

Evaluation of the Coexistence of Attention-Deficit Hyperactivity Disorder and Anxiety Disorder Symptoms

Abstract

Aim: Attention-deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder, and its etiology of it has not been fully elucidated yet. We tried to evaluate the familial aspects of anxiety disorders and ADHD in this study. **Materials and Methods:** Our study group comprised 128 parents aged between 24 and 60 years (114 mothers and 14 fathers) of 128 children with diagnosis of ADHD ($n = 47$), anxiety disorders ($n = 30$), and ADHD + anxiety disorders ($n = 51$) who had been evaluated by the department of child and adolescent psychiatry. Findings of anxiety disorders and ADHD were evaluated in accordance with the Diagnostic and Statistical Manual-V Criteria. Beck Anxiety Inventory, Wender Utah Rating Scale (WURS), and Turgay's Adult Attention-Deficit Disorder (ADD)/ADHD Diagnosis and Evaluation Scale were applied to parents. **Results:** Anxiety levels, WURS, and Turgay's Adult ADD/ADHD Diagnosis and Evaluation Scale points did not be differentiated between groups. 16.7% ($n = 5$) of ADHD + anxiety, 6.4% of ADHD ($n = 3$), and 9.8% ($n = 5$) of anxiety group of parents were high-degree ADD/ADHD (+). **Conclusion:** Our study results show that there are some familial features of ADHD and anxiety disorders. Considering the relationship between these two disorders during the psychiatric care of children as well as their parents is deeply important for clinicians.

Keywords: Anxiety, attention-deficit hyperactivity disorder, children, comorbidity, family

Introduction

Attention-deficit hyperactivity disorder (ADHD) causes impairment in various areas of development. Its symptoms are also seen in adolescence and adulthood. Its incidence is high with various psychiatric disorders.^[1] Conditions associated with various psychiatric disorders impress the clinical pattern and results of ADHD. Research results showed that 87% of adults with ADHD had a minimum of one and 56% had at least two accompanying psychiatric disorders.^[2] ADHD has strong familial inheritance (55%–92%).^[3] The incidence of ADHD was high in children whose parents were diagnosed with adulthood ADHD compared to healthy parents. It has been seen in family studies that the incidence of ADHD diagnosis in mothers, fathers, and kids with ADHD is 2–8 times higher.^[4–7] Gene and environment interaction has a determinant role in occurrence of ADHD.^[8]

Coexistence of anxiety disorders with ADHD is common. This togetherness has been extensively investigated in pediatric and adult ADHD studies. There are studies showing that about 15%–35% of kids and adolescents with ADHD have an anxiety disorder, which is significantly higher than the reported 2% rate in kids with the absence of ADHD.^[9–11] Adulthood ADHD is often comorbid with anxiety disorders.^[12–14]

There are various arguments about anxiety disorders and ADHD.^[15–17] Some of them are: (a) although genetic risk factors are the same, different results occur as anxiety disorders and ADHD; (b) when anxiety disorders and ADHD co-occur, they form a separate ADHD subtype, or individuals with ADHD and anxiety disorders are phenotypically different from individuals with only one disorder; and (c) ADHD and anxiety symptoms have different transfer.^[17,18]

In the past, studies have been conducted related to anxiety disorders and ADHD interaction.^[19,20] There are reviews mentioning

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that anxiety is a widespread clinical aspect in ADHD and that it can significantly change the development and consequences of the disorder. However, defining the best criteria for grouping subspecies remains an unsolved problem.^[10] Besides these, researchers have difficulty answering many questions about parents of kids diagnosed with ADHD. In respect of etiology of ADHD, yet to date, family studies have been paid less attention.^[21]

Some results of studies show that ADHD and anxiety disorders interact continuously and consistently. These two disorders affect and also increase the prevalence of each other when compared to the frequency in society and display an independent transition.^[15,16,22,23] Our study was planned to reveal the familial features of anxiety disorders and ADHD. Our first hypothesis is finding rate of anxiety disorders of parents of children with anxiety disorders score more meaningful than parents of children with ADHD on the Beck Anxiety Inventory (BAI) Scale. Second hypothesis is to find ADHD symptom scale points more meaningful in parents of kids with ADHD.

Materials and Methods

The ethics committee approval has been obtained from Haydarpasa Numune Training and Research Hospital Ethics Committee with a number of 21.02.2017 version 1. Protocol Code: 21.02.2017/V1.

The study was planned in a cross-sectional model, and we aimed to assess the frequency of anxiety disorders and ADHD levels in groups (parents of kids with ADHD, anxiety disorders, ADHD + anxiety disorders group).

Subjects

The sample consisted of 128 parents aged 24–60 years (114 mothers and 14 fathers) of 128 kids ($n = 84$ men, $n = 44$ women) with ADHD, anxiety disorders, and ADHD + anxiety disorders who had been applied to the child and adolescent psychiatry department between April 2017 and May 2017. All patient groups meeting the following criteria were counted in research.

Exclusion criteria for children were having a chronic disease, neurologic problems, and pervasive developmental disorder. Exclusion criteria for parents were mental retardation, minority, and having a psychiatric problem dependent on organic problems.

The research was approved by the Ethics Committee of Haydarpasa Numune Training and Research Hospital (Protocol Code: 21.02.2017/V1). We obtained written consent form from each parent. Children participating in the research were diagnosed with ADHD and anxiety disorder according to the Diagnostic and Statistical Manual (DSM)-V.

Anxiety disorders were evaluated in parents of children in three different groups (ADHD [$n = 47$], ADHD + anxiety

disorders group [$n = 30$], and anxiety disorders group [$n = 51$]). Parents of a total of 128 children were evaluated in the adult ADHD unit of the adult psychiatry department. Only one of the parents for each child was included in the study. A structured clinical interview was applied with each parent to appraisal current and lifetime anxiety disorders and ADHD. Anxiety disorders and findings of ADHD were evaluated in accordance with the DSM-V.^[24] Sociodemographic profiles and clinical features were collected in a sociodemographic form. BAI was administered to assess the severity of anxiety symptoms.

Assessment

Sociodemographic data form

This form is a specially developed questionnaire to determine the sociodemographic characteristics of the patients and to collect data.

Beck Anxiety Inventory

It is a Likert-type scale consisting of 21 items. The guidebook suggests 16 points as cutoff.^[25] It has been revealed that BAI is more sensitive to principally detect panic symptoms than more general anxiety symptoms and its scores correlate with physiological measures of anxiety.^[26–28]

Wender Utah Rating Scale

It evaluates ADHD signs throughout childhood in adults.^[29] It has 61 items. The cutoff point was determined as 36.^[30]

Turgay's Adult Attention-Deficit Disorder/Attention-Deficit Hyperactivity Disorder Diagnosis and Evaluation Scale

Turgay's Adult Attention-Deficit Disorder (ADD)/ADHD Diagnostic and Rating Scale was also administered.^[31] Gunay *et al.* adapted it to Turkish.^[32] It is composed of 58 items. The first part evaluates attention deficit, the second part evaluates excessive motor activity and impulsivity, and the third part evaluates characteristics of ADHD.

Statistical analysis

We used Number Cruncher Statistical System 2007 and Power Analysis and Sample Size. Descriptive statistical methods (mean, standard deviation, median, frequency, rate, and minimum and maximum) were used for evaluating our data. One-way ANOVA test is used for comparison of three and more groups. Tukey's test was used to examine the difference between groups. Kruskal–Wallis test was used for comparison of three and more groups with the absence of normal distribution. Pearson's Chi-square test and Fisher–Freeman–Halton test were used for qualitative data. Significance was evaluated as $P < 0.01$ and $P < 0.05$.

Results

Parents participated in our study were grouped into three groups: subjects with a kid diagnosed with

ADHD ($n = 47$), subjects with a kid diagnosed with anxiety disorder ($n = 51$), and subjects with a kid diagnosed with ADHD + anxiety disorder ($n = 30$). The mean age for parents of ADHD group was 33.91 ± 4.58 years, for parents of anxiety disorders group was 39.63 ± 6.60 years, and for parents of ADHD + anxiety disorders group was 38.27 ± 5.42 years. According to one-way ANOVA test, there was statistically difference between ages of the parents ($P < 0.01$). As a result of the pairwise comparisons, parents of anxiety disorder group ($P = 0.001$) and ADHD + anxiety disorder group ($P = 0.004$) were older than parents of ADHD group ($P < 0.01$). No difference was found between parents of anxiety disorder group and ADHD + anxiety disorder group in average age ($P = 0.549$, $P > 0.05$) [Table 1].

Statistical difference was determined among ADHD group and anxiety disorder group at repetition of grades at school (ADHD vs. anxiety disorders: $P = 0.0076$). We

could not find any difference among other groups (ADHD vs. ADHD + anxiety disorders: $P = 0.2856$, anxiety disorders vs. ADHD + anxiety disorders: $P = 0.3379$).

We could not find any difference among groups in social properties, such as occupation changes, income level, receiving disciplinary punishment, having trouble with police, receiving traffic summons, and alcohol abuse by Fisher–Freeman–Halton test.

When we compare all three parental groups, we could not find any difference in presence of psychiatric disease in family, having a family member with a physical illness, presence of physical illness in the parents, and application to the psychiatry department ($P > 0.05$).

Beck anxiety scores of the total groups ranged from 0 to 52 points.

We could not find any difference among groups according to Beck anxiety scores ($P > 0.05$) [Table 2].

Table 1: Mean scores for demographic variables and child diagnoses by child group

	Diagnosis			<i>P</i>
	ADHD ($n=47$), <i>n</i> (%)	Anxiety disorders ($n=51$), <i>n</i> (%)	ADHD + anxiety disorders ($n=30$), <i>n</i> (%)	
Gender (parents)				
Male	7 (14.9)	4 (7.8)	3 (10.0)	0.549 [†]
Female	40 (85.1)	47 (92.2)	27 (90.0)	
Gender (children)				
Male	34 (72.3)	30 (58.8)	20 (66.7)	0.368 [‡]
Female	13 (27.7)	21 (41.2)	10 (33.3)	
Marital status (parents)				
Married	45 (95.7)	49 (96.1)	28 (93.3)	0.761 [†]
Divorced	2 (4.3)	2 (3.9)	2 (6.7)	
Level of education				
Primary school	16 (34.0)	33 (64.7)	14 (46.7)	0.064 [†]
Secondary school	9 (19.1)	6 (11.8)	4 (13.3)	
High school	16 (34.0)	6 (11.8)	9 (30.0)	
College	6 (12.8)	6 (11.8)	3 (10.0)	
Repetition of grades at school				
No	31 (66.0)	46 (90.2)	24 (80.0)	0.013 ^{*,‡}
Yes	16 (34.0)	5 (9.8)	6 (20.0)	
Occupational status				
Employed	10 (21.3)	8 (15.7)	6 (20.0)	0.763 [‡]
Unemployed	37 (78.7)	43 (84.3)	24 (80.0)	

* $P < 0.05$, ** $P < 0.01$, [†]Fisher–Freeman–Halton test, [‡]Pearson Ki-Kare test. ADHD: Attention-deficit hyperactivity disorder

Table 2: Comparison of the groups according to their anxiety levels

	ADHD ($n=47$), <i>n</i> (%)	Anxiety disorders ($n=51$), <i>n</i> (%)	ADHD + anxiety disorder ($n=30$), <i>n</i> (%)	<i>P</i>
Anxiety level according to beck anxiety				
Minimal anxiety (0-7 points)	24 (51.1)	18 (35.3)	13 (43.3)	0.30 [†]
Mild anxiety (8-15 points)	15 (31.9)	16 (31.4)	8 (26.7)	
Moderate anxiety (16-25 points)	7 (14.9)	9 (17.6)	5 (16.7)	
Severe anxiety (26-63 points)	1 (2.1)	8 (15.7)	4 (13.3)	
Beck anxiety score	9.53±6.50	14.76±11.74	12.57±10.36	0.077 [‡]

[†]Fisher–Freeman–Halton test, [‡]Kruskal–Wallis test. ADHD: Attention-deficit hyperactivity disorder

There was a statistically significant relationship between the prevalence of generalized anxiety disorder (GAD) in groups [Table 3].

Twenty-five of 128 parents had childhood ADHD according to Wender-Utah Rating Scale (WURS). 13 of the total 125 parents were evaluated as high-degree ADD/ADHD (+) according to Turgay's cutoff scale. 16.7% ($n = 5$) of ADHD + anxiety disorder group, 6.4% of ADHD group ($n = 3$), and 9.8% ($n = 5$) of anxiety disorder group of parents were high-degree ADD/ADHD (+). No difference was observed between three groups at distribution of ADD/ADHD scale points.

There was also no difference between groups according to cutoff 36 points for WURS either using Pearson Ki-Kare test [Table 4].

Discussion

Anxiety disorders and ADHD are usually kept together.^[33-36] We designed the study as cross-sectional type to measure the rate of anxiety disorders and ADHD symptoms in three groups. Our study was planned to reveal the familial features of anxiety disorders. We focused on parental anxiety and how anxiety interacts with ADHD.

The first point that needs to be discussed is the prevalence of anxiety disorders do not differentiate between groups, except GAD. The GAD prevalence was higher in subjects with a child diagnosed with ADHD + anxiety

disorder (30% [$n = 9$]) than other groups. Comparing the rate of other anxiety disorders in three groups, the result was not in the statistically significant range. The majority of studies report that comorbid anxiety disorder, especially GAD, was very prevalent in adults.^[37,38] The high rate of GAD in our study seems to be in agreement with other studies. The incidence of GAD in females is twice that of males.^[1] Further, the overlap of anxiety disorders + ADHD in children may have influence in the issue. Something like the potential burden of care provided by a child with both disorders (anxiety disorders + ADHD) is higher than that of a child with only anxiety disorder or only ADHD. Because of the child's multiple psychiatric disorders, his/her behavior and effects on school, family, and social settings may cause more distress on parents. The other anxiety disorders of three groups were similar ($P > 0.05$), and the predicted group differences in anxiety levels were not observed. Although the rates of severe and moderate levels of anxiety were higher in the subjects with a child with anxiety disorder, no statistically significant difference (15.7% of participants had severe and 17.6% had moderate anxiety level) was noted. When we find that anxiety degree was high in parents of kids with only ADHD, we might have thought that anxiety occurred due to the burden proceed from an ADHD child.

Another interesting result of our study was that we did not observe any difference in childhood ADHD according to WURS scores among parents. We expect

Table 3: Distribution of anxiety disorders in all parents groups multiple diagnosis are included

	ADHD, <i>n</i> (%)	Anxiety disorders, <i>n</i> (%)	ADHD + anxiety disorder, <i>n</i> (%)	<i>P</i>
Panic disorder	3 (6.4)	8 (15.7)	6 (20)	0.187 [†]
OCD	6 (12.8)	7 (13.7)	5 (16.7)	0.898 [†]
PTSD	1 (2.1)	3 (5.9)	0	0.450 [†]
Acute stress disorder	0	1 (2)	1 (3.3)	0.415 [†]
Social phobia	6 (12.8)	5 (9.8)	6 (20)	0.429 [†]
Agoraphobia	0	4 (7.8)	3 (10)	0.070 [†]
Special phobia	14 (29.8)	18 (35.3)	18 (35.3)	0.813 [‡]
Generalized anxiety disorder	4 (8.5)	10 (19.6)	9 (30)	0.048 [†]

[†]Fisher's exact test, [‡]Ki-Kare. ADHD: Attention-deficit hyperactivity disorder, OCD: Obsessive-compulsive disorder, PTSD: Posttraumatic stress disorder

Table 4: Comparison of the groups according to their Wender-Utah Rating Scale and Turgay's Adult Attention Deficit Disorder/Attention-Deficit Hyperactivity Disorder Evaluation Scale

	Mean±SD			<i>P</i>
	ADHD	Anxiety disorders	ADHD + anxiety disorders	
WURS	21.67±11.49	24.16±14.15	19.90±15.23	0.231 [†]
Turgay's ADD/ADHD Evaluation Scale				
ADD score	5.87±4.61	6.88±4.80	7.36±5.58	0.387
ADHD score	5.19±4.38	5.03±4.51	5.06±4.58	0.985
Problem score	19.53±12.45	21.70±12.61	20.76±11.98	0.687
Total score	30.59±19.16	33.62±17.88	32.41±18.73	0.705

[†]Kruskal-Wallis test. ADHD (+): WURS >36. ADHD: Attention-deficit hyperactivity disorder, ADD: Attention deficit disorder, SD: Standard deviation, WURS: Wender-Utah Rating Scale

to find higher levels of WURS scores, so higher rates of childhood ADHD in subjects have a child with ADHD. There was no difference in Turgay's ADD/ADHD scale points either. When the studies from our country were examined, the adult-type ADHD rate was 6.8%–33.8% in parents of children with ADHD.^[21,39] According to our study, the ADHD rate was 6.4% in hyperactivity group and 16.7% in ADHD + anxiety group of parents. The rate of ADHD symptoms in parents of kids with ADHD has been reported to be higher in many studies compared to control groups.^[4,40,41]

In a similarly designed study, it has been shown that psychiatric symptoms and ADHD findings are less common in parents whose kids do not have ADHD or other disruptive behavior disorders, compared to parents of kids with ADHD. Parents of kids with ADHD got statistically higher scores than controls from subdivisions of Adult Attention Deficit Hyperactivity Scale.^[4] Some properties usually seen in ADHD people did not show difference between three groups, except repetition of grades at school. The correlations of parents' psychiatric aspects with their children's psychiatric problems may change up to sex and a variety of symptoms.

It is a matter of curiosity how psychiatric problems of parents and children affect each other. Maternal clinical variables (ADHD, anxiety, and depression), compared to paternal variables, were more associated with children's variables. Segenreich *et al.* studied interactions of ADHD symptoms and anxiety symptoms in family members. The results showed that maternal attention deficit was associated with inattention and hyperactivity in kids. Anxiety disorder in mother was associated with attention deficit in children, and attention deficit in mother was associated with anxiety disorder in kids.^[42] We did not assess the level of anxiety and hyperactivity of children in our study. Hence, we cannot compare the studies head to head. However, the frequency of anxiety disorders, which we could not find a difference between the groups, was mentioned.

Throughout the years, authors try to find the answers to questions if the two disorders are only two disorders that affect each other, do they each cause a different disorder or alter the course of the other? However, most of these studies are investigating the comorbidity of anxiety disorders in ADHD children or adults. In some studies, ADHD and anxiety disorder comorbidity is detected deeply. It has been reported that groups with ADHD and concomitant anxiety show higher problems in emotion regulation and problem-solving than groups with only ADHD or anxiety alone.^[20] In addition, patients with ADHD + anxiety perform worse in working memory and express more physical anxiety symptoms compared to ADHD alone.^[43] Previous studies have shown that both biological/genetic and extrinsic factors explain noticeable link in anxiety among family members.^[44–46]

In addition, ADHD and anxiety disorders are correlated variables in households and should be considered together.^[42] Our study design has limited probability of detecting causality and cannot resolve genetic and environmental factors; however, in the light of our results, assessing anxiety disorders in cases with having a kid with ADHD is substantial for care and course.

Kids diagnosed with ADHD + anxiety disorders are the ones who have difficulties in the management of their treatment. The data of our study are quite limited. In addition, not evaluating children's anxiety levels is another shortcoming of the study. However, examining both parents and children in the same study is a strong aspect of this study. The present study demonstrates that further family studies with larger sample sizes must be needed about the issue.

Patient informed consent

Patient informed consent was obtained.

Ethics committee approval

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Conflicts of interest

There are no conflicts of interest to declare.

Author contribution subject and rate

- Melek Gözde Luş (%40) headed the subject enrollment, contributed with scale development process, data analysis, revision and theoretical background.
- Meliha Zengin Eroğlu (%60) contributed with scale development process, data analysis and wrote the whole manuscript.

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