



# Comorbid Psychiatric Disorders and Related Sociodemographic Factors in Adolescents with Attention-Deficit Hyperactivity Disorder

## Dikkat Eksikliği Hiperaktivite Bozukluğu Olan Ergenlerde Eşlik Eden Psikiyatrik Bozukluklar ve İlişkili Sosyodemografik Faktörler

© Serdar Karatoprak<sup>1</sup>, © Yunus Emre Dönmez<sup>2</sup>

<sup>1</sup>Konya City Hospital, Clinic of Child and Adolescent Psychiatry, Konya, Turkey

<sup>2</sup>İnönü University Faculty of Medicine, Department of Child and Adolescent Psychiatry, Malatya, Turkey

### ABSTRACT

**Objective:** Attention-deficit hyperactivity disorder (ADHD) disorder is a neuropsychiatric disorder that begins in early stages of life and has a lifelong effect. Previous studies have found that 50-70% of children and adolescents with ADHD have comorbid psychiatric disorders. The aim of this study is to identify comorbid psychiatric disorders in adolescents with ADHD and to compare the sociodemographic characteristics of ADHD cases with and without psychiatric comorbidity.

**Method:** This study was conducted with 105 adolescents with ADHD. The Schedule for Affective Disorders and Schizophrenia for School-age Children-present and Lifetime-Turkish version was used to evaluate ADHD and comorbid psychiatric disorders.

**Results:** The study was completed with 73 male and 32 female adolescents. The mean age of the participants was 13.75±1.45 years. It was determined that 41 cases (39%) had at least one comorbid psychiatric disorder. The most common comorbid psychiatric disorders were conduct disorder (14.3%), specific learning disorder (8.6%), obsessive compulsive disorder (3.8%) and elimination disorders (3.8%). While the prevalence of comorbid psychiatric disorders was compared according to sociodemographic characteristics, it was found that the prevalence of comorbidity was significantly higher in adolescents with ADHD living in families with low socioeconomic levels.

**Conclusion:** The findings of current study showed that adolescents with ADHD had a high rate of comorbid psychiatric disorders. We are opinion that presence of comorbid psychiatric disorder in ADHD will have negative effects on both ADHD and comorbid psychiatric problems. Therefore, all adolescents with ADHD should be evaluated for comorbid psychiatric disorders.

**Keywords:** Adolescents, attention deficit/hyperactivity disorder, comorbidity, psychiatric disorders

### ÖZ

**Amaç:** Dikkat eksikliği/hiperaktivite bozukluğu (DEHB), yaşamın erken dönemlerinde başlayan ve etkisi yaşam boyu sürebilen nöropsikiyatrik bir bozukluktur. Önceki çalışmalarda, DEHB olan çocuk ve ergenlerin %50-70'inin komorbid psikiyatrik bozukluklara sahip olduğu bulunmuştur. Bu çalışmanın amacı, DEHB olan ergenlerde eşlik eden psikiyatrik bozuklukları belirlemek ve komorbid psikiyatrik bozukluğu olan ve olmayan DEHB olgularının sosyodemografik özelliklerini karşılaştırmaktır.

**Yöntem:** Bu çalışma DEHB tanısı alan 105 ergen ile yapılmıştır. DEHB ve eşlik eden psikiyatrik bozuklukları değerlendirmek için Okul Çağı Çocukları İçin Duygusal Bozukluklar ve Şizofreni Çizelgesi-Şu Anda ve Yaşam Boyu Türkçe versiyonu kullanılmıştır.

**Bulgular:** Çalışma, DEHB tanısı olan 73 erkek ve 32 kız ile tamamlandı. Katılımcıların yaş ortalaması 13,75±1,45 yıl idi. Kırk bir olguda (%39) en az bir ek psikiyatrik bozukluk olduğu belirlendi. En sık eşlik eden psikiyatrik bozukluklar, davranım bozukluğu (%14,3), özgül öğrenme bozukluğu (%8,6), obsesif kompulsif bozukluk (%3,8) ve eliminasyon bozuklukları (%3,8) idi. Komorbid psikiyatrik bozukluk sıklığı sosyodemografik özelliklere göre karşılaştırıldığında, sosyoekonomik düzeyi düşük ailelerde yaşayan DEHB'li ergenlerde komorbidite sıklığının anlamlı derecede daha yüksek olduğu bulunmuştur.

**Sonuç:** Bu çalışma, DEHB olan ergenlerin yüksek oranda eşlik eden psikiyatrik bozukluklara sahip olduğunu göstermiştir. Hemen hemen her bozuklukta olduğu gibi DEHB'de de komorbid psikiyatrik bozukluk varlığının hem DEHB hem de komorbid psikiyatrik sorunlar üzerinde olumsuz etkileri olmaktadır. Bu nedenle, DEHB olan tüm ergenler komorbid psikiyatrik bozukluklar açısından değerlendirilmelidir.

**Anahtar kelimeler:** Ergen, dikkat eksikliği/hiperaktivite bozukluğu, psikiyatrik komorbidite

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Corresponding Author

Serdar Karatoprak MD

Konya City Hospital, Clinic of Child and Adolescent Psychiatry, Konya, Turkey

✉ sdrkrtrprk@hotmail.com

ORCID: 0000-0001-6319-8948

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## INTRODUCTION

Attention-deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by inattention and/or hyperactivity/impulsiveness<sup>(1)</sup>. It is one of the common psychiatric disorders of childhood and is becoming more prominent in children due to the increasing social and academic achievement demands of the families<sup>(2)</sup>. In population-based researches, the prevalence of ADHD is determined as approximately 5% in children and 2.5% in adults<sup>(2)</sup>. Studies show that the frequency is higher in boys than in girls, and this ratio varies between 2:1 and 9:1 depending on whether the sample consists of the general population or clinical population<sup>(3)</sup>.

It is inevitable that a life-long psychiatric disorder will be accompanied by other psychiatric disorders. Previous studies have determined that only 13-32% of cases are diagnosed as non-comorbid ADHD, and many ADHD patients have comorbid psychiatric disorders<sup>(4)</sup>. The most common comorbid psychiatric disorders in children and adolescents with ADHD are disruptive behavioural disorders. It is stated that 30-40% of the children with ADHD have oppositional-defiant disorder, and 30-50% of them have conduct disorder (CD)<sup>(5)</sup>. The second most frequent comorbid psychiatric disorders are anxiety disorders and affective disorders. It is stated that approximately one third of ADHD patients have anxiety disorders<sup>(6)</sup>. In MTA study, it has been determined that 34% of cases with ADHD have anxiety disorders<sup>(7)</sup>. The prevalence of major depression in children with ADHD has been found as 6-30%<sup>(8)</sup>. In addition, ADHD may be comorbid with tic disorders, autism spectrum disorders, bipolar disorders, or other developmental disorders.

Comorbidity is common in psychiatric disorders<sup>(9)</sup>. However, the cause of the comorbidity is not fully known yet. There are various hypotheses regarding the development of comorbid psychiatric disorders in ADHD. It has been stated that emotion dysregulation in ADHD may be a predisposing factor to comorbidity with psychiatric disorders such as oppositional defiant disorder (ODD), anxiety, and depression<sup>(10)</sup>. Also, irritability may have a role in the development of comorbid mood and anxiety disorders, as well as reactive aggression<sup>(10)</sup>. Moreover, individual and familial sociodemographic characteristics have an effect on comorbidity. It has been found that the prevalence of psychopathology in the parents of children with ADHD and comorbid ODD/CD is higher than parents

of children with pure ADHD<sup>(10)</sup>. It has been also stated that the families of those children have higher divorce rates and parent-child interactions are more negative<sup>(11,12)</sup>. Studies have also shown that there is a relationship between low socioeconomic status and comorbidity<sup>(13,14)</sup>.

Comorbid psychiatric disorders affect the severity of impairment in mental health, quality of life, psychosocial adaptation, severity of symptoms and response to the treatment. Therefore, it is important to determine whether there are comorbid psychiatric disorders in patients diagnosed with ADHD or not. Previous studies investigating ADHD and comorbid psychiatric disorders have mostly been conducted in children and adolescents in a wide age range<sup>(4,13,15,16)</sup>. In studies, the prevalence of comorbid psychiatric disorder in adolescents with ADHD has been found as nearly 70-80%<sup>(17,18)</sup>. But, it can be said that studies on the adolescent age group are limited. Therefore, studies evaluating ADHD and psychiatric comorbidity in only adolescents are needed due to the characteristics of childhood periods. The aim of this study was to investigate the prevalence and distribution of comorbid psychiatric disorders in adolescents with ADHD and to evaluate their association with sociodemographic factors.

## MATERIALS and METHODS

### Participants and Psychiatric Evaluation

The participants consisted of adolescents who have applied to a child psychiatry clinic for the first time and were diagnosed with ADHD; adolescents who were followed up regularly for ADHD in this clinic; adolescents who were diagnosed with ADHD but refused to continue the treatment process, and adolescents who applied to our clinic while formerly being followed in another clinic. The records of the participants were reviewed retrospectively, and their clinical status at the application deadline was taken into account. Both adolescents who had never received ADHD treatment before and adolescents who had been followed up and treated with a diagnosis of ADHD were included in the study. It was conducted as a retrospective cross-sectional descriptive study.

Participants whose file information was complete and whose psychiatric examination was evaluated with the Schedule for Mood Disorders and Schizophrenia for School-Age Children-Now and Lifetime Version, Diagnostic and Statistical Manual of Mental Disorders (DSM-5) November 2016-Turkish Adaptation were included in the study. Adolescents with bipolar disorder,

autism spectrum disorder or mental retardation were excluded from the study. The study approved by the Firat University Non-invasive Researches Ethic Committee (approval number: 2020/09-07, date: 12.06.2020) carried out its research in accordance with the principles of the Helsinki Declaration. Informed consent was not obtained from the participants because of retrospective design of the study.

### Sociodemographic Data Form

Sociodemographic data form consists of eleven questions which was planned by the authors. The form included questions regarding gender, age, family structure, family income, and any psychiatric diseases of parents. Family income status was evaluated at three levels. The family income level that below the gross minimum wage was defined as low; between the gross minimum wage and twice the gross minimum wage was defined as medium, and over twice the gross minimum wage was defined as high.

### Schedule for Affective Disorders and Schizophrenia for School-age Children-Present and Lifetime Version, DSM-5 November 2016-Turkish Adaptation (K-SADS-PL-DSM-5-T)

K-SADS-PL-DSM-5-T is a semi-structured interview schedule used to evaluate psychiatric disorders in children and adolescents based on DSM-5 diagnostic criteria. This interview schedule was firstly developed by Kaufman et al. <sup>(19)</sup> in 1997. It was updated again by Kaufman et al. <sup>(19)</sup>, in 2016 according to DSM-5 diagnostic criteria. The validity and reliability of this semi-structured

interview schedule was performed by Ünal et al. <sup>(20)</sup>.

### Statistical Analysis

Statistical analyses were carried out with SPSS version 22.0. Descriptive data related to the quantitative variables were given as the mean  $\pm$  standard deviation, while data related to the qualitative variables were given as numbers and percentages. Pearson Fisher's, chi-square test was used for statistical analysis of qualitative variables. Values of  $p < 0.05$  were accepted as statistically significant.

### RESULTS

This study was conducted with 105 adolescents (73 males, 32 females), 50 (47.7%) of whom were diagnosed with ADHD for the first time. It was determined that 25 adolescents (23.8%) with ADHD have received regular treatment for the last 6 months, and 30 adolescents (28.5%) with ADHD have not continued the treatment regularly. The mean age of the cases was  $13.75 \pm 1.45$  years. It was determined that, in terms of family structure, 89% ( $n=94$ ) of participants live as nuclear family. The vast majority of cases (nearly 83%,  $n=87$ ) report that they lived in urban areas while 17% ( $n=18$ ) report that they lived in rural areas. In addition, 50 (47.6%) participants had a medium family income and 29 (27.6%) participants had a low family income. Moreover, it was found that 10 patients (9.5%) had additional physical diseases such as asthma, diabetes mellitus, and hypertension. The sociodemographic characteristics of participants were shown in Table 1.

		Mean $\pm$ SD	Minimum-maximum
<b>Age</b>		13.75 $\pm$ 1.45	11-16
		<b>n</b>	<b>%</b>
Gender	Female	32	69.5
	Male	73	30.5
Living area	Rural areas	18	17.1
	Urban areas	87	82.9
Family structure	Nuclear	94	89.5
	Extended	11	10.5
Family income	Low	29	27.6
	Middle	50	47.6
	High	26	24.8
Physical illness	No	95	90.5
	Yes	10	9.5

SD: Standard deviation

According to the psychiatric evaluation conducted with K-SADS-PL-DSM-5-T, 64 cases (61%) met only ADHD diagnosis, and 41 cases (39%) met ADHD diagnosis and at least one comorbid psychiatric disorder. The results of comorbid psychiatric disorders were presented in Table 2. The most common comorbid psychiatric disorders of cases were CDs (n=17, 14.3%), and specific learning disorders (LD) (n=9, 8.6%), respectively. These disorders were followed by elimination disorders and obsessive-compulsive disorder (OCD).

The prevalence of comorbid psychiatric disorders in boys was higher than in girls, but this difference was not statistically significant (p=0.664). While determining the relationship between socioeconomic status and comorbid psychiatric disorders, statistical analysis was performed by combining middle and high income groups

**Table 2. Comorbid psychiatric disorder**

Comorbid psychiatric disorder	n	%
No	64	61.0
Conduct disorder/oppositional defiant disorder	17	16.2
Learning disorder	9	8.6
Elimination disorders	4	3.8
Depressive disorder	2	1.9
Anxiety disorder	3	2.9
Obsessive compulsive disorder	4	3.8
Tic disorder	1	1.0
Stuttering	1	1.0

due to the low number of families with high income. It was determined that the prevalence of comorbidity was higher in adolescents with ADHD living in families with low socioeconomic level and the difference between the groups was statistically significant. However, no statistically significant difference was detected between other sociodemographic characteristics (family structure and physical illness) and the presence of comorbid psychiatric disorders (Table 3).

**DISCUSSION**

In this study, the prevalence and the distribution of comorbid psychiatric disorders in adolescents previously diagnosed with ADHD and diagnosed as ADHD for the first time were investigated by using a semi-structured psychiatric interview schedule. It was determined that approximately 40% of patients had comorbid psychiatric disorders and the most common comorbidities were CDs and specific learning disabilities. In addition, no association was found between the presence of comorbid psychiatric disorder and age, gender, familial sociodemographic characteristics and physical illness. In addition, no association was found between the presence of a comorbid psychiatric disorder and other sociodemographic characteristics except socioeconomic level.

In this study, 41 (39%) of 105 patients had comorbid psychiatric disorders. This rate was lower than the rates obtained from other many studies. In a population-based study, Mohammadi et al. (2) reached the result that the prevalence of comorbidity as 61% in children

**Table 3. Presence of psychiatric comorbidities in cases with ADHD according to the sociodemographic characteristics**

		Have psychiatric comorbidity	No psychiatric comorbidity		
		Mean ± SD	Mean ± SD	F	p
Age		13.97±1.48	13.62±1.43	0.058	0.232
		n (%)	n (%)	X <sup>2</sup>	p
Gender	Female	11 (34.4)	21 (65.6)	0.422	0.664
	Male	30 (41.1)	43 (58.9)		
Living area	Rural areas	8 (44.4)	10 (55.6)	0.266	0.607
	Urban areas	33 (37.9)	54 (62.1)		
Family structure	Nuclear	36 (38.3)	58 (61.7)	0.212	0.747
	Extended	5 (45.5)	6 (54.5)		
Family income	Low	16 (55.2)	13 (44.8)	4.377	0.036
	High-middle	25 (32.9)	51 (67.1)		
Physical illness	No	37 (39.4)	57 (60.6)	0.002	1.000
	Yes	4 (40.0)	6 (60.0)		

ADHD: Attention-deficit hyperactivity, SD: Standard deviation

and adolescents with ADHD. In another study with 14,825 children and adolescents with ADHD, Jensen and Steinhausen <sup>(4)</sup> found that 48% of patients had pure ADHD, and 52% had at least one comorbid disorder. Hergüner and Hergüner <sup>(18)</sup> determined that 81% of the adolescents with ADHD had comorbid psychiatric disorders in their study with 133 children and adolescents consisting of clinical samples. Similarly, in another study, the frequency of comorbid psychiatric disorders in adolescents was found as 80% and in this study, there might be several reasons for the low rates of comorbid psychiatric disorders <sup>(17)</sup>. In our study, only a 6-month window was used to evaluate comorbid disorders. Considering developmental comorbidity in ADHD, comorbid psychiatric disorders might not have appeared within this short period of time. Another reason may be methodological differences between studies. Previous studies have been conducted with participants diagnosed as ADHD for the first time <sup>(17,18)</sup>. In this study, apart from newly diagnosed cases, patients who were followed up and treated with ADHD were also included. Previous studies have shown that ADHD treatment has also a therapeutic effect on comorbid psychiatric disorders <sup>(21-25)</sup>. However, inadequate recognition of comorbid disorders in patients could not be completely excluded. Sometimes the severity of comorbid psychiatric disorders is higher than the severity of ADHD and might dominate the clinical picture. Therefore, the underlying ADHD cannot be noticed.

Consistent with the literature findings, the most common comorbid psychiatric disorder in this study was CD/ODD which occur in 16.2% of the cases. In previous studies, it has been found that ODD and/or CD frequently accompanies to ADHD at rates ranging from 16% to 75% <sup>(15,16)</sup>. ADHD is considered as a risk factor for the development of ODD and CD <sup>(26)</sup>. In addition, some studies suggest that the psychosocial outcome of CD/ODD comorbidity is worse than other comorbid psychiatric disorders <sup>(26)</sup>. It has been found that ADHD patients with comorbid CD in childhood have a higher risk of substance use in adulthood <sup>(26)</sup>. In studies which have been conducted with the clinical sample of ADHD cases in our country, the frequency of comorbid ODD and CD is determined as 50% and 75%, respectively <sup>(15,18)</sup>. We think that this inconsistency was due to the methodological differences. Participants in this study consist of an adolescents group only. In addition, adolescents who were diagnosed with ADHD for the first time, as well as adolescents who received treatment for ADHD were included.

In previous studies, it has been suggested that there is a clear association between ADHD and LD <sup>(27)</sup>. And several theories have been suggested to explain this association. One of the mostly supported hypothesis is that both disorders have a common genetic etiology <sup>(28)</sup>. The results of population-based twin researches have reported that there is a strong genetic correlation between ADHD and LD <sup>(29)</sup>. Previous studies state that 8-76% of children and adolescents with ADHD have comorbid LD <sup>(27)</sup>. Most of this variability depends on the difference in methodological procedures. In our study, specific LD were determined as the second most frequently comorbid psychiatric disorders in adolescents with ADHD. In their studies evaluating comorbid psychiatric disorders in children and adolescents with ADHD, Jensen and Steinhausen <sup>(4)</sup> have found specific disorders of development (15.4%) as the second most common comorbid psychiatric disorder. Jensen et al. <sup>(12)</sup> have examined the disorders in the fields of motor, language, and scholastic skill development. In this study, only the disorder in the field of scholastic skill development was evaluated, and only adolescents were included. Therefore, we think that the frequency was lower.

However, while anxiety disorders and depression are among the common psychiatric disorders in children and adolescents with ADHD in previous studies, the prevalence rates of anxiety disorders and depression are quite low in this study. In their study conducted with 14825 children and adolescents, Jensen and Steinhausen <sup>(4)</sup> have found the frequency of anxiety disorder and depression as 2.9% and 1.9%, respectively, which is close to our study. The reason for the low prevalence might be that only a period of 6 months has been used to evaluate comorbid psychiatric disorders in our study. Depression and anxiety disorder have symptoms which could mimic the phenotype of ADHD, including inattention, distractibility, aggression and irritability. Underlying ADHD in patients with depression and anxiety disorders might not be detected in such a short time. Another reason could be that ADHD patients who still receive treatment were included in this study. It has been determined that ADHD pharmacotherapy treatment might have a protective effect for reducing the risk of later major depressive disorder <sup>(25)</sup>. Also, it has been found that ADHD pharmacotherapy reduces the anxiety symptoms <sup>(26)</sup>.

In this study, it was found that the third most frequently comorbid psychiatric disorders were obsessive compulsive disorder and elimination disorders.

Although OCD and ADHD are very different disorders in terms of pathophysiology, phenomenology and treatment protocols, there have been studies showing that there might be a relationship between ADHD and OCD<sup>(30)</sup>. In some studies, it has been determined that the frequency of ADHD-OCD comorbidity varies between 0-60%. Also, it has been reported that among patients with OCD-ADHD comorbidity, the symptoms onset earlier, the symptoms are more severe, and the risk of persistence is higher<sup>(26)</sup>. However, the relationship between these two disorders has not been clearly established yet. Another psychiatric disorder that is associated with ADHD is the elimination disorders (enuresis and encopresis) determined as the third most comorbid disorder in this study. The risk of developing elimination disorders has been found to be higher in children with ADHD<sup>(31)</sup>. Elimination disorders has been detected in 1-28% of children and adolescents with ADHD<sup>(15,16)</sup>. On the other hand, ADHD has also been detected in 30-40% of children with enuretic<sup>(32)</sup>. Because of the key role of neurodevelopmental delay in the ethology of both disorders, these disorders might often accompany with each other<sup>(26)</sup>.

In this study, it is found that age and gender do not affect the presence of comorbid psychiatric disorders. In previous studies, it has been found that the frequency of comorbid psychiatric diagnosis rise with the increase of age and there is a linear relationship between age and number of psychiatric disorders<sup>(18)</sup>. However, not only adolescents but also children have been included in these studies. The results of this study have suggested that age has no effect on presence of the comorbid psychiatric disorder during adolescence. When the effect of gender on the presence of comorbid disorders has been examined, no effect has been found in this study, similarly to previous studies<sup>(18)</sup>. The absence of a relationship between the sociodemographic characteristics of the adolescent and his/her family (except socioeconomic level) and the presence of comorbid psychiatric disorder has suggested that comorbid psychiatric disorders are directly related to ADHD, regardless of these factors<sup>(18)</sup>.

In previous studies, it has been shown that there is a negative relationship between socioeconomic status and health problems. It has been found that individuals with low socioeconomic levels have more health problems. Larson et al.<sup>(13)</sup> have stated that children and adolescents

diagnosed with ADHD with a low socioeconomic level have more comorbid psychiatric disorders. Similarly, in another study, it has been shown that comorbidity is more common in adolescents with ADHD with a low socioeconomic level<sup>(14)</sup>. In current study, comorbidity was found to be higher in adolescents with low socioeconomic level, in line with literature data.

### Study Limitations

This study had some potential limitations. It was a cross-sectional study, and had a limited sample size. Among the participants, there were adolescents who were both diagnosed for the first time and previously treated for ADHD. Data was obtained by retrospective examination of patient records. Since the study was conducted retrospectively, complete information about the patients' past treatment processes could not be obtained, and the effect of the treatment processes on comorbid psychiatric disorders could not be clearly evaluated. Also, since there was no control group in our study, no comparison was made in terms of the prevalence and the distribution of psychiatric disorders. For these reasons, the findings of the study could not be adapted to the general population. In addition, another limitation was that the ADHD diagnosis subtypes could not be made. Despite these limitations, the fact that this study was carried out in a clinical sample of adolescents who were diagnosed for the first time as ADHD, and followed up with ADHD, and that psychiatric disorders were identified by a semi-structured interview schedule constituted the strengths of this study.

### CONCLUSION

The prevalence of comorbid psychiatric disorders in adolescents with ADHD was determined as 39% in this study, and the prevalence of comorbidity was found to be higher in adolescents with ADHD living in families with low socioeconomic level. The most common comorbidities were found as CD/ODD, learning disorder, OCD and elimination disorders, respectively. Depressive disorders and anxiety disorders, tic disorders, and stuttering also accompanied with ADHD. Comorbidity of other psychiatric disorders in ADHD aggravates the clinical picture, worsens the course, makes treatment difficult and increases the cost of the treatment<sup>(18)</sup>. Therefore, it can be said that it is crucial to investigate comorbid psychiatric disorders in adolescents diagnosed as ADHD, especially in adolescents with ADHD living in families with low socioeconomic level.

## Ethics

**Ethics Committee Approval:** The study approved by the Firat University Non-invasive Researches Ethic Committee (approval number: 2020/09-07, date: 12.06.2020).

**Informed Consent:** Informed consent was not obtained from the participants because of retrospective design of the study.

**Peer-review:** Externally and internally peer-reviewed.

## Author Contributions

**Surgical and Medical Practices:** S.K., Y.E.D., **Concept:** S.K., Y.E.D., **Design:** S.K., Y.E.D., **Data Collection and/or Processing:** S.K., Y.E.D., **Analysis and/or Interpretation:** S.K., Y.E.D., **Literature Search:** S.K., Y.E.D., **Writing:** S.K., Y.E.D.

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