non-parametric data.

Results:

Table 1 shows the comparison of the sociodemographic profile of the investigated population, which consisted of 60 children (30 children with ADHD and 30 healthy children).

Table 2 shows the prevalence rate of eating behaviors in two children's groups. Table 3 shows the comparison of CEBQ subscale scores of the two groups. Table 4 shows the comparison of CEBQ scores in ADHD subtypes. The findings of our study showed that as the severity of ADHD increased (Conner's score), emotional overeating also increased (child's eating behaviour questionnaire). Pearson correlation (value of 0.32).

Table 1:Socio-demographic profile :

Parameters	Groups		P value
	Case	Control	
Age (in years)	8.17+_2.21	8.16+/-2.17	0.870
Gender			0.00
Male	25 (83.3%)	25 (83.3%)	
Female	5 (16.7%)	5 (16.7%)	
Birth order			0.224
1st	22 (73.3%)	15 (50.0%)	
2nd	6 (20.0%)	10 (33.3%)	
3rd	2 (6.7%)	3 (10.0%)	
4th	0 (0.0%)	2 (6.7%)	
Adopted (yes)	2 (6.7%)	0 (0.0%)	0.492

Locality			1.000
Rural	15 (50.0%)	15 (50.0%)	
SubUrban	1 (3.3%)	1 (3.3%)	
Urban	14 (46.7%)	14 (46.7%)	
Family structure			0.513
Nuclear	14 (46.7%)	16 (53.3%)	
Joint	12 (40.0%)	8 (26.7%)	
Extended	4 (13.3%)	6 (20.0%)	
Age of father (in years)	33.00+/-9.68	36.03+\-5.77	0.484
Age of mother (in years)	31.97+/-6.04	32+\-5.43	0.381

Table 2. Comparison of the prevalence of eating behavior in the two study groups

CEBQ	GROUPS	n	Frequency	Percentage	Chi-Squared Test	
					χ^2	p-value
Enjoyment of Food	Case	30	25	83.3%	4.022	**0.045**
	Control	30	18	60.0%		
Emotional Overacting	Case	30	7	23.3%	3.268	0.145
	Control	30	2	6.7%		
Satiety Responsiveness	Case	30	23	76.7%	0.089	0.766
	Control	30	22	73.3%		
Slowness In Eating	Case	30	18	60.0%	0.069	0.793
	Control	30	17	56.7%		

Desire To Drink	Case	30	13	43.3%	2.411	0.121
	Control	30	19	63.3%		
Food Fussiness	Case	30	27	90.0%	0.218	1.00
	Control	30	28	93.3%		
EMOTIONAL UNDER-EATING	Case	30	22	73.3%	2.783	0.095
	Control	30	27	90.0%		
FOOD RESPONSIVENESS	Case	30	21	70.0%	4.344	**0.037**
	Control	30	13	43.3%		

Table 3. Comparison of CEBQ sub-scale scores in the two study groups

CEBQ	**Group (Mean ±SD)**		**Wilcoxon-Mann-Whitney U Test**	
	ADHD	Control	W	P
Enjoyment of food	14.60 ± 4.67	12.37 ± 5.02	537.000	0.069
Emotional overeating	8.23 ± 2.58	7.03 ± 2.01	580.000	0.053
Satiety responsiveness	15.97 ± 3.78	16.00 ± 4.30	-0.032	0.975
Slowness in eating	10.47 ± 2.49	10.77 ± 2.94	444.000	0.934
Desire to drink	8.63 ± 3.62	9.90 ± 3.68	377.000	0.280
Food fussiness	18.47 ± 3.33	18.20 ± 2.40	486.000	0.595

Emotional under-eating	11.93±3.55	14.10±3.97	-2.228	**0.030**
Food responsiveness	17.13±6.89	13.60±6.85	578.500	0.057

Table 4. Comparison of CEBQ in ADHD subtypes.

CEBQ		Yes	No	Total	P value
Enjoyment of food	Combined	20	4	24	0.403
	Inattentive	4	0	4	
	Hyperactive	1	1	2	
	Total	25	5	30	
Emotional overeating	Combined	7	17	24	0.736
	Inattentive	0	2	2	
	Hyperactive	0	4	4	
	Total	7	23	30	
Satiety responsiveness	Combined	18	6	24	1.000
	Inattentive	2	0	2	
	Hyperactive	3	1	4	
	Total	23	7	30	
Slowness in eating	Combined	13	11	24	0.501
	Inattentive	2	0	2	
	Hyperactive	3	1	4	
	Total	18	12	30	
Desire to drink	Combined	10	14	24	0.334
	Inattentive	2	0	2	
	Hyperactive	1	3	4	
	Total	13	17	30	

Food fussiness	Combined	22	2	24	0.501
	Inattentive	2	0	2	
	Hyperactive	3	1	4	
	Total	27	3	30	
Emotional under-eating	Combined	20	4	24	**0.029**
	Inattentive	1	1	2	
	Hyperactive	1	3	4	
	Total	22	8	30	
Food responsiveness	Combined	17	7	24	0.601
	Inattentive	2	0	2	
	Hyperactive	2	2	4	
	Total	21	9	30	

Discussion:

This case-control study was conducted to investigate the eating behavior in children with ADHD and to compare this with thatof children without ADHD.

It is difficult for highly impulsive children to resist food intake because of the varied colour, form, taste, and texture, which would result in higher energy intake and obesity.[11] Influence of ADHD on physical activity, metabolism, and eating habits can lead to impairment of balance between energy intake and expenditure.[12] Lack of attention and poor planning can be associated with a lack of awareness of food intake, resulting in irregular eating patterns and non-adherence to dietary regimens.[13] Motor overactivity in ADHD is modulated by situations and engagement in less physical activities[14] for example, children with ADHD have increased screen time.[15]

In our study the prevalence of various eating behaviours including being interested in eating food, polyphagia, love to eat, interested in snack (enjoyment of food) and urge to eat in response to external cues, like sight or smell of food (food responsiveness) is more in children with ADHD than children without ADHD. There was a significant relationship between the prevalence of these behaviour in children with ADHD and children without ADHD (P=0.04,0.03). When various subtypes of ADHD were compared on total CEBQ scores, there was no significant correlation; however, on sub-scale of emotional under-eating, three subtypes showed statistically significant difference i.e 83.3% children with combined subtype had emotional under eating(p=0.029).

Further we also noticed that combined subtype of ADHD is associated with higher severity of symptoms (as evident from Conner's score) followed by hyperactive subtype and then inattentive subtype. These findings are also supported by a study conducted in India.[16]

When scrutinised for any relationship between various eating behaviours and severity of ADHD, we did not find any statistically significant relationship between these two, except for positive correlation between severity of ADHD and emotional overeating subscale of CEBQ. Study by Leventakou et al also found a positive correlation between severity of ADHD and food responsiveness and emotional overeating sub-scales of CEBQ.[17] Tong et al also found positive correlation between the severity of ADHD and emotional overeating, emotional under-eating.[18]Aykutlu et al reported a positive correlation between severity of ADHD and food responsiveness, emotional overeating and desire to drink.[6] Though it is one of its own type study in this part of country, there are certain limitations like : the small sample size, cross sectional design devoiding us of the knowledge about how eating behaviours change over time in the same individual and in relation to treatment. Also, as this study was hospital-based study so the findings cannot be generalised to the community. The confounding factors such as parent's economic and educational level, parental feeding practices, home environment can easily influence the study variables and should have been controlled.

Conclusion:

To the best of our knowledge, this is probably the first study in India comparing eating behaviour in children with and without ADHD. Eating behaviours such as emotional overeating was positively associated with ADHD severity. However, community based longitudinal, prospective studies with larger samples can give us insight into change in level of eating behaviour after treatment of children with ADHD.

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Conflict of Interest:

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

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Ethical approval and informed consent statements:

Ethical approval was obtained from the Institute's ethical committee, and written informed consent was obtained from patients

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