

# Comparison of High School Entrance Exam Scores of Children with Hyperactivity Disorder Before and After Treatment: A Retrospective Evaluation

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## ABSTRACT

Comparison of high school entrance exam scores of children with hyperactivity disorder before and after treatment: a retrospective evaluation

**Objective:** In this study, we aimed to investigate the effect of the treatment in children with Attention Deficit Hyperactivity Disorder (ADHD) on High School Entrance Exam scores.

**Method:** Forty five students of seventh and eighth grades, who referred to our clinic in the academic year of 2009-2010 and diagnosed with ADHD were included in this study. ADHD diagnoses had been made with the help of family interviews, child interviews, family and teacher questionnaires and DSM-IV. Results were obtained via examination of the records retrospectively.

**Results:** We have found that 32 of 35 cases (91.4%) had increased scores and 3 cases (8.6%) had decreased scores after medication. High School Entrance Exam average scores was 371.6 before the treatment and 401.9 after, and the difference between the two scores was statistically significant. The average treatment duration was 4.4 months.

**Discussion:** Our study shows ADHD treatment has positive effects on High School Entrance Exam scores. Also, we found that ADHD treatment has positive impact on academic progress and child, family and educators must be aware about this situation.

**Key words:** Attention deficit hyperactivity disorder, academic achievement, high school entrance exam

## ÖZET

Hiperaktivite bozukluğunda tedavi öncesi ve sonrası seviye belirleme sınavı puanlarının karşılaştırılması: Retrospektif bir değerlendirme

**Amaç:** Bu çalışmada, Dikkat Eksikliği Hiperaktivite Bozukluğu (DEHB) tanısı konan çocukların tedavilerinin Seviye Belirleme Sınavı (SBS) puanları üzerine olan etkisinin araştırılması amaçlanmıştır.

**Yöntem:** Bu çalışma, 2009-2010 öğretim yılında Konya Eğitim ve Araştırma Hastanesi polikliniğine başvuran ve DEHB tanısı alan ilköğretim 7. ve 8. sınıf öğrencisi 35 olgunun dosyalarının incelenmesi yoluyla yapılmış, geriye dönük bir çalışmadır. DEHB tanısı; çocuklar ve aileleriyle yapılan görüşmelere, aile ve öğretmenlere yöneltilen anketlere ve DSM-IV kriterlerine dayandırılmıştır. Muayene sonuçları, kayıtlar retrospektif olarak incelenerek elde edilmiştir.

**Bulgular:** Otuz beş olgunun 32'sinde (%91.4), ilaç tedavisi ile girdikleri SBS'den aldıkları puanlarda, önceki yıllarda girdikleri sınavlara kıyasla artış saptanırken, 3'ünde (%8.6) düşme saptandı. Olguların tedavi görmeden girdikleri SBS puan ortalamaları 371.6, tedaviden sonraki SBS puan ortalaması ise 401.9 olarak bulundu ve iki puan arası fark istatistiksel olarak anlamlıydı. Olguların ortalama tedavi sürelerinin 4.4 ay olduğu tesbit edildi.

**Tartışma:** Çalışmamızda DEHB'li çocukların tedavilerinin, bu çocukların SBS puanları üzerinde anlamlı derecede artışa sebep olduğu bulunmuştur. Bu sonuç, DEHB'li çocukların tedavi edilmesinin akademik hayatları üzerinde olumlu etkileri olacağını düşündürmektedir. Bu konuda çocuk, aile ve eğitimcilerin bilgilendirilmesi önemlidir.

**Anahtar kelimeler:** Dikkat eksikliği hiperaktivite bozukluğu, akademik başarı, seviye belirleme sınavı

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## INTRODUCTION

ADHD is a prevalent disorder affects approximately 7-8% of school-age children (1) and characterized by excessive mobility, inattention and impulsivity

which is inappropriate for that level of development (2). ADHD impair family, teacher and friend relations and reduce academic performance by affecting behaviors and performance of the children at both home and school environment when not treated

appropriately (3).

School performance is one of the most important areas which is affected by ADHD in child's life. It was found that reading and mathematics skills of children with ADHD are lower than their peers, receive lower grades and experience more class repetitions and school leaving than their peers (4-6). These studies were generally done abroad and there are only few studies done in Turkey. In the study of Çakaloz et al. (7), school performance of children with ADHD was found lower than control group.

It is known that ADHD symptoms continue in adolescence and adulthood. Adults who were diagnosed as ADHD in childhood had 2-3 years less education compared to control group. When their lower professional status, higher number of problems in professional life and lower professional performance are considered (8), it is clear that this disorder will produce consequences which will affect the whole life of the individual negatively.

Level Determination Exams (SBS) which have been performed at 6, 7 and 8<sup>th</sup> grades till 2010 have critical importance for the school life of children. Reducing the number of exams to a single one has been studied recently. Children have the chance to get their high school education in a better school which is critical before university according to their success at these exams. Lower exam success is inevitable when main symptoms of ADHD which are excessive mobility, impulsivity and inattention are not treated. When 7-8% prevalence rate of ADHD in school-age children is considered, number of students with ADHD is noteworthy in SBS which nearly 3 million students enter every year.

In this study, we aimed to investigate the effect of medications administered in children with on their SBS scores which are important in school lives of these children.

## METHODS

This study was planned as a retrospective record survey. File records of 45 cases who were at 7 and 8<sup>th</sup> grade of primary school and diagnosed as ADHD at

Child Mental Health and Diseases outpatient clinic of in 2009-2010 school year. ADHD was diagnosed by information obtained from family, interview done with the child, information obtained from teacher and clinical interviews which DSM-IV diagnostic criteria were thoroughly evaluated after all these evaluations. Exam scores were accessed from retrospective records and these scores were subsequently confirmed by calling the families. Inclusion criteria were taking SBS without previously medicated, IQ score of at least 80 and maintaining regular medication use till 2010 SBS exam. Ten out of 45 cases were excluded due to absence at control appointment visits and/or irregular medication use after evaluating records retrospectively. When evaluating increases at SBS scores, difference between scores obtained from exams of 2008 and 2009 and 2010. SBS score of 2010 were compared to exam scores of 6<sup>th</sup> grade for grade 7 students and compared to arithmetical mean of two exams entered at 6<sup>th</sup> and 7<sup>th</sup> grades for 8<sup>th</sup> grade students. Paired t-test was used to compare pre- and post-treatment SBS scores and  $p < 0.05$  was taken as level of significance. Approval was obtained from Ethical Committee of Selçuk University Selçuklu Medical School.

## RESULTS

Gender distribution was 5 girls (14.3%) and 30 boys (85.7%) out of 35 cases recruited. While 23 students (65.7%) were going to 7<sup>th</sup> grade but took the exam only at 6<sup>th</sup> grade, 12 students (34.3%) were going to 8<sup>th</sup> grade and took SBS at both 6<sup>th</sup> and 7<sup>th</sup> grades. Twenty cases (57.1%) were followed-up for ADHD-combined type and 15 cases (42.9%) were followed-up for ADHD-attention deficit predominant type. Although thirty-five cases had a history of admission to child psychiatry outpatient clinics, they did not continue their follow-ups and treatments regularly. Thirty cases were using OROS-methylphenidate which is a slow-release preparation of methylphenidate and 5 cases were using short-acting methylphenidate as treatment. Cases were using OROS-methylphenidate in 18-72 mg/day dose range and short-acting methylphenidate OROS in 0.5-1.2 mg/day dose range. Patients are evaluated for

adverse effects at the following 10<sup>th</sup> day after methylphenidate started, dose is adjusted according to body weight and followed-up in one month intervals thereafter. Thirty-two cases out of 35 (91.4%) received higher scores from SBS while their treatments continue compared to previous exams and 3 cases (8.6%) received lower scores. Average pre-treatment SBS scores of cases was  $371.6 \pm 489$  and average post-treatment score was found  $401.9 \pm 55.3$  and difference between two scores was statistically significant ( $p < 0.001$ ). Average treatment duration was calculated as  $4.4 \pm 2.7$  months.

## DISCUSSION

ADHD is an important disorder affecting academic performance of the child. Academic success of children with ADHD was found to be lower compared to their peers in previous studies (7,9,10). Tests assessing academic skills in mathematics and reading were generally used in studies done abroad; however, performance status could not be compared quantitatively in studies done in Turkey due to lack of these tests. For example, Çakaloz et al. (7) assessed the performance status as high or low, Öztürk et al. (11) evaluated by using mental and school status sub-scales of Piers-Harris Children's Self-Concept Scale. Kabakuş et al. (12) found that ADHD treatment increased school performance of children but school performance was not reported as scores in this study. Loe et al. (13) suggested to use standardized studies assessing performance objectively such as college exams rather than studies using standardized tests and school performance scores: It can be predicted that school scores can be different for each school due to system differences and standard tests may not always reflect school performance. Likewise, result of the General Certificate of Secondary Education exam which reflects school performance in adolescence was used in another study recently done in Britain (14). We compared the pre- and post-treatment scores of children with ADHD obtained from SBS in our study and found a significantly higher increase in post-treatment exam scores.

Twenty cases (57.1%) were ADHD-combined type and 15 cases were (42.9%) were ADHD-attention-deficit

type out of 35 cases. Distribution of ADHD sub-types was reported as 70-80% combined type, 2-10% hyperactive type and 10-20% attention deficit type (15). Higher prevalence of attention-deficit type compared to literature in our study may be due to detecting cases in adolescence period and having cases with predominantly inattention symptoms such as exam failure. Applegate et al. (16) reported that 43% of cases with ADHD-attention deficit type are not symptomatic and are not diagnosed until school age. Tahiroğlu et al. (17) suggested that group with predominant attention deficit do not show important behavioral problems so they could not be diagnosed until last years of primary school. For this reason, treatment of these children are generally started late and these children make up mostly untreated group with ADHD (18,19,20). Efficacy of stimulant drugs on main symptoms of ADHD has been proven by several studies. Powers et al. (21) showed that treatment by stimulants increase academic performance in adolescents with ADHD. Scheffler et al. (22) found increase in academic performance of children with ADHD using medications at primary school period. All cases of our study were using stimulant drugs and a significant increase at SBS scores of 91.4% of these cases compared to exams while they were untreated.

One of the consequences of academic failure in ADHD at adolescent period is its effect on self-esteem. Low self-esteem was reported in children with ADHD in different studies (23,24). Öztürk et al. (11) reported that cases with ADHD using stimulants have more positive emotions and thoughts about school performance and mental status compared to cases not using them. Negative impact on self-esteem of adolescent getting lower scores from general evaluation exams such as SBS compared to his/her peers is inevitable. Being less successful of an individual with ADHD compared to his/her own mental capacity and not entering to a high school desired will both negatively affect self-esteem and cause lower performance than expected throughout his/her high school and following school life. Low academic performances of children with ADHD in longitudinal follow-up studies support our finding (10).

Main limitation of this study is lack of a control group consisting of case diagnosed with ADHD but remain untreated. Studies having control groups will contribute to understand the effect of treatments of children with ADHD on performance in exams such as SBS. Moreover, making diagnosis by clinical and structured interviews and not determining psychiatric disorders comorbid with ADHD is another limitation. This study is among a few studies in the literature evaluating whether treatment of ADHD contributes any difference on academic success assessed by a centralized exam.

## CONCLUSION

ADHD is among the most prevalent psychiatric disorders seen in children and adolescents at all populations. ADHD is a disorder which negatively affects self-esteem and academic performance of children and adolescents when untreated. For this

reason, it is important to diagnose and treat this disorder, inform families, teachers and educational institutions and make arrangements in these exams for these children. Studies report that although teaching staff know about the effects of cognitive skills and motivation on academic performance, their awareness about ADHD symptoms which is as important as these two areas is low (14). Results of this study emphasize the effect of drug treatment on academic field which is one of the problematic areas in ADHD. However, it is necessary to mention that treatment of ADHD is an integrated therapy covering all other areas problematic in ADHD treatment and medications used in treatment are not needed only to increase school performance or exam scores in particular.

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