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Evaluating the effectiveness of chess as a therapeutic tool in the comprehensive management of ADHD

Neilay Krishna Agarwal[1*]

[1] *Gems Modern Academy, High School Senior, Dubai, UAE*

ABSTRACT

Using databases such as PubMed and Google Scholar with the keywords "Chess" and "ADHD", this study was conducted to review the literature on the usefulness of chess in patients with ADHD. The most relevant articles were searched using the following criteria: English language, and all types of studies published in a medical journal. A total 12 articles were identified. Of a total of 12 articles, 4 met the inclusion criteria and were subsequently reviewed. The results of the review showed that chess therapy/training is effective in the management of ADHD patients in terms of reducing symptoms and severity. Due to its effectiveness, playful nature, high adherence and low cost, it can be used as a therapeutic tool in multimodal management to improve ADHD symptoms. Considering the limited number of published studies in this field, our findings need to be confirmed by further controlled, randomized and extended studies. In our investigation, we found no study evaluating the effectiveness of chess in the adult subgroup of the ADHD population.

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***Corresponding author:**

Neilay Krishna Agarwal,

Gems Modern Academy, High School Senior, Building 22, Ewan residences DIP-1, Dubai, UAE

E-mail: pragyagarg129@gmail.com

Introduction

Attention deficit hyperactivity disorder (ADHD) is a clinically varied neurodevelopmental disorder characterized by hyperactivity, inattention, and impulsivity. Currently it is considered one of the most common neuropsychiatric diseases of childhood, which may continue later in adult life.

In adults, it is mainly manifested by dysfunction of an executive task, inattention, impulsivity, emotional disturbances, and restlessness. Generally, the symptoms of inattention are more common, and the presence of all symptoms collectively leads to profound impairment in functioning [1].

First-line treatment of adult ADHD includes combined medication and cognitive-behavioural therapy (CBT). This strategy of combining chess therapy with treatment appears to contribute to mutual benefits, indicating that their combination leads to better outcomes. Other types of psychotherapies used in adult ADHD include dialectical behavioural therapy and mindfulness meditation. Therapies which appear to be promising for ADHD includes music therapy and physical therapy. Chess games have also been reported to show benefit in a few smaller studies [2,3].

The multimodal management of ADHD is centered around pharmacological therapy and psychotherapy, which primarily includes CBT and psychoeducation for parents and teachers. While combination therapy is preferred over monotherapy because of a better outcome, these therapies cannot be associated to all patients because of parents'/ patients' preferences, cost, and side effects. Researchers are investigating new ways which are effective, cheap, more attractive, and devoid of side effects for treating ADHD. The cognitive skills required to play chess reflect the deficits present in ADHD patients, providing a reason to consider chess as a therapeutic option for the management of this population [4].

Chess is a game which is inexpensive, devoid of any side effects and utilizes those areas of executive functioning which are impaired in the ADHD population. Thus, within this frame of reference, testing the presumed remedial benefit of chess training, a thousand-year-old game which may have the potential to improve concentration and attention, is not only fascinating but rewarding [5].

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As a consequence, we decided to review the existing literature on the utility of chess in the management of the ADHD population.

Materials and Methods

To collect data on the utility of chess as a therapeutic tool in the multimodal management of ADHD patients, a literature search was conducted in accordance with the profile articles for systematic reviews and meta-analysis (PRISMA) using PubMed and Google Scholar as databases. The keywords used were "Chess' and "ADHD" and the date chosen was 19 January 2023.

The inclusion criteria were all trials in peer-reviewed English medical journals with full-text availability. The search identified a total of 12 articles. Two articles were excluded because of duplicity, 1 article for incompleteness (study protocol), 2 for their non-trial type (review articles), and 3 for their publication in other than medical journals. Finally, 4 studies were reviewed. The search algorithm used is presented in Figure 1.

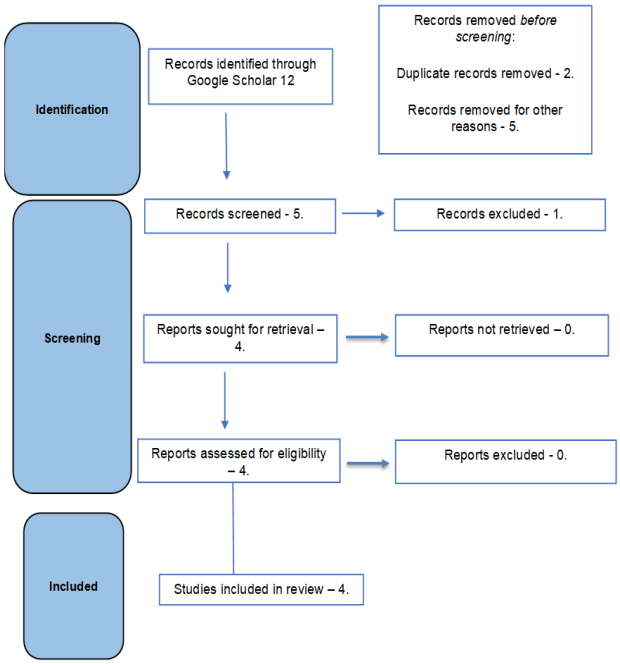


Figure 1. The search algorithm used for study selection

Results

Out of a total of 12 articles, 4 satisfied the inclusion criteria and were subsequently reviewed. The total number of study participants were 229 with age ranging from 6-17 years. An overview of the studies on the effect of chess therapy in the ADHD population is shown in Table 1. In a study by Amouzadeh et al., 64 children diagnosed with ADHD were randomized to four groups of control, chess training, commercial computer games and a combined group [6].

After a training of 11 weeks, each group was re-evaluated. Pre- and post-evaluation were performed using Conner's rating scale for parents (CPRS-HI) and Swanson, Nolan and Pelham scale for parents (SNAP-IV). They found large effect in reducing the symptoms of ADHD in intervention group but statistically insignificant difference between chess training group and commercial computer games group. They concluded that chess training has positive effects, therefore it should be administered to improve ADHD symptoms in this population [6].

Another study by Blasco-Fontecilla et al. without any control group on 44 children with ADHD revealed that children improved in both the CPRS-HI and SNAP-IV and the effect was large [7]. The improvement was noted in both inattention and hyperactivity-impulsivity. According to the result of the study, chess has beneficial effects in ADHD, and it should be the part of multimodal treatment in ADHD. At the same time, they warned that studies with better design should be conducted to replicate their findings [7].

In a study by Sahar Gindi et al. the authors investigated whether chess training contributes to inhibitory control [8]. The study was done in teenagers with and without ADHD. In this study, participants were given a visual-spatial assignment which was prepared for the study. It consisted of two different conditions: In the first condition, also called as "free" condition, participants were given free hand to test varied options before finalizing the result. In the second condition, also known as "touch-move" condition, participants were requested to respond without making any physical efforts.

They were also exposed to the "Go/No-go" task. Their result revealed that only the "touch-move" situation resulted in the group difference, wherein players who do not play chess are performing poorly compared to those who play chess, irrespective of diagnosis. They concluded that non-chess players were more impulsive than chess players [8].

In another study by ElDaou et al., it was evaluated whether playing chess affects the concentration of students with ADHD [9]. They hypothesized that chess enhances listening language skills and concentration. Students were first trained on the movement of every piece with its value. Subsequently, they were given a lesson on chess puzzles, position tasks and approaches to checkmate, and finally the possibility of the full game. Pre- and post-measurements of Conner's Teacher scale, language listening tests and concentration tasks were performed.

Their result showed that playing chess has a positive effect on their concentration period and skill and children take a longer duration until they start displaying unacceptable and undesirable actions. They concluded that it is relevant for ADHD children to train in chess as it helps them to maintain longer on the given task, limits undesirable activities and stay focused [9].

Table 1: An overview of the studies reporting the effectiveness of chess in ADHD.

Authors	Participants	Intervention	Impact	Effect size	Limitation
Blasco-Fontecilla et al.	44 children with ADHD (6-17 years old)	Weekly one hour session over a period of 11 consecutive weeks taught by a chess expert.	Significant improvement in severity of ADHD (both inattention and hyperactivity-impulsivity)	Large effect as measured by SNAP-IV (d=.85) and the CPRS-HI (d=.85)	Open label, no control group, no randomization, small sample size
Mohammad Nour ElDaou et al.	14 Students with ADHD (11-13 years old)	Trained by experts for four months twice per week of 30-45 minutes session. Motivational methods used to engage the participants.	Improvement in focus, concentration and listening language score	Large effect in time taken by student until they show disruptive behavior (pre: 4.07-post: 9.64), in spot different task, there was an improvement in task score in all participants, improvement in inattention score (CTRS: R-L, pre: 26.21-post 21.21) and mild improvement in listening language score	Open label, no control group, no randomization, small sample size
Gindi Shahar et al.	107 participants, all male with mean age 11 years and 11.76 months, participants divided into chess players or non-chess players, 55% were in the ADHD population, 57% of the total ADHD population played chess.	Subjected to task- Go/No-go tasks and "Pièce Touchée" tasks which included two items under two different conditions. In the "free" condition, participants were allowed to test different solutions before choosing the answer, whereas in the "touch-move" condition they were asked to choose the answer without any physical attempts.	In all three tasks- "Go", "No-go", and "touch-move"- the effect was found for learning chess irrespective of ADHD diagnosis. "Free" condition did not differentiate between various groups.	"Touch-move" condition produced significant group differences with chess players performing better than non-chess players, regardless of diagnosis.	Correlational study, No pre and post comparison
Amouzadeh Fereshteh et al.	64 children diagnosed with ADHD	Children with ADHD randomly divided into four groups of 16 each, four group: control, educational computer game (chess training), commercial computer games (FIFA) and combined games, pre-posttest, for 11 consecutive weeks and a weekly session of 1-1.5hours	Education computer games (chess training) and commercial computer games (FIFA) reduced the symptoms of ADHD and the difference between two games is not significant.	Large effect in reducing the symptoms of ADHD in intervention group	Small sample size

Discussions

Clinical guidelines for the management of ADHD recommend a multimodal treatment, including a combination of pharmacological treatment, cognitive-behavioral psychotherapy and psychoeducational treatment for parents and teachers [10,11]. There are challenges in using cognitive-behavioural therapy as it is not only expensive but often unattractive to patients, hence causing difficulties in adhering to therapy [4]. In terms of pharmacological treatment, many times parents and patients do not prefer medication treatment or stop pharmacological therapy because of side effects. Additionally, many children do not respond to medications [7,12]. For this reason, researchers are investigating newer therapies that are free of these commonly encountered problems.

Malfunction of executive skills domain is central to ADHD symptomatology, and during chess training, multiple functions requiring executive skills are operational [7].

However, it is relevant to know that executive dysfunction is neither imperative nor adequate to cause ADHD. The executive functions needed in chess mirror the deficit of ADHD, a reason for believing chess as an option to treat the disorder. Chess is an abstract strategy game played on a board by two players. It is based on easy rules but needs an enhanced level of cognitive strategy including memory, executive functions, and attentional processes, among others. Teaching chess or providing chess training or chess therapy connote the same meaning and it involves the dedicated training of chess games by an expert to ADHD patients once or twice a week in a gradual manner starting from recognizing the chess pieces to puzzles, checkmate and a full game over a period of 10-12 weeks [13].

In comparison to other treatments, there are many benefits of chess therapy. Not only is it less costly than psychotherapies, but playing chess has no side effects leading to better acceptance amongst children and parents. Most children do not continue medication because of safety and efficacy issues.

Moreover, side effects may affect a child's performance in school [7,14]. Games are critical to the growth of children [15]. The central issue relevant to activities based on the game is their likelihood to drive the motivation of ADHD children. Motivation is central to the benefits of any treatment [16]. During treatment, it is important to enhance and maintain motivation by involving the children in a game-based activity which improves their participation in a fun way because low motivational activity or interventions may lead to the drop out of patients from treatment or sub-therapeutic effect of an intervention.

Because inattention increases when the given task is tedious, it is not advisable to suggest chess for children who voluntarily oppose playing chess. Children devoid of motivation for a specific task will likely not maintain their attention while performing the task. Most of the children had a high degree of motivation to play chess, according to the results of our study, as revealed by the discontinuation rate of less than 5% [7]. This is relevant because ADHD children encounter problems in social play, including a lack of interpersonal empathy while playing [17].

Recently, the use of chess has been extended for the stimulation of cognitive functions in the management of various mental ailments [7,18]. Given its wide-ranging advantages, the European Parliament recently made a statement to include chess in the education systems of the European Union [19,20].

Visual working memory and working memory are significant abilities of the cognitive functions that must be activated during the game of chess. The relation between inhibition and chess is intuitive. The saying “When you find a good move, hold on and check if you can get a better one” – An obvious aspect of the necessity for inhibition while playing chess [11,14].

Limitations and future directions

We have few limitations in our study. First, this review incorporated a very limited number of studies and studies were of small sample size. Second, in our study there is a possibility of placebo effects which is inherent in its design as studies compared pre- post-intervention for a single group or with a control group without intervention. Therefore, further investigations of the effects of chess on the ADHD population are required through large randomized controlled trials.

Conclusions

The present review of the literature showed that chess has positive effects on ADHD symptoms and their severity. In addition to its efficacy in ADHD, the advantages of chess therapy include high adherence, low cost, and no side effects. Taken together all data, there is a suggestion that chess could be a relevant add-on modality which may impart to the multimodal management of ADHD. Based on our findings, chess should be included for the management of ADHD patients as a complementary therapy till we have a clear answer on the role of chess therapy in ADHD through large randomized controlled trials.

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Compliance with ethical standards

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors.

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