Original article / *Araştırma*

Relation of emotion regulation and empathy skills with maternal emotion regulation and attachment in children diagnosed with ADHD

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ABSTRACT

Objective: *Attention deficit hyperactivity disorder (ADHD) is one of the most common childhood neurodevelopmental disorder. Difficulties in the areas of emotion regulation and empathy were found in prior studies. Mother child attachment is important in the development of emotion regulation and empathy. We aimed to examine the relation emotional regulation and empathy skills in children with ADHD and emotion regulation and attachment properties in their mothers and to compare with healthy controls.* ***Methods:*** *The study group consisted of 61 children (8-12 years old) diagnosed with ADHD. The control group (87 children) comprised patients of other clinics at hospital and was matched for gender and age to the ADHD patients. The Kiddie Schedule for Affective Disorders and Schizophrenia for School Aged Children-Present and Lifetime Version (K-SADS-PL) was used to diagnose ADHD and allowed comorbidities. We evaluated disorder severity at the time of assessment using the DuPaul Attention Deficit and Hyperactivity Disorder Rating Scale. All patients were treatment-naive. Emotional Regulation Checklist (ERC) and KA-SI empathy scale were used to examine children emotional regulation and empathy. Difficulties in Emotion Regulation Scale (DERS) was used to indicate maternal emotional dysregulation status and Experiences in Close Relationship Scale-II was used to evaluate attachment properties in mothers.* ***Results:*** *Children with ADHD had statistical significant lower scores in the areas of affective empathy, cognitive empathy, total empathy score and emotion regulation and cases had statistical significant higher scores in emotion lability. Mothers of children with ADHD had higher scores in anxious and avoidant attachment styles and all subscales of DERS. The correlation between, ADHD symptoms, KA-SI Empathy, ERC, Attachment Scale, and DERS was evaluated by Pearson's correlation analysis. Negative correlation was found between both attention deficit and hyperactivity scores of Du Paul scale and affective, cognitive empathy scores of KA-SI Emphatic Tendency Scale and emotion regulation scores of ERC; a positive correlation was determined between attention deficit and hyperactivity scores of Du Paul scale, mothers' anxious and avoidant attachment andDERS total scores, and emotional lability scores of ERC.* ***Discussion:*** *Mother-child attachment and maternal emotion regulation skills have important roles in the emotion regulation and empathy skills of children. Better understanding of neuropsychologic development process of attachment, empathy and emotion regulation skills and their relations with each other may contribute to the treatment of children with ADHD.* ***(Anatolian Journal of Psychiatry 2017; 18(6):611-620)***

Keywords: *attachment, attention deficit, emotion regulation, empathy, hyperactivity, mother*

DEHB'li olgularda empati ve duygu düzenleme becerilerinin annelerinin bağlanma ve duygu düzenleme becerileri ile ilişkisi

ÖZ

Amaç: *Dikkat eksikliği hiperaktivite bozukluğu (DEHB), çocukluk çağında en sık görülen nörogelişimsel bozukluk-*

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lardan biridir. DEHB'li çocukların empati ve duygu düzenleme becerilerindeki güçlükler daha önceki çalışmalarda gösterilmiştir. Anne-çocuk bağlanması, çocukların duygularını düzenleme ve empati yeteneğinin gelişmesi açısından önemlidir. Bu çalışmada DEHB'li olgulardaki duygu düzenleme ve empati becerilerinin annelerindeki duygu düzenleme ve bağlanma özellikleri ile ilişkisinin incelenmesi ve sağlıklı kontroller ile karşılaştırılması amaçlanmıştır. ***Yöntem:*** *Çalışmaya 8-12 yaşları arasında DEHB tanısı olan 61 çocuk ve DEHB grubu ile yaş ve cinsiyet olarak benzer 87 sağlıklı kontrol alınmıştır. DEHB tanısı ve eşlik eden bozuklukları ortaya koymak için Okul Çağı Çocukları için Duygulanım Bozuklukları ve Şizofreni Görüşme Çizelgesi-Şimdi ve Yaşam Boyu sürümü (ÇDŞG-ŞY) kullanılmıştır. Du Paul Dikkat Eksikliği ve Hiperaktivite Değerlendirme Ölçeği, DEHB'nin şiddetini ölçmek için kullanılmıştır. Duygu Ayarlama Ölçeği (DAÖ), çocukların duygularını düzenlemesini; KASİ Empati Ölçeği çocukların empati becerilerini değerlendirmek için kullanılmıştır, Annelerin duygularını düzenlemesini değerlendirmek için Duygu Düzenleme Güçlüğü Ölçeği (DDGÖ) ve bağlanma özelliklerini değerlendirmek için Yakın İlişkide Yaşantılar Ölçeği-II kullanılmıştır.* ***Sonuçlar:*** *Olgu grubunun duygusal ve bilişsel empati ve toplam empati puanlarında ve duygu düzenleme alanında kontrol grubuna göre istatistiksel açıdan anlamlı düşük puanlar elde ettiği, duygusal değişkenlik alanında ise olgu grubunun kontrol grubuna göre istatistiksel olarak anlamlı düzeyde yüksek puanlar elde ettiği görülmüştür. DEHB'li çocuğu olan anneler hem kaygılı bağlanma, hem kaçıngan bağlanma puanları, hem de DDGÖ tüm alt ölçekleri ve toplam puanında kontrol grubunun annelerine göre istatistiksel açıdan anlamlı düzeyde yüksek puan almışlardır. DEHB belirtileri, KA-Sİ Empati ölçeği, DAÖ, DDGÖ ve bağlanma ölçeği arasındaki ilişki pearson korelasyon analizi ile değerlendirilmiştir. Du Paul Dikkat eksikiliği ve hiperaktivite beliritleri ile bilişsel, duygusal ve toplam empati puanları ve duygu düzenleme alt ölçeği arasında negatif ilişki saptanırken DDGÖ toplam skoru, duygusal değişkenlik, anksiyöz ve kaçıngan bağlanma arasında pozitif ilişki saptanmıştır.* ***Tartışma:*** *Anne-çocuk bağlanması ve annenin duygu düzenleme becerisi de çocukların duygu düzenleme ve empati becerilerine katkı sağlayan anne ile ilişkili etkenlerdendir. Bağlanma, empati, duygu düzenleme becerilerinin nöropsikolojik gelişim süreçlerinin ve birbirleri ile olası ilişkilerinin anlaşılması DEHB'li çocukların tedavisine katkı sağlayabilir.* ***(Anadolu Psikiyatri Derg 2017; 18(6):611-620)***

Anahtar sözcükler: *Dikkat eksikliği, hiperaktivite, anne, bağlanma, duygu düzenleme, empati*

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is one of the most frequent neurodevelopmental disorders in childhood that have heterogeneous clinical characteristics such as inattention, hyperactivity and impulsivity.[1] Its prevalence varies between 8-12% around the world.[2] Both genetic and environmental factors have effects on etiology of ADHD. Previous studies revealed that ADHD was associated with parent-child relationship and parental attitudes were predictor for symptoms of ADHD.[3,4] Additionally, these studies indicated difficulties for emotion regulation in etiology of ADHD.[5-7] This situation makes us think that the attachment, which is important for parent-child relationship and development of emotion regulation, may also play a role in ADHD's etiology.

It was found in studies that caregiver's remaining non-response caused difficulties for infants to regulate their emotions and infants who were calmed down, and found response to their positive signs by dealing with themselves had more efficient emotion regulation skills. If parents accept emotions of children and respond appropriately, children often can regulate their emotions; however if they are punished or their emotions are not noticed, children usually have difficulty in regulating their emotions.[8,9] These responses of caregiver might also be closely associated with mother-child attachment. Having safe mother-child attachment will increase primarily mother's self and emotion regulation and contribute to respond her child appropriately.[10-11]

The effect of mother-child attachment in ADHD, which is also assessed as a self-regulation disorder,[12] on symptoms of ADHD and difficulties in emotion regulation and empathy skills which are commonly seen in ADHD has not been investigated before. The purpose of this study was to evaluate emotion regulation and empathy skills of children diagnosed with ADHD and their mothers' characteristics of emotion regulation and attachment to their children and to compare them with healthy controls. Secondly, the correlation between emotion regulation skills and empathy skills of children and mothers' emotion regulation skills and attachment characteristics was examined. The correlation of comorbid disorders with empathy, emotion regulation, and attachment was also investigated.

METHODS

Eight-twelve year-old 61 children (mean age= 9.66±0.20; 48 boys, 13 girls), who were diagnosed with ADHD according to DSM 5 and KIDDIE-SADS-PL after applying to child psychiatry outpatient clinics of a public hospital and a research and training hospital between June-September 2016 and never used drug before, and their mothers (mean age=36.5±5.04) as case group and 87 children (mean age=

10.12±0.16, 71 boys, 16 girls) who applied to different outpatient clinics of the same hospitals, had no psychiatric disorder, chronic disease and agreed to participate in the study and were similar to case group in terms of age and gender and their mothers (mean age=37.29±5.75) as control group were included in the study. In the evaluationthe children who did not have diagnosis of any mental retardation, had clinically normal intelligence, learned how to read and write at the first grade, reading and writing skills were appropriate to his or her grade and did not fail the class were included in the study. Adapting behaviors (in communication, self care, family life, social relations areas) were also evaluated in excluding mental retardation. Psychiatric conditions of control group were assessed by using KIDDIE-SADS-PL and children without any psychiatric disorder were included in the study. Ethics committee approval of the study was obtained from İzmir Katip Çelebi University Clinical Trials Ethics Committee. Verbal and written consents of the mothers and their children who participated in the study were received.

Comorbidities of children in case group were examined by using KIDDIE-SADS-PL and while cases with ADHD having comorbid oppositional defiant disorder (ODD) or conduct disorder (CD) in ADHD group were included in the study, cases diagnosed with ADHD were not included in the study in case of comorbidity of other disorders. While there was comorbid disorder in 27 of cases diagnosed with ADHD including 16 with ODD and 11 with CD; any comorbidity was not determined in 34 of them.

Measurements

Sociodemographic Data Form: It was prepared in order to collect information about sociodemographic characteristics of children and parents. There were questions examining child's age, gender, socioeconomic level, academic condition, peer relationships and parent's age, educational status, marital status, and occupation in the form. It was filled by clinician.

Schedule for Affective Disorders and Schizophrenia for School Age Children Present and Life-time Version (KIDDIE-SADS-PL): It is a semi-structured interview formwhich was developed by Kauffman et al. in order to examine present and life time psychopathology in children and adolescents aged between 6-18 years.[13] Turkish translation and reliability and validity study of KIDDIE-SADS-PL were carried out by Gökler et al.[14]

DuPaul Attention Deficit Hyperactivity Disorder Rating Scale (DuPaul ADHD-RS-IV Inventory): DuPaul ADHD Inventoryis a scale with 18 items including 1 item for each of 18 symptoms in DSM-IV diagnosis of ADHD. Rating inventory which was developed by Du Paul et al. is a scale filled by physician evaluating severity of the symptom during the past week.[15]

Emotion Regulation Checklist (ERC): ERC is used to evaluate regulation of emotions in children.[16] ERC is a scale developed by Shields and Cicchetti in 1997.[17] ERC was adapted for Turkish children by Kapçı et al., (2009).[23] The scale consisting of totally 24 items can also be filled by an adult, who knows the child, in addition to parents and teacher. It has emotion lability and emotion regulation subscales.

KA-SI Empathic Tendency Scale for Children and Adolescents: An assessment instrument specific to Turkish culture was developed in order to measure empathic tendencies of children and adolescents.[18] Two-factor structure was determined to be appropriate for both child and adolescent form as a result of explanatory and confirmatory factor analysis and sub-super group distinctiveness analyses performed for validity of KA-SI Empathic Tendency Scale for Children and Adolescents. Cronbach's alpha reliability coefficients of subscales of child and adolescent form and the overall scale, correlation coefficients between subscales, and test-retest reliability coefficients obtained from its applicationwith one-week interval also indicated that the scale could be used reliably.[25]

Difficulties in Emotion Regulation Scale (DERS): DERS was developed by Gratz and Roemer in order to measure difficulties in emotion regulation field.[19] The scale has six subscales: awareness, clarity, non-acceptance, strategies, impulse, goals. High scores indicate existence of difficulty in regulation of stronger emotions. Turkish adaptation, reliability and validity study of the scale were conducted by Rugancı.[20] The scale is composed of 6 subscales: goal, strategy, impulsivity, awareness, clarity, nonacceptance.

1. Goal: Purpose for initiating behavior (Increasing points mean difficulties in initiating behavior),
2. Strategy: Effective strategies using for mood regulation (Increasing scores indicate difficulties in using effective strategies),
3. Impulsivity: Control of impulsive behaviors (Increasing scores mean difficulties in controlling behavior),

4. Awareness: Awareness in emotional responses (Increasing scores indicate a decrease in awareness in emotional responses),
5. Clarity: Clarity in emotional responses (Increasing scores mean decreasing in clarity in in emotional responses),
6. Nonacceptance: Acceptance of negative feelings (Increased scores indicate difficulties in accepting negative feelings).

The total score of the scale which shows more difficulties in emotion regulation is also used in the study.

Experiences in Close Relationships Scale-II: Fraley et al. developed Experiences in Close Relationships Scale-II in order to examine attachment behavior in experiences of close relationships.[21] The scale measures anxious attachment in 18 items and avoidant attachment in 18 items. Turkish adaptation, reliability and validity study of the scale were conducted by Selçuk et al.[22]

Statistical analysis

SPSS 18.0 (Statistical Package for the Social Sciences) program was used for statistical analysis of data obtained in the study. Certain sociodemographic and clinical categorical variables of case and control groups were evaluated by number and percentage values. Cross chi-square test was used for comparison of classified categorical variables. Firstly, distribution of the data was evaluated by using Kolmogorov-Smirnov method. Because distribution of data was compatible with normal distribution, paired groups were evaluated by parametric t test. In order to determine correlation between continuous variables, Pearson's correlation analysis was used. On the other hand, because they were not compatible with normal distribution and the number was inadequate while comparing subgroups and comorbid conditions of ADHD group, paired groups were compared by using Mann Whitney U test and triple groups were compared by using Kruskal Wallis test. p value was accepted as <0.05.

RESULTS

Difference was not found between children's age, gender, mothers' age, educationallevel, and marital status. While school success of children was measured as regards to their school report grades in the last term, peer relationship was evaluated based on statements of children.

A difference was determined between the groups in terms of school success and peer relationship (respectively, p<0.001, p<0.001) (Table 1). Table 2 shows comorbid conditions and ADHD subtypes. When data of case and control groups belonging to scores from DuPaul Attention Deficit Hyperactivity Disorder Evaluation Inventory, Emotion Regulation Scale, and KA-SI Empathic Tendency Scale were examined by using parametric t test, it was observed that case group obtained statistically significant low scores in affective and cognitive empathy and total empathy scores and emotion regulation subscale compared to control group; and obtained statistically significant higher scores in emotional lability subscale compared to control group (respectively, p<0.001, p<0.001, p<0.001, p<0.001, p<0.001) (Table 3).

Table 1. Sociodemographic properties of ADHD and control group

	ADHD (n=61)	Control (n=87)	p
Age*	9.66±0.20	10.12±0.16	0.375
Gender**			
Female	13	16	0.659
Male	48	71	
Maternal age*	36.5±5.04	37.29±5.75	0.153
Maternal education**			
<8 years	47	68	0.353
>8years	14	19	
Marital status**			
Married	55	78	0.134
Divorced	6	9	
School success**			
Good	29	68	<0.001
Moderate	22	14	
Bad	10	4	
Peer relation**			
Good	34	85	<0.001
Bad	27	2	

**: t test; **: Chi-square test*

Table 2. Comorbide disorders and ADHD subtypes

Comorbidity	n	%
ODD	16	25.81
CD	11	17.74
No comorbidity	34	54.84
ADHD subtypes		
Predominantly inattentive	12	19.67
Predominantly hyperactive-impulsive	19	31.14
Combined	30	49.18

ODD: Oppositant Defiant Disorder CD: Conduct Disorder

Table 3. Comparision of Du Paul ADHD Rating Scale, KA-Sİ empath tendency scale, emotion regulation checklist scores between ADHD and control group

	ADHD	Control	p*	Cohen's d	Effect size
Du Paul AD	19.01±2.59	3.45±1.75	<0.001	7.03	0.961
Du Paul HA	19.00±2.66	4.33±1.82	<0.001	6.43	0.954
Du Paul total	38.01±2.17	7.78±3.54	<0.001	10.29	0.981
Emotional lability	35.83±6.92	28.4±7.1	<0.001	1.06	0.468
Emotional regulation	17.70±6.71	27.50±3.5	<0.001	-1.83	-0.067
Empathy					
Cognitive empathy	11.47±1.47	15.34±1.54	<0.001	-2.57	-0.789
Affective empathy	15.09±2.39	21.29±1.46	<0.001	-3.13	-0.842
Empathy total	26.57±3.74	36.34±2.60	0.001	-3.03	-0.834

**: t test; Du Paul AD: Du Paul Attention Deficit; Du Paul HA: Du Paul Hyperactivity; ADHD: Attention deficit hyperactivity disorder*

Table 4. Comparision of DERS and experiences in close relationship 2 scales between ADHD and control groups

DERS	ADHD	Control	p*	Cohen's d	Effect size
DERS					
Nonacceptance	15.36±6.18	9.86±2.66	<0.001	1.156	0.500
Goals	13.45±5.14	10.81±3.21	0.001	0.616	0.294
Impulsivity	16.62±5.36	9.81±2.57	<0.001	1.620	0.629
Strategies	16.29±6.55	10.86±3.47	0.001	1.035	0.459
Awareness	14.00±3.13	12.43±2.32	0.012	0.569	0.274
Clarity	11.68±2.51	10.06±2.27	<0.001	0.676	0.320
Total score	87.42±24.4	63.86±11.17	<0.001	1.241	0.527
Attachment					
Anxious attachment	3.97±0.76	2.88±0.47	<0.001	1.725	0.653
Avoidant attachment	4.47±0.24	3.87±0.72	<0.001	1.118	0.487

**: t test; DERS: Difficulties in Emotion Regulation Scale; ADHD: Attention deficit hyperactivity disorder*

As the mothers were examined by using parametric test in emotion regulation and attachment subscale, it was found that mothers diagnosed with ADHD obtained statistically significant higher scores in both anxious attachment and avoidant attachment compared to mothers of control group (respectively, p<0.001, p<0.001), the mothers diagnosed with ADHD also obtained statistically significant higher scores in all subscales and total score of DERS compared to mothers in control group; values are shown in Table 4.

Total scores of Du Paul Attention Deficit and Hyperactivity Subscales, KA-SI Empathic Tendency Scale, attachment, ERC subscales, and DERS were compared by Pearson's correlation analysis. While a negative correlation was found between both attention deficit and hyperactivity scores of Du Paul scale and affective, cognitive empathy scores of KA-SI Emphatic Tendency Scale and emotion regulation scores of ERC; a positive correlation was determined between attention deficit and hyperactivity scores of Du Paul scale, mothers' anxious and avoidant attachment and emotion regulation scores (DERS total scores), and emotional lability scores of ERC. Table 5 shows correlation values.

The correlation between KA-SI Empathy, ERC, Attachment Scale, and DERS was evaluated by Pearson's correlation analysis. It was found that cognitive, affective, and total empathy scores had a positive correlation with emotion regulation subscale; a negative correlation with emotional lability, DERS total score, anxious and avoidant attachment (p<0.001 for all values). Consequently, it was found that children with better empathy skills regulated their emotions

Table 5. Correlation between Du Paul ADHD Rating Scale, Emotion Regulation Checklist, KA-SI Empathy Scale and Experiences in Close Relationship Scale

	DuPaul AD		DuPaul HA	
	r*	p	r*	p
Cognitive empathy	-0.734	<0.001	-0.722	<0.001
Affective empathy	-0.833	<0.001	-0.809	<0.001
Empathy total	-0.734	<0.001	-0.734	<0.001
Emotion Lability	0.482	<0.001	0.500	<0.001
Emotion Regulation	-0.664	<0.001	-0.653	<0.001
Avoidant Attachment	0.510	<0.001	0.535	<0.001
Anxious Attachment	-0.604	<0.001	-0.649	<0.001
DERS total	0.566	<0.001	0.601	<0.001

**: Pearson's correlation analysis; DERS: Difficulties in Emotion Regulation Scale; Du Paul AD: Du Paul Attention Deficit; Du Paul HA: Du Paul Hyperactivity*

Table 6. Correlation between KA-SI Empathy Scale, Emotion Regulation Checklist and Experiences in Close Relationship Scale

	Cognitive empathy		Affective empathy		Empathy total	
	R	p	r	p	r	p
Emotion lability	-0.35	<0.001	-0.383	<0.001	-0.381	<0.001
Emotion regulation	0.57	<0.001	0.621	<0.001	0.618	<0.001
Avoidant attachment	-0.347	<0.001	0.390	<0.001	-0.384	<0.001
Anxious attachment	-0.594	<0.001	0.563	<0.001	-0.592	<0.001
DERS total	-0.392	<0.001	-0.422	<0.001	-0.422	<0.001

**: Pearson's correlation analysis; DERS: Difficulties in Emotion Regulation Scale*

Table 7. Comparision of DERS, experiences in close relationship 2 scale, ERC, KASİ Empathy Scale between ADHD and ADHD+comorbidity groups

	ADHD (n=34)	ADHD+comorbidity (n=27)	p
Anxious attachment	3.84±0.79	4.13±0.69	0.134
Avoidant attachment	4.00±0.71	3.71±0.82	0.179
DERS total	82.76±22.74	93.40±25.53	0.102
Emotional lability	34.76±7.89	37.18±5.32	0.068
Emotional regulation	16.05±5.08	19.92±6.58	0.132
Empathy			
Cognitive empathy	12.17±1.33	10.59±1.15	<0.001
Affective empathy	16.20±2.14	13.70±1.95	<0.001
Total empathy	28.38±3.38	24.29±2.85	<0.001

**: Mann Whitney U test; DERS: Difficulties in Emotion Regulation Scale; ADHD: Attention deficit hyperactivity disorder; ERC: Emotion Regulation Checklist*

more easily, experienced less emotional lability, and their mothers'attachment characteristics and emotion regulation skills were better.

When those diagnosed with comorbid ODD and CD (n=27) and ADHD group without comorbidity (n=34) were compared by using Mann Whitney U test, it was determined that while there was no difference between those having diagnosis of comorbid ODD and CD and those without co-morbidity in terms of emotion regulation skills and attachment characteristics of children and mothers, those having comorbid ODD and CD diagnosis had statistically significant lower scores in affective, cognitive empathy and total

Table 8. Comparision of DERS, experiences in close relationship 2 scale, ERC, KASİ Empathy Scale between ADHD subtypes

	Inattention (n=12)	Hyperactivity (n=19)	Combined (n=30)	p*
Anxious attachment	4.09±1.01	4.21±0.72	3.73±0.58	0.461
Avoidant attachment	3.81±1.00	3.92±0.64	3.87±0.77	0.983
DERS total	80.25±23.86	97.52±21.64	83.90±25.0	0.062
Emotional lability	32.08±7.69	37.38±6.75	36.36±6.39	0.071
Emotional regulation	16.33±4.00	17.68±6.54	18.40±6.48	0.726
Empathy				
Cognitive empathy	12.83±1.43	11.10±1.32	11.16±1.31	0.004
Affective empathy	17.16±1.94	15.10±2.26	14.26±2.19	0.003
Total empathy	30.00±3.24	26.21±3.45	25.43±3.35	0.001

**: Kruskal Wallis test; DERS: Difficulties in Emotion Regulation Scale; ADHD: Attention deficit hyperactivity disorder; ERC: Emotion Regulation Checklist*

Table 8. Comparision of DERS, experiences in close relationship 2 scale, ERC, KASİ Empathy Scale between ADHD subtypes

	Inattention (n=12)	Hyperactivity (n=19)	Combined (n=30)	p*
Anxious attachment	4.09±1.01	4.21±0.72	3.73±0.58	0.461
Avoidant attachment	3.81±1.00	3.92±0.64	3.87±0.77	0.983
DERS total	80.25±23.86	97.52±21.64	83.90±25.0	0.062
Emotional lability	32.08±7.69	37.38±6.75	36.36±6.39	0.071
Emotional regulation	16.33±4.00	17.68±6.54	18.40±6.48	0.726
Empathy				
Cognitive empathy	12.83±1.43	11.10±1.32	11.16±1.31	0.004
Affective empathy	17.16±1.94	15.10±2.26	14.26±2.19	0.003
Total empathy	30.00±3.24	26.21±3.45	25.43±3.35	0.001

**: Kruskal Wallis test; DERS: Difficulties in Emotion Regulation Scale; ADHD: Attention deficit hyperactivity disorder; ERC: Emotion Regulation Checklist*

empathy compared to those without comorbid condition. When ADHD subtypes and ERC, DERS, attachment subscales were statistically evaluated by Kruskal Wallis test, any difference was not determined and a statistically significant difference was found in affective empathy, cognitive empathy and total empathy field (p=0.004, p=0.003, p=0.001, respectively).

DISCUSSION

In this study, both anxious attachment characteristics and avoidant attachment characteristics of mothers of children diagnosed with ADHD were found to be higher than mothers of healthy controls and this result is a finding compatible with previous studies.[23-26] Child learns to regulate him/herself and emotions through sensitivity of caregiver in responding child's needs and teaching child how to regulate him/herself by caregiver.[1] It was shown in clinical research and series of cases that ADHD was associated with insecure attachment.[23-26] In the study of Keskin and Çam, 11-16 year-old 384 children were examined and characteristics of insecure attachment were observed to associate with symptoms of attention deficit and hyperactivity.[27] In another case control study in which 5-10 year-old 19 boys diagnosed with ADHD participated, the correlation between ADHD and insecure attachment was revealed.[28] In a related longitudinal study, it was indicated that 53 one year-old children with many disorganized attachment characteristics had more symptoms of attention deficit and hyperactivity at the age of 6-8.[39] Maternal attachment properties have effects both on maternal and children's emotion regulation.[10-12]

Children diagnosed with ADHD were found to have difficulties in emotion regulation, empathy skills and self-regulatory fields.[12,30,31] Our results are similar to current studies. When the relation

between empathy, emotion regulation and attachment; it was found that empathy skills were correlated with emotion regulation and secure attachment negatively. Role of secure attachment in emotion regulation, empathy and self-regulation of child is extremely crucial,[32,33] but it was not mentioned much in previous studies.[11] It was determined in study of Roskam et al., that attachment problems were predictor for severity of ADHD symptoms of children.[11] In the present study, the result indicating that symptoms of ADHD increased as attachment problems increased was similar to the study of Roskam et al., and another important result was that difficulties in emotion regulation increased as attachment problems increased. These results support studies revealing that attachment process plays an important role in development of child's attention and development of emotional and behavioral regulation skills.[22,23,26] Attention deficit symptoms in ADHD can also affect communication with others and make it difficult to empathize with them.[34,35] Children with ADHD are experiencing difficulties in emotion regulation and have high emotional responsiveness.[36,37] As a result of the stress in communicating with other people, these children can easily induce negative emotions and the child may experience significant difficulty in regulating these feelings. Previous studies have also shown that children who have strong emotional regulation are more likely to experience stressful negative emotions in communication with people.[38] As a result of these situations the ability to empathize of children with ADHD can be reduced.

Affective part of empathy develops earlier than cognitive part and affective part was shown to be associated with amygdala, hypothalamus, and orbitofrontal cortex and emotional processing. These parts of brain are the parts that are closely associated with mother-child attachment. On the other hand, it is revealed that cognitive empathy is rather associated with awareness of others and its relation with prefrontal cortex was shown.[39] Close relationship of cognitive empathy with executive functions, mind theory, and self regulation was shown and this is the cerebral part affected by ADHD at most.[37,40] Development of emotion regulation skill is also associated with ventral and dorsal prefrontal cortex which are closely associated with executive functions like development of cognitive part of empathy.[41,42] Difficulties in both cognitive and affective empathy in cases diagnosed with ADHD in the present study make us think that cases diagnosed with ADHD had attachment difficulty and affective empathy was affected in related process and also cognitive empathy might have been influenced concerning difficulty in executive functions. The result indicating that anxious and avoidant attachment had a negative correlation with both cognitive and affective empathy supports this condition.

When the relation between ADHD subtypes and empathy, attachment, emotion regulation was investigated; statistically significant difference was found in empathy scales; children in predominantly inattention group had beter empathy skills. This result is similar with relevant studies.[43-45] Similar to the present study; in studies examining characteristics of empathy in cases of comorbid ODD and CD, empathy skills of children with ADHD having comorbid ODD and CD were found to be lower compared to children diagnosed with ADHD without comorbidity.[43,46] The correlation between disruptive behavior problems and empathy deficiency was shown in previous studies.[47,48] In Descham's study it was found that children who were diagnosed with ADHD and CD or ODD had more difficulties in empathy field.[49] Another interesting finding in present study is that no difference in emotional regulation, emotional lability, attachment was found in comorbide situations. In a metaanalysis study, it was found that co-occurring conduct problems did not moderate the link between ADHD and any other emotion dysregulation.[50]

The most important limitation of the present study was that the mothers were not evaluated in terms of ADHD. Psychiatric condition of the mothers could be assessed via semi-structured interviews. That fact that we only used information coming from mothers in the present study could affect objectivity of the present study; receiving information from teachers could make results of the study more objective. Measuring emotion regulation and empathy skills of children not only by information obtained from the mothers but also neuropsychological tests made results of the study more provable and repeatable. Intelligence of children was only evaluated with clinical interview; standart tests can be used.

Consequently, examining emotion regulation and empathy skills of children diagnosed with ADHD and placing importance also to this field in the treatment may reduce social and adaptation problems of children. Because parents are an important part of treatment and difficulties of parents in emotion regulation and attachment field may influence their relationship with child,

they need to be examinewell. Further studies are required in order to understand attachment, empathy, emotion regulation skills, neuro-psychological development process and their correlations with each other better.

Authors' conributions: *G.Ö.: Konuyu bulma, verilerin toplanması, literatür tarama, makale yazımı; Y.Ö.: Verilerin toplanması, makale yazımı; A.A.: Makale yazımı, konu ve yazım danışmanlığı.*

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