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**THE EFFECT OF ATTENTION GAMES ON SYMPTOMS OF  
ATTENTION DEFICIT/HYPERACTIVITY DISORDER IN  
STUDENTS OF ELEMENTARY SCHOOLS**

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## ABSTRACT

**Aim:** One of the most prevalent pervasive development disorders is attention deficit/hyperactivity disorder (ADHD). The present study was conducted to investigate the effect of attention games on symptoms of attention deficit/hyperactivity disorder in male students of elementary schools.

**Methods:** This study was a semi experimental study. The study population consisted of all male elementary students with ADHD in Bouin Miandasht County in 2013-2014. For this study, the participants were randomly enrolled and then assigned to two case and control groups. Then Connor's questionnaire (for parents and teachers) was used to gather data.

Firstly, a pretest was administered to the two groups. Then case group performed attention games individually for 30-45 min within eight sessions. At the completion of sessions, a post-test was administered to both groups by Connor's questionnaire. Descriptive statistics (mean and standard deviation) and analytical statistics (ANCOVA) in SPSS were used for data analysis.

**Results:** Analysis of covariance indicated no significant difference between the two groups before the intervention, but attention games had a significant effect on ADHD symptoms including hyperactivity-impulsivity and inattention in the treatment group after the intervention ( $P < 0.05$ ).

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**Conclusion:** Given many side effects caused by drugs in children with ADHD, attention games are recommended to control and moderate these children activities.

## INTRODUCTION

Attention deficit/hyperactivity disorder (ADHD) is currently absorbing the attention of many experts, teachers, and parents (1, 2). This disorder is most common psychiatric diagnoses in children and adolescents (3) and characterized by a pattern of behavior, present in school and home that can result in performance subject. As far as, this disorder (DSM-IV) is classified into inattention and hyperactivity and impulsivity categories consisting of behaviors like difficulty organizing tasks and activities, lack of attention to details will accompany verbalizing, forgetting, or Skipping out (4). ADHD causes many problems for children's academic, cognitive, social, emotional function, some problems for adults' occupational, family function (5), Sleep disturbances (6), adverse health effect (7) and decrease quality of life in this patients (8). Students with ADHD had lower school performance and orderliness reported by the school and is correlated with poor performance (2, 9). Early diagnosis of and intervention for ADHD help to diagnose and treat many disorders such as oppositional defiant disorder, conduct disorder, learning disability, and educational problems (10).

Among types of ADHD, hyperactive type was higher prevalence in boys, and inattentive type was more frequent in girls (11). Approximately 5-10 % of school age children are affected with this disorder (12). A study was conducted in Iran, indicate prevalence of ADHD in elementary schools was 9.7% (13).

Play can be used as a standard to help therapist work together with children and help them express their feelings and emotions. Due to its focus on the developmental needs of ADHD children, play therapy is widely used as an intervention for children's emotional and behavioral problems. Play therapy has been particularly designed to be developmentally suitable for children and is based on the idea that children communicate and express inner disagreements and emotions through play (14, 15).

According to studies, although play-based intervention can reduce symptoms of ADHD, but Further studies warranted regarding appropriateness (16).

Chronic diseases can cause negative effects on quality of life and various aspect of health (17-21).

ADHD one of them that causes many problems for school children's and also affects their adulthood, early diagnosis and intervention is vital. In educational arena, nowadays, experts, authorities, and even teachers and trainers face students with many behavioral and emotional problems and disorders (2, 22). The behavioral disorders greatly affect children's educational status and social growth, so that the children cannot develop healthily and appropriately (23). Therefore, the present study is conducted to study the effect of attention games on symptoms of attention deficit/hyperactivity disorder in male students of elementary schools in western Iran.

## PATIENTS AND METHODS

In this semi-experimental, study population were all male elementary school students diagnosed with ADHD referring Counseling Center of Bouin Miandasht County, southwest Iran. With reference to a statistician's advice, previous studies, and formula of sample size calculation, a sample size of 40 individuals was determined for this study. As dropout was very likely, 60 students were randomly enrolled and then assigned to two case and control groups.

Case group played two sessions (30-45 min) per week for four weeks in the sports hall (24). The plays determined for these sessions were done by some useful methods that contribute positively to children's concentration and self-control. A single play was done by children in each session.

Play therapy sessions processed for children diagnosed for ADHD:

First session: Drawing/painting (house, tree, manikin), puppet play, accuracy and precision measurement, win/lose game (basketball), puzzles solving.

Second session: Knock/clock game, storytelling, book reviewing, harmony game (golf), chair and song game, puzzle solving, word repetition, make friend with flower (flower growing), vision training cards.

Third session: Knock/clock game, storytelling, book reviewing, painting, harmony and win/lose game (bowling), puzzles solving, dot/line extension drawing, puzzle, vision training cards.

Fourth session: Knock/clock game, storytelling, book reviewing, token receiving goodwill game, dot/line extension drawing and coloring, vision training cards, dart and circle play, Litterbag technique.

Fifth session: Knock/clock game, storytelling, token receiving counting, clay game, mine implanting

game, vision training cards, nut and screw game, Litterbag technique

Sixth session: Knock/clock game, storytelling, token receiving counting, vision training cards, finger painting, house building game, fantasy play, and Litterbag technique.

Seventh session: Knock/clock game, storytelling, playing with animals, token receiving counting, win/lose game (tennis), words repetition game, Litterbag technique, puzzle solving, list my goodwill game, sequentially instructions game, Litterbag technique.

Eighth session: Knock/clock game, storytelling, words repetition game, puzzle solving, snake and ladder game, clay play, token receiving counting, Litterbag technique, nut and string play, objects setting game (24).

The inclusion criteria into the study were definite diagnosis of ADHD by specialist, consent to participate in the study, and ability to talk, move, and do daily activities. And the exclusion criteria from the study were failure to complete playing for any reasons and cooperate. In this study, 20 students (10 in case group and 10 in control group) were excluded from the study for various reasons.

In this study Connors Questionnaire [teacher and parent rating scale] and demographic characteristics questionnaire were used to gather data.

Connors Questionnaire validity (parent scale) sensitivity and specificity were reported 95% and 90%, respectively (25) Connors Questionnaire validity (teacher scale) has been already obtained 0.90, as well (25). Connors Questionnaire (teachers' scale): This questionnaire consists of 38 items and the total score ranges from 0 to 114. The scores above 57 represent attention deficit. The higher the score, the more severe the child's disorder and vice versa. Method of scoring: Teacher or parents should wonder how much the

problem has been severe within the past month and tick the best possible choice. Never (score 0) represents that the problem has not been existing; occasionally presenting problem or partial presentation of the problem is represented by occasional or a little [score 1]; score 2 represents frequent or average presentation of the problem, and score 3 stands for full presentation denoted by very much.

Reliability of instruments with Cronbach's alpha has been totally derived 0.86 for Connors Questionnaire (teacher scale), and 0.74 for hyperactivity subscale and up to 0.89 for attention deficit subscale (Study of Standardization and Psychometric Properties of Connors Questionnaire [teacher scale]), (25). Connors Questionnaire validity and reliability were reported 0.75-0.90 by studies undertaken by Institute of Cognitive Science in Iran (22). In this study, the teachers and parents filled out Connors Attention Deficit/Hyperactivity Diagnosis Questionnaire (parent and teacher scale) before and after the intervention in case and control groups.

In the present study, descriptive statistics (mean [standard deviation]) and analytical statistics [analysis of covariance] in SPSS were used for data analysis.

## RESULTS

Most [6.25%] of the participants were third child of family and most (1.23%) participants' fathers were self-employed. Most participants' fathers and mothers (6.25% and 4.15%, respectively) had high school completion certificate.

For pretest, mean (standard deviation) score of pretest impulsivity and attention deficit was not notably different between the students of two groups, but the score of post-test was lower in the case group than the control (Table 1).

**Table 1.** Mean (standard deviation) scores of impulsivity and attention deficit in students.

| Groups                   | Case pretest |     | Control pretest |     | Case post-test |      | Control Post-test |      |
|--------------------------|--------------|-----|-----------------|-----|----------------|------|-------------------|------|
|                          | Mean         | SD  | Mean            | SD  | Mean           | SD   | Mean              | SD   |
| <b>Impulsivity</b>       | 17.6         | 2.4 | 15.25           | 1.8 | 12.9           | 1.6  | 17                | 3.04 |
| <b>Attention deficit</b> | 15.65        | 2.1 | 15.2            | 1.9 | 11.75          | 1.16 | 15.25             | 1.8  |

SD: standard deviation

ANCOVA indicated no statistically significant difference between the two groups before the intervention, but by removing the pretest scores of hyperactivity as a covariate, the playing main effect on

ADHD was derived significant from the teachers' perspectives  $p < 0.001$ .

This rate was obtained 59.2, that is, 59.2% of the whole difference is explained by plays effect in case

group. However, by removing the post-test scores of hyperactivity as a covariate, the playing main effect on

ADHD was not derived significant from the parents' perspectives ( $p>0.22$ ) (Table 2).

**Table 2.** Main effect of playing on attention deficit/hyperactivity from teachers perspective.

| Source  |                      | SS     | df | MS     | F     | P     | Eta <sup>2</sup> |
|---|----------------------|--------|----|--------|-------|-------|------------------|
| <b>Attention deficit/hyperactivity pretest scores</b> | Teachers perspective | 4.42   | 1  | 4.42   | 1.8   | 0.179 |                  |
|   | Parents perspective  | 31.91  | 1  | 31.91  | 2.22  | 0.144 |                  |
| <b>Group</b>  | Teachers perspective | 126.22 | 1  | 126.22 | 53.63 | 0     | 0.592            |
|   | Parents perspective  | 22.35  | 1  | 22.35  | 1.55  | 0.22  | 0.04             |
| <b>Residual error</b>                                 | Teachers perspective | 87.07  | 37 | 2.35   |       |       |                  |
|   | Parents perspective  | 530    | 37 | 14.34  |       |       |                  |
| <b>Total</b>  | Teachers perspective | 214    | 39 |        |       |       |                  |
|   | Parents perspective  | 56.4   | 39 |        |       |       |                  |

ANCOVA indicated that by removing the pretest scores of hyperactivity as a covariate, the playing main effect on ADHD was derived significant from the parents' and teachers' perspectives  $<0.001$ . Eta<sup>2</sup> indicates the effect rate of group membership on dependent variable, which was obtained 47.3%.

Therefore, the hypothesis H1 stating that attention games are effective on students' ADHD symptoms from the parents' and teachers' perspectives is confirmed at 95% confidence interval. Overall the findings showed that attention games were effective in reducing ADHD symptoms (Table 3).

**Table 3.** Training main effect on hyperactivity/impulsivity in post-test from parents and teachers perspective.

| Source  |                      | SS     | df | MS     | F     | P        | Eta <sup>2</sup> |
|---|----------------------|--------|----|--------|-------|----------|------------------|
| <b>Attention deficit/hyperactivity pretest scores</b> | Teachers perspective | 4.42   | 1  | 4.42   | 1.88  | 0.179    |                  |
|   | Parents perspective  | 0.541  | 1  | 0.541  | 0.088 | 0.769    |                  |
| <b>Group</b>  | Teachers perspective | 126.22 | 1  | 126.22 | 53.63 | $<0.001$ | 0.592            |
|   | Parents perspective  | 205.22 | 1  | 205.22 | 33.18 | $<0.001$ | 0.473            |
| <b>Residual error</b>                                 | Teachers perspective | 87.07  | 37 | 2.35   |       |          |                  |
|   | Parents perspective  | 228.8  | 37 | 6.18   |       |          |                  |
| <b>Total</b>  | Teachers perspective | 214    | 39 |        |       |          |                  |
|   | Parents perspective  | 2182   | 39 |        |       |          |                  |

## DISCUSSION

The findings indicated that attention games are effective on ADHD symptoms in the involved students. The present study findings are consistent with Ray et al (26) and Schaefer et al (15). Studies confirmed the positive contribution of play therapy on ADHD symptoms.

In Panksepp et al study tested the ability of right frontal lesions to induce hyperactivity in rats. Besides, evaluated the effects of chronic play therapy during early adolescence reduce both hyperactivity and the elevated playfulness later in development. Play therapy was able to reduce both hyperactivity and excessive playfulness. In addition they founded that access to rough-and-tumble play in normal animals could enhance subsequent behavioral indices of behavioral inhibition that appeared to be independent of increased fearfulness and fatigue. Overall, these results suggest that neonatal frontal lobe lesions can be used as an animal model of the over activity in ADHD (27) and rough-and-tumble play therapy may be a new useful treatment for ADHD (13).

Some type of modeling ADHD in human. Playing is thought to help self-control and other executive functions develop appropriately (27).

Abdollahian et al (28) study of effectiveness of cognitive-behavioural play therapy on the symptoms of attention deficit hyperactivity disorder in children. They indicate Play therapy can be reduce the symptoms of ADHD. Play therapy can be used as an efficacious treatment method for children with ADHD. The findings indicated that the ADHD symptoms and response errors decreased significantly and response time increased in case group compared to the control group in post-test. Also Mazurek et al showed that play therapy could be an effective approach to treating ADHD (29).

Ray et al and Gentile et al studies results demonstrated that the children with ADHD developed attention deficit and impulsivity. As the tests do not assess themselves in playing and, as with schooling, do not think of error in playing as leading to losing opportunities, then they are likely to respond more deliberately during these activities and situations, and hence arrive at correct answers more frequently (26, 30). It should be noted Play too much, leading to increased symptoms. Gentile et al study results demonstrated spend more time playing video games subsequently have more attention problems, even when earlier attention problems, sex, age, race, and socioeconomic status are statistically controlled. Violent content may have a

unique effect on attention problems and impulsiveness, but total time spent with video games appears to be a more consistent predictor. Individuals who are more impulsive or have more attention problems subsequently spend more time playing video games, even when initial video game playing is statistically controlled, suggesting bidirectional causality between video game playing and attention problems/impulsiveness (30).

Further, the findings indicated that attention games were effective on the symptoms of attention deficit in the patients with ADHD. The present study findings are consistent with Moro et al (2006), Lim et al (2012), and Dovies et al (2012) for the efficacy of playing on attention deficit. (31-33). Muro et al study (2006) indicated that the children attending 32 sessions significantly improved in all the scales including RSS and ADHD symptoms, particularly attention deficit, as compared to the control group. Lim et al (2012) demonstrated a positive correlation between computer teaching software and attention development in brain, which could be applied to treat ADHD. Dovies et al (2012) study of children with ADHD indicated that memory impairment was caused because of poor motivation. Hence, playing could be an economical approach to minimizing executive children in the children with ADHD (31-33).

The findings indicated that teaching games caused a significant relief of attention deficit symptoms in the case group compared to the control group. The children with ADHD are not able to organize their behaviors and have difficulty focusing their attention. These children are described as external control locus, meaning that the environmental forces control their behaviors (34).

Results study also indicated that by removing the pretest scores of hyperactivity as a covariate, the playing main effect on ADHD was derived significant from the teachers' perspectives Attention games, because of their nature, deal with children's carefulness, concentration, perception, and distributed and focused attention and challenge such cognitive domains. In a study showed, teachers can diagnose cognitive disorders and predict homework problems more properly in school-aged children with ADHD (35). Because of being attractive and novel, these games attract children, in fact promoting the level of arousal and enhancing attention. In these games, children's attention is absorbed by colors, forms, voices, and situations, and a variety of cognitive domains is involved, including perception, memory, and attention.

Of the limitations of this study can be pointed out to the difficulty of work with children with ADHD

and lack of simultaneous investigation of psychological and ADHD disorders.

## CONCLUSION

The result of this study is indicated that attention game can alleviate the symptoms of children with ADHD disorders. It is suggested that some interventions such as playing, alongside pharmacotherapy and other approaches, should be used to decrease the symptoms and improve the function in the students with ADHD.

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