

Eating Behaviors and Quality of Life in Adolescents with Attention Deficit Hyperactivity Disorder

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ABSTRACT

Aim: The aim of this study is to investigate eating behaviour and quality of life in adolescents with Attention Deficit Hyperactivity Disorder (ADHD).

Material and Methods: One hundred adolescents diagnosed with ADHD and age-gender matched 100 healthy adolescents were included in this study. Clinical interview was conducted by “Schedule for Affective Disorders and Schizophrenia for School-Aged Children (K-SADS)” and Dutch Eating Behavior Questionnaire (DEBQ), Pediatric Quality of Life Scale (PedsQL) self and parent reports, Conners Parent Rating Scale (CPRS).

Results: In ADHD group compared to control group, all subscales were found to be significantly lower in PedsQL self-report and parent-reports ($p<0.05$), while emotional and external eating subscale scores were found to be statistically significantly higher ($p=0.006$, $p=0.001$, respectively). In the ADHD group, positive significant correlations were found between emotional eating subscale scores and CPRS inattention ($p=0.038$), hyperactivity ($p=0.001$), and oppositional behaviour ($p=0.002$), and also between the external eating subscale and hyperactivity score ($p=0.024$). Regarding self reports of quality of life, significant negative correlations were found between emotional eating subscale score and both emotional functionality ($p=0.05$) and psychosocial health total score ($p=0.036$). In PedsQL parent reporting, a significant negative correlation was found only between psychosocial health total score ($p=0.034$) and emotional eating subscale score.

Conclusion: The results of our study indicate the importance of evaluating eating behaviours and quality of life in follow up and treatment of ADHD in terms of preventive strategies for mental health.

Keywords: ADHD; emotional eating; external eating; quality of life.

Dikkat Eksikliği Hiperaktivite Bozukluğu Olan Ergenlerde Yeme Davranışı ve Yaşam Kalitesinin İncelenmesi

ÖZ

Amaç: Çalışmamızın amacı, Dikkat Eksikliği Hiperaktivite Bozukluğu (DEHB) olan ergenlerde yeme davranışı ve yaşam kalitesini araştırmaktır.

Gereç ve Yöntemler: Çalışmaya DEHB tanısı alan 100 ergen olgu ve yaş, cinsiyet açısından olgu grubu ile eşleştirilmiş 100 sağlıklı ergen dahil edilmiştir. “Okul Çağı Çocukları için Duygulanım Bozuklukları ve Şizofreni Görüşme Çizelgesi” (ÇDŞG) kullanılarak klinik görüşmeler yapılmış, Hollanda Yeme Davranışı Anketi (HYDA), Çocuklar İçin Yaşam Kalitesi Ölçeği (ÇİYKÖ) öz bildirim ve ebeveyn bildirimleri, Conners Anne-Baba Derecelendirme Ölçeği (CADÖ) uygulanmıştır.

Bulgular: DEHB grubunda kontrol grubuna göre, ÇİYKÖ öz bildirim ve anne-baba bildirimlerinde tüm ölçek puanlarında DEHB grubunda anlamlı düşük ($p<0,05$), duygusal ve dışsal yeme alt ölçek puanları istatistiksel olarak anlamlı yüksek tespit edilmiştir (sırasıyla, $p=0,006$, $p=0,001$). DEHB grubunda duygusal yeme puanları ile CADÖ dikkat eksikliği ($p=0,038$), hiperaktivite ($p=0,001$), karşıt olma karşı gelme ($p=0,002$) alt ölçek puanları arasında ve dışsal yeme puanı ile hiperaktivite puanı arasında pozitif anlamlı korelasyonlar bulunmuştur ($p=0,024$). ÇİYKÖ öz bildirim puanlarından duygusal işlevsellik ($p=0,05$), psikososyal sağlık toplam puanı ($p=0,036$) ile duygusal yeme alt

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ölçek puanı arasında anlamlı negatif korelasyon bulunmuştur. ÇİYKÖ yaşam kalitesi anne baba bildirimlerinde ise sadece psikososyal sağlık toplam puanı ($p=0,034$) ile duygusal yeme alt ölçek puanı arasında anlamlı negatif korelasyon bulunmuştur.

Sonuç: Çalışmamızın sonuçları DEHB takip ve tedavisinde, DEHB belirtileri ile birlikte yeme tutumlarının ve yaşam kalitesinin de değerlendirmesinin koruyucu ruh sağlığı kapsamında önem taşıdığına işaret etmektedir.

Anahtar Kelimeler: DEHB; duygusal yeme; dışsal yeme; yaşam kalitesi.

INTRODUCTION

Attention Deficit and Hyperactivity Disorder (ADHD) is a disorder characterized by symptoms of inattention, hyperactivity, and / or impulsivity that are not age-appropriate (1). ADHD has high rate of comorbidity with other various psychiatric diseases. Both comorbid conditions and basic symptoms of ADHD may result in non-adaptive behaviours. Impaired eating pattern can also be found among non-adaptive behaviours, and ADHD may also present comorbid with eating disorders (2).

It has been suggested that three types of eating behaviors, emotional eating, external eating and restrictive eating, might be responsible for weight gain. Restrictive eating refers to avoidant eating (3). Emotional eating is thought to be an eating behavior that occurs in response to negative emotions (4). It has been found that emotional eating and binge eating attacks may be related to Binge Eating Disorder (BED) that eating as a result of negative affect (5). Extrinsic eating defines an increase in eating behaviors in response to the taste, smell and appearance of foods without feeling hunger (6). From a neurocognitive perspective, individuals with exogenous eating behaviors have increased sensitivity to nutrient-reward cues. They have a cognitive bias towards food cues and difficulty in regulating cognitive functions. Extrinsic eating is also thought to be an impulsive response to an external stimuli (7). Studies have found a significant positive correlation between extrinsic eating and impulsivity (8).

The term "impaired eating behavior" is often used when eating pattern does not fully meet the criteria for eating disorders. However, this eating style is often associated with psychopathology, and it is thought that it may turn into an eating disorder later (9). There are studies on the relationship of ADHD with impaired eating behavior. When the studies with individuals are evaluated who diagnosed with ADHD between the ages of 12-21, a relationship was found between ADHD and eating disorder or impaired eating behavior in 5 of 8 studies. It has been found that there is a significant relationship between hyperactivity, hyperactivity / impulsivity, hyperactivity / inattention and "binge eating" (10). In another study, the authors suggested that inattention rather than hyperactivity or impulsivity might explain the symptoms of "Bulimia Nervosa" (BN) (11). It was also found that bulimic behaviors observed in adolescents are associated with ADHD. In adolescents with ADHD diagnosis and anxiety/depressive symptoms, only ADHD was found to be associated with bulimia symptoms, independent of comorbidity (12).

Health-related quality of life is defined as an individual's subjective perception of health status on physical, psychological and social functions (13). ADHD is one of the most common psychiatric disorders in childhood that may impair an individual's cognitive, emotional, social and academic performance. ADHD is often accompanied by comorbid psychiatric diseases, and academic failure, difficulty in family and peer relationships (14). In a systematic review published in 2010, it was found that ADHD has negative effects on children's quality of life (15). One another systematic review study which published in 2016, it was found that Anorexia Nervosa (AN), BN and BED decrease the quality of life, and there is a significant relationship between the symptom severity of eating disorders and quality of life (16).

The aim of this study is to examine eating behavior and quality of life in adolescents with ADHD in comparison with the healthy control group, to evaluate the relationship between ADHD symptoms and eating behavior, as well as the relationship between eating behavior and different sub-domains of quality of life. The hypotheses of our study can be count as quality of life is adversely affected in patients with ADHD compared to healthy control groups, eating behavior is impaired in patients with ADHD compared to healthy control groups, and there may be a correlation between quality of life scales and eating behavior subscales in ADHD group.

MATERIAL AND METHODS

To determine the sample size, based on a similar study in the literature, the total mean value of the PedsQL in the case group was assumed to be 71.52 ± 12.12 and 78.30 ± 13.34 in the control group (17). Accordingly, the minimum sample size was calculated as 114 with 95% confidence level and 80% power. Simple random sampling method was used in sample selection. Adolescent patients aged 13-18 years old who diagnosed with Attention Deficit and Hyperactivity Disorder and 100 healthy adolescents without any psychopathology were included in this study that conducted in Düzce University Medical Faculty Child and Adolescent Psychiatry outpatient clinic. Clinical diagnoses were established according to DSM-5 diagnostic criteria and Schedule for Affective Disorders and Schizophrenia for School Aged Children, Present and Lifetime Version (KSADS-PL). Exclusion criteria in the case group were: chronic medical illness, diagnosis of comorbid psychiatric disorders other than oppositional defiant disorder (ODD), presence of life events that may affect quality of life, having received treatment for Attention Deficit and Hyperactivity Disorder in the last 1 year, having symptoms that suggest mental disability clinically, failure to complete the required assessments. The exclusion criteria in the control group were having any psychiatric disorder, any chronic medical illness, history of any life event that may affect quality of life, clinical symptoms suggestive of mental disability and not completing the necessary evaluations. Information about the study was explained and written consent was obtained. This study was performed in accordance with the ethical standards of Helsinki Declaration. Ethics committee approval was obtained from Düzce University

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Measures

Kiddie Schedule for Affective Disorders and Schizophrenia for School Aged Children, Present and Lifetime Version, KSADS-PL: It is a semi-structured psychiatric illness screening interview with the child and parents completed by the clinician (18). The Turkish validity and reliability study was conducted by Gökler et al. (19).

Conners Parent Rating Scale (CPRS): The Turkish validity and reliability study of the short form which developed by Conners et al. (20) was conducted by Kaner et al (21). There are 4 different subscale scores are calculated as: "Inattention/cognitive problems ", "hyperactivity subscale", "oppositional behaviour", "ADHD Index".

Dutch Eating Behavior Questionnaire (DEBQ): It was developed in 1986 by Van Strien et al. (22) and the Turkish validity and reliability study of the questionnaire consisting of 33 items was conducted by Bozan in 2009 (23). The questionnaire consists of 3 subscales that evaluate emotional eating, external eating and restrictive eating behaviors. The items in the questionnaire are evaluated with a 5-point Likert scale (1: never, 2: rarely, 3: sometimes, 4: often, 5: very often). The total score of the test is not evaluated, but 3 subscales are evaluated within themselves. While there is no cut-off point in the scoring of the test, the high total score of the 3 sub-scores evaluated with the Likert scale which indicates the negativity about eating attitude.

Quality of Life Scale for Children (PedsQL): This scale was developed by Varni et al. (24) in 1999, whose validity and reliability was shown in the adolescent age group in 2007 by Memik et al. (25). There are two types for self and parent reporting. It consists of 23 items that examine physical and psychosocial (emotional, social and school) functionality. Three different scores are calculated as: "Scale Total Score", "Physical Health Total Score" and "Psychosocial Health Total Score", which consists of calculating item scores that evaluate emotional, social and school functionality. The higher the total score, the higher the quality of life.

Statistical Analysis

Descriptive statistics of the obtained data were calculated as mean \pm standard deviations (SD), median, interquartile range, number and% frequencies. The compliance of numerical data to the normal distribution was examined by Kolmogorov-Smirnov test separately in two groups. It was determined that the numerical type data did not conform to the normal distribution, and the Mann-Whitney U test or Kruskal-Wallis test was used to compare the mean values. Relationships between numerical type data were analyzed by Spearman Rank correlation analysis. $P < 0.05$ was taken as the statistical significance level and the SPSS (ver. 22) program was used in calculations.

RESULTS

The median age of the adolescents in the ADHD group participating in the study was 14.06 (IQR: 2.76), and 14.11 for the control group (IQR: 2.45). The median value of Body Mass Index in ADHD group was 21.16

(IQR: 4.32), and there was no statistically significant difference between the groups in terms of age ($p = 0.270$) and BMI ($p=0.121$). No significant difference was found between the groups in terms of sociodemographic characteristics ($p > 0.05$) (Table 1).

Table 1. Comparison of the socio-demographic characteristics of the groups

		Control		ADHD		P
		n	%	n	%	
Sex	Male	64	64	69	69	0.454
	Female	36	36	31	31	
Family structure	Nuclear family	75	75	71	71	0.150
	Extended family	23	23	21	21	
	Divorced	2	2	8	8	
Maternal education	Primary school	59	59	63	63	0.323
	Highschool	25	25	28	28	
	University	16	16	9	9	
Paternal education	Primary school	49	49	55	55	0.110
	Highschool	29	29	34	34	
	University	22	22	11	11	
Income	Less than 1500 TL	4	4	11	11	0.129
	1500-5000 TL	63	63	63	63	
	More than 5000 TL	33	33	26	26	
Type of birth	Vaginal delivery	54	54	47	47	0.322
	Cesarean delivery	46	46	53	53	
Timing of birth	Term (38-41 week)	92	92	85	85	0.121
	Premature (less than 37 week)	8	8	15	15	
Disease in pregnancy	No	96	96	93	93	0.352
	Yes	4	4	7	7	
History of psychiatric disease	No	97	97	92	92	0.121
	Yes	3	3	8	8	

When the emotional and external eating subscale scores were compared between the groups, a statistically significant difference was found between the groups for both eating behaviors ($p=0.006$, $p=0.001$, respectively) (Table 2).

Table 2. Comparison of restrictive, emotional and external eating scores between ADHD and control groups

	Control			ADHD			P
	N	Median	IQR	N	Median	IQR	
Restrictive eating	100	18	10	100	18	11	0.325
Emotional eating	100	19	11	100	22.5	13.75	0.006
External eating	100	25	8	100	31	12	0.001

Mann-Whitney U test IQR:Interquartile Range

When the restrictive eating subscale scores were compared between the groups, no significant difference was found. ($p>0.05$) (Table 2).

Positive significant correlation between emotional eating scores in the ADHD group and attention deficit ($r=0.207$, $p=0.038$) (Table 3), hyperactivity ($r=0.344$, $p=0.001$) (Table 3), oppositional behaviour ($r=0.302$, $p=0.002$) (Table 3) subscale scores of CPRS was determined. A positive significant correlation was also found between extrinsic eating score and the hyperactivity score ($r=0.266$, $p=0.024$) (Table 3).

Table 3. Correlations between CPRS subscale scores and eating subscale scores in ADHD group

CPRS	Restrictive eating		Emotional eating		External eating	
	r	P	r	P	r	P
Inattention	-0.162	0.108	0.207	0.038	0.141	0.162
Hyperactivity	0.086	0.394	0.344	0.001	0.226	0.024
Oppositional	0.154	0.126	0.302	0.002	0.148	0.141

Spearman's correlation, r: Spearman's correlation coefficient

In ADHD group compared to control group, all subscales were found to be significantly lower in PedsQL self-report and parent-reports ($p<0.05$) (Table 4).

A significant negative correlation was found between emotional eating and emotional functioning ($r=-0.195$, $p=0.05$) (Table 5), psychosocial health total score ($r=-0.21$, $p=0.036$) (Table 5) of the PedsQL self-report scales. As the eating subscale score increased, a decrease was observed in the quality of life. When relationships between DEBQ subscale eating scores and quality of life parent form scores were examined, a significant negative correlation was found between psychosocial health and emotional eating ($r=-0.213$, $p=0.034$) (Table 5).

DISCUSSION

In our study, we investigated whether eating behaviors and quality of life of adolescents diagnosed with ADHD differ from their healthy peers, and examined the relationship between emotional, extrinsic, restrictive eating behaviors and quality of life in ADHD group. To the best of our knowledge, our study is first to examine the relationship between eating behavior and quality of life in adolescents with ADHD.

In our study, eating subscale scores (restrictive, emotional, and extrinsic) of ADHD and control groups were compared. While emotional and external eating subscale scores were found higher in the ADHD group, no significant difference was found in terms of restrictive eating subscale scores between ADHD and the control groups.

Consistent with our study, a study using the Dutch Eating Behavior Questionnaire in adult patients showed that there is a relationship between ADHD and emotional eating, binge eating behaviors (26). In another study conducted with children, a significant positive relationship was found between ADHD and emotional eating and BN (27). In a study conducted with young people aged 18-28 in 2013, it was found that there is a significant relationship between ADHD and binge eating and / or purging behavior and no significant relationship

was observed with regard to restrictive eating (28). These results are in accordance with the results of our study.

It is thought that impulsivity predicts binge eating (11). In our study, a statistically significant difference was found between ADHD and control groups in terms of emotional eating subscales. Consistent with our study, a study reported that there is a significant relationship between ADHD and emotional eating (29).

Emotion regulation problems in ADHD make it difficult to recognize and regulate emotions and to give appropriate emotional responses to various situations. In our study, it was thought that emotional eating attitudes emerging in individuals with ADHD compared to the healthy population were related to the person's use of inappropriate coping strategies, especially against negative emotions (30).

In our study, external eating scale scores among the groups were found to be significantly higher in the ADHD group. Children with ADHD have more impulse control problems and loss of eating control than children without ADHD (31). Impulsivity plays a role in the onset and maintenance of binge eating and obesity (32). Similar to our study, Davis et al.'s study published in 2006 found a significant relationship between ADHD symptoms and external eating and binge eating (26).

Higher impulsivity and difficulties in self-regulation skills in individuals with ADHD may lead to external eating behavior or binge eating (33). Abnormal functioning in corticostriatal pathways in ADHD leads to poor impulse control, and abnormalities in reward pathways associated with nucleus accumbens lead to impairments in reward processing (34). It has been suggested that insufficient dopaminergic activity in the brain reward center leads to glucose craving and impaired eating occurs to compensate for the lack of pleasure that results from low dopamine levels (35).

In our study, a positive significant correlation was found between emotional eating and symptoms of hyperactivity, inattention, oppositional behaviour. A positive significant correlation was found between external eating and hyperactivity symptoms. In addition, significant relationships were found between the inattention subscale and emotional eating, and between hyperactivity and external eating subscale scores. In previous studies consistent with our study, a relationship was found between ADHD symptoms and emotional and external eating (26,36).

In a study comparing eating behaviors of children aged 7-9 with ADHD and healthy children it has been found that children with ADHD have significantly higher scores in emotional eating subscale (36). In another study conducted in preschool children with ADHD, it has been suggested that emotional eating behavior is related to the severity of ADHD symptoms (37).

In this study, total score of PedsQL and all subscale scores in both self report and parent report forms were found to be significantly lower in the ADHD group. Consistent with our study, Pongwilairat et al. compared the quality of life of 46 children with ADHD and 94 healthy children using the Children's Quality of Life Scale, and found a statistically significant decrease in total scores of physical health and psychosocial health in both the self and the parent reportings (38).

Table 4. Comparison of PedsQoL scores between ADHD and control groups

PedsQL self report	Control			ADHD			P
	N	Median	IQR	N	Median	IQR	
Physical functioning	100	84.38	25	100	78.13	26.56	0.010
Emotional functioning	100	75	30	100	65	33.75	0.001
Social functioning	100	97.5	10	100	90	30	0.002
School functioning	100	80	30	100	50	30	0.001
Psychosocial Functioning	100	83.33	20	100	66.67	21.25	0.001
Total	100	80.98	19.56	100	69.57	20.38	0.001
PedsQL parent report							
Physical functioning	100	89.06	31.25	100	68.75	37.5	0.001
Emotional functioning	100	85	20	100	65	30	0.001
Social functioning	100	95	15	100	75	40	0.001
School functioning	100	90	10	100	50	25	0.001
Psychosocial Functioning	100	85.83	14.59	100	62.5	23.33	0.001
Total	100	87.45	23.85	100	64.11	25.83	0.001

Mann-Whitney U test, PedsQL: Pediatric Quality of Life Scale, IQR: Interquartile Range

Table 5. Correlations between PedsQL scores and eating scores in the ADHD group

PedQoL self report	Restrictive eating		Emotional eating		External eating	
	r	P	r	P	r	P
Physical functioning	0.06	0,553	-0.094	0.354	0.028	0.781
Emotional functioning	-0.026	0,799	-0.195	0.05	-0.144	0.154
Social functioning	-0.049	0,629	-0.184	0.067	-0.044	0.664
School functioning	0.051	0,611	-0.119	0.237	-0.108	0.283
Psychosocial Functioning	0.013	0,898	-0.21	0.036	-0.107	0.291
Total	0.034	0,741	-0.188	0.061	-0.06	0.554
PedQoL parent report						
Physical functioning	-0.102	0,311	-0.039	0.702	0.102	0.313
Emotional functioning	0.043	0,67	-0.189	0.059	-0.059	0.561
Social functioning	-0.091	0,367	-0.125	0.217	-0.059	0.557
School functioning	-0.012	0.907	-0.061	0.544	-0.009	0.928
Psychosocial Functioning	-0.038	0.709	-0.213	0.034	-0.068	0.501
Total	-0.084	0.404	-0.113	0.263	0.053	0.6

Spearman's correlation, r: Spearman's correlation coefficient

In a study conducted by Yurteri et al., quality of life of 60 children with ADHD between the ages of 8-16, 60 children with type 1 Diabetes Mellitus (DM) were compared with healthy controls. In self-reports of children, except for physical health total score, other subscale total scores and in parent reports, all scores of quality of life were found to be significantly lower in the ADHD group compared to the control group.

Additionally, emotional and psychosocial health total scores were found to be significantly lower than the group with Type 1 DM (39).

In our study, eating behaviours were compared with the quality of life subscale scores. Significant negative correlations were found between emotional eating scores and emotional functionality, psychosocial health score in self reports and psychosocial health score in parent reports. It is thought that impaired eating behavior may negatively affect quality of life in different areas. Since there is no study in the adolescent-ADHD group that examines the relationship between eating behavior and quality of life in the literature, a comparison was made with studies in different sample groups. In a review article in the literature, consistent with the results of our study, studies investigating how different eating attitudes affect different areas of life quality, have been shown that impaired eating attitudes mostly affect the quality of life associated with psychosocial health (40). Studies examining the relationship between eating disorders and quality of life were mostly conducted in adult patient groups. There are fewer studies examining the relationship between eating disorders and quality of life in adolescents. In a study conducted in patients aged 11-17 years, an association was found between symptoms of eating disorders and poor quality of life (41). Although the diagnosis of eating disorder was not fully met, it has been found that there is impairment in functionality in cases with subthreshold findings compared to healthy controls (42).

There are some limitations of our study. The fact that it has a cross-sectional and descriptive design and relatively small sample size, the generalizability of our study results is limited. Among the strengths of our study, it was conducted in a homogeneous group of adolescents with ADHD who did not receive treatment, the diagnosis and exclusion criteria were determined by using a standardized semi-structured interview, the cases with other comorbidities, except ODD, were not included in the study, and healthy control group was matched in terms of age and gender to the case group.

According to the results which obtained in our study; emotional and external eating behaviours presented more common in adolescents diagnosed with ADHD compared to their healthy peers. It was found that external eating behaviour increased with the severity of hyperactivity symptoms. Additionally, it was also found that the severity of symptoms of attention deficit, hyperactivity and oppositional behaviour increased with emotional eating behaviour. Adolescents with ADHD have lower quality of life compared to healthy individuals, and a negative relationship was found between emotional eating behaviour and quality of life within the scope of psychosocial health in both self reports and parent reports of adolescents with ADHD.

The impaired eating attitude detected in adolescents with ADHD in our study was found to be associated with a decrease in quality of life, and may indicate a risk for future eating disorders. We think that it is important to consider eating attitudes and quality of life together with ADHD symptoms in order to apply a holistic approach within the scope of preventive mental health in the treatment of ADHD.

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