



Effectiveness of Physical and Manual Therapy and Communication in Children with Attention Deficit Hyperactivity Disorder: A Randomized Controlled Trial

Aybek Izzatov*

Tyan Anmo Medical Massage School, Arlington Heights, Illinois, USA

*Corresponding e-mail: aybekizzatov@yahoo.com

ABSTRACT

Introduction: Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder which mainly affects children. It affects their physical, mental, social, occupational and academic well-being. They show lack of attention and demonstrate hyperactivity, which affects their learning capability. They also have impaired language articulation which affects their communication capability. **Material and methods:** In the present study the sample consisted of two groups with a total of 5 children, as research participants. It was composed of the 1st control group: Three male children, aged between 4-12 years and the second, therapeutic group consisting of 2 male children, aged between 6-8 years. In the test (therapeutic group) the children were given a combination treatment consisting of verbal communication and physical therapy under the guidance of a practitioner. The children who belonged to the control group were given treatment consisting of only plain physical therapy as performed by the practitioner. In both the groups the sessions were performed 2 times a week for one hour extending up to 2 months. **Results:** After the treatment, better outcome was seen in the test group. Their attention span increased to 2-3 times. They started making eye contact when the physical therapy was performed. Additionally, when the therapist was communicating with them they started obeying his commands and also improved cooperating with their parents. On the other hand, in the control group, there were not much behavioral changes noticed. **Conclusion:** The study shows that verbal communication plays an important role to bring out a positive behavior and increase attention span in children with ADHD.

Keywords: ADHD, Physical therapy, Massage, Communication, Hyperactivity, Attention

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is one of the commonly encountered neurodevelopmental disorder seen in children. It represents itself in different ways such as the child shows inadequate levels of attention, increased activity and impulsivity [1]. The child is often diagnosed to be suffering from this disorder when a combination of different types of learning disabilities, restlessness and conduct disorders are mentioned by their parents or their teachers [2]. It has been seen that its prevalence increased 3% annually between the years 1997 and 2006 in most areas of the world [3,4]. The various etiological factors of ADHD are still unclear, but it is known that genetic and neurological factors play a significant role. As it is seen that the probability of getting ADHD is more common (2-8 times) in people who have a family members affected with this condition [5,6]. Additionally, deficiencies present in the neural connections, functioning and the brain structure is also associated with the severity of ADHD [7,8].

It is observed that children with ADHD frequently demonstrate disabilities associated with their learning and communication skills along with impulsive behaviors and anxiety. This overall affects their physical [9], mental, social [10], occupational [11] and academic [12] well-being such that it results in low self-esteem, negatively influences them and creates suicidal thoughts when they become adults [13]. It is seen that children with ADHD have a higher risk of showing poor academic performance and low psychological and occupational outcomes [14]. In school as well at home, they lack focus, do not follow the rules, show disruptive behavior and tend to be disorganized such that they have a lot of undone tasks [15,16]. When it comes to social interaction they avoid making eye contact, find it difficult

to make friends, become intrusive and show negative attitude when interacting with peers [17]. Furthermore, they also display aggression and lack self-control [18].

It is very important to provide adequate attention and manage this disorder at an early age [19]. Studies have shown that ADHD impacts children at a larger extent when they grow older, they tend to drop out from school or college, show less enrolment in special education classrooms, grade deterioration and frequent failures in school exams [20,21]. It is also seen that girls with ADHD show more self-harm during their teenage years [22].

It is highlighted in few research studies that children with ADHD though show lack of attention and demonstrate hyperactivity, still they have intact knowledge capability. There is problem when it comes to executing skills in a social environment [23,24]. They also have impaired language articulation which affects their communication capability. It is observed that there is deficit in the structural component that is associated with communication and phonology [23]. Few studies have shown poor literacy skills in these children that is mainly linked with their inattention and hyperactivity [25-29] and the impact of their levels of attention is strongly associated with these outcomes [30-33].

These outcomes can be related as they frequently encounter disruptions during acquisition of reading skills therefore, they find it difficult to follow direct instructions that are necessary for the ability to read [34,35]. Furthermore, as their language skills are directly affected which also alter their phonological processing [36-38]. Their lack of execution associated with the working memory affects the attention as well as their literacy skills. It is reported that they have a deficiency involving the neural system in the prefrontal–limbic region which largely affects the imitation, social, communicative and affective skills. They have mirror neurons which are activated not only when any activity is observed but also when it is performed [39].

Pharmacological treatment has been there since long time to improve the symptoms of ADHD, however it is observed that long term usage of the drugs causes adverse events. Due to this their use has been limited lately. Additionally, it is seen that it is difficult to continue with the medication for long term and there is an uncertain responsiveness seen with the drugs. Therefore, the attention has shifted to provide physical therapy and exercises which has shown great amount of beneficial effects in ADHD affected children.

Physical therapy is a preventive measure which diminishes the exacerbation of ADHD symptoms and impairments associated with it. Recent studies have demonstrated that physical therapy improves the behavioral outcome as well as the cognitive functions in children with ADHD [40]. Physical therapy utilizes different kinds of techniques such as massage therapy, and exercises which balance the breathing so that there is decreased anxiety, stress and muscle tension in these children. Thus, it will help in improving children's quality of life. However, there are very limited studies performed in children with ADHD which can demonstrate the effects of physical therapy.

Along with physical therapy, the role of communication is also very significant in altering their behavior in a positive way. Research has shown that verbal communication when expressed in a calm, quiet and pleasant manner is a very effective way to focus their attention [41]. It is observed that when the command is expressed in a repetitive and firm tone, the children tend to be more responsive [42-44].

Hence in the present research article we aimed to evaluate the effectiveness of physical therapy and verbal communication techniques in children with ADHD.

MATERIALS AND METHODS

The study from the point of view of its nature framed in an experimental research with a qualitative approach. The application of research started in 2020, extending from 1st May to June 30th. The study consisted of children affected with ADHD and were given manual therapy sessions at the Tyan Anmo Massage School. The parents of the participants provided informed consent and agreed to have their non-identifiable information used for research, including publishing purposes.

The sample consisted of two groups with a total of 5 children, as research participants. It was composed of the 1st control group: Three male children, aged between 4-12 years and the second, therapeutic group consisting of 2 male children, aged between 6-8 years who were chosen based on the pathology studied. The groups were distributed by

conducting randomized sampling. For the participants the inclusion criteria required: children having the diagnosis of Attention Deficit Disorder/Hyperactivity Disorder (ADHD), allowed manual therapy to be performed by a practitioner, and their mother or guardian were aware of the children being participated in the research.

In the test group (therapeutic) the children were given a combination treatment consisting of verbal communication and physical therapy under the guidance of a practitioner. The verbal communication included phrases such as: you're so good, you're very smart, such a nice boy, what a sweetheart, you're going to be so happy, peaceful, smart, healthy etc. While performing manual therapy with each manual motion we counted out loud one two three initially. It was followed by the numbers being repeated till ten. Exercises was also involved such that we performed flexing and extension of each limb, neck and back was bended and simultaneously pressure was also applied on muscles. We ensured that while conducting any physical therapy or exercise, counting was also added to provide a systematic approach to our routine therapy.

The children who belonged to the control group were given treatment consisting of only plain manual therapy as performed by the practitioner. The therapy involved pressing, squeezing, kneading and stroking. There was minimal interaction with the kids. Where it was genuinely required, we opted for verbal communication. The commands like, please turn around, please stop moving, please keep quiet etc. were used to make them feel comfortable and safe.

In both the groups the sessions were performed 2 times a week one hour each from 1st May to June 30th, 2020. Based on the children's change in behavior before and after the therapy and the reports of mothers, the data were analyzed. The outcome was discussed between the researcher and professionals involved in the study. The findings observed in the research and control group were analyzed structurally in an approach to obtain a conclusive pattern regarding their behavior change.

RESULTS

Baseline Characteristics

The children in both the test and control groups showed significant feature which were specific to ADHD. They were hyperactive and avoided eye contact when came for the therapy sessions at the beginning stage. Most of the kids were reluctant to start with their therapy sessions. They would show disruptive behavior and display tantrums to avoid interaction with the therapist. During their manual therapy sessions they were very restless and did not follow the guidelines as required of them. It was difficult for them to obey the commands. Parents also reported that children in both the groups lacked the attention span, had learning impairments, kept on repeating few things daily (As one kid was always saying, mom you drive safe? hundreds time a day) and lacked self-awareness. Parents shared that it is a daily struggle for them to ensure a completion of task by these kids as they easily get distracted. They did not cooperate with them and also did not interact socially.

Difference in Test and Control Group after Intervention

As the physical therapy lasted for around 2 months following changes were observed in both the groups

Test group: The children with ADHD who were given a combination treatment consisting of verbal communication and manual therapy under the guidance of a practitioner showed drastic improvement in their behavior and attitude. After the therapy it was observed by the therapist that they became more cooperative. Their attention span increased to 2-3 times. They started making eye contact when the physical therapy was performed. Additionally, when the therapist was communicating to them they started obeying his commands. They did not demonstrate any negative behavior during entire therapy session. They looked more calm and relaxed after the session was completed. They stopped getting distracted easily. When the physiotherapist was counting repeatedly from one to ten while massaging then after few days they also started counting with them. They demonstrated more self-control and reduced impulsiveness.

The parents were also very happy after seeing the behavioral changes in their children. They also expressed their gratitude towards the therapist. They reported that now the children listened to them and followed what they said. They did not show tantrums at home as often. Before they were reluctant to come for the physical therapy sessions but after a few days of treatment they get excited when they come to know that they have to come for their therapy sessions. Children have showed improvements in their academic performance as well. They have less learning impairments

and do not get distracted easily. Parents mentioned that they have shown improvements during social interactions and make eye contact with their peer group. They also started following their schedule where they obeyed their parents.

Control group: The children of the control group were given treatment consisting of only physical therapy as performed by the practitioner. They demonstrated slight improvements with no obvious achievements. The attention span, learning and communication skills, academic performance and impulsiveness did not change much which was similar as seen before the therapy sessions.

Clinical Significance

As it is clearly evident that children in the test group showed better improvement overall as compared to those of the control group. The following outcomes were shifted in the test group from the initial stage: increased attention span, better social interaction, positive behavior change, learning improvements, decreased impulsiveness and hyperactivity, better focus, academic performance improved and followed the commands.

DISCUSSION

In the present study we observed that the overall response and outcome in the test group showed higher effectiveness than the control group. There was effective improvement in the behavioral, social skills, learning and communication skills. It strongly suggests that the verbal communication plays a significant role in modifying the delivery of their action. When children with ADHD are interacted in a calm, relaxed and patiently they showed better overall outcome as compared to children where only physical therapy was provided.

There are many studies where ADHD children's motor and cognitive impairments have been observed among children as well adults, but very few of them have measured the effects of these motor interventions on the skills associated with communication and social well-being. Majority of the research till date has paid attention to improving their social, cognitive and learning skills by traditional behavioral analysis approaches. The effects of

one or more of these approaches were largely based on operant conditioning and learning [45]. However, what is the effects of one or two combination therapies is not discussed in most of the research studies.

In the previous literature the therapy or intervention was highly individualized based on the requirements of child across the ADHD spectrum [45]. Here, in the present study we have used physical exercise and verbal communication as a combination approach in a similar way among all the test group. The children in the study belonged to age group 4-12 years old. It has been shown that children during early childhood stage are better at learning which can be used to modify their social and motor behaviors [46]. Among the infants the approach is based on cause-and effect play such that floor time interaction, teaching them through their toys, using sensory integration training and implementing motor training to improve their overall coordination [47-50]. In contrast, with older children, the intervention approach is modified. Evidence supports that these children learn the motor skills better and follow the commands when a procedural manner is implemented. Also, known as learning-by-doing approach [51,52].

As in our study we firstly interacted with them and made them comfortable. During initial sessions we performed the physical therapy according to their needs. Once when the trust was built between the practitioner and the child, communication was made regularly. Research also suggests that these children have a difficult time in learning as they are easily distracted [53]. Therefore, based on these we ensured to follow an interdisciplinary approach. We repeated the counting for them during each sessions, guided them through the procedure of therapy (i.e., hand-on-hand instruction) along with brief verbal explanation of each step within the entire activity. All these measures showed an improvement in their attitude and learning abilities in the test group.

The aim of our study was to provide a treatment which improves their symptoms along with functional performance. We wanted to make sure that various behavioral obstacles which affect their confidence, personality and social interaction could be modified in a positive way. Therefore, the combination approach was used to demonstrate its effectiveness as compared to the group where only physical therapy was used.

It is well known that physical therapy in the form of different techniques brings out positive effects, improving the quality of life [54-56]. It has been shown in various studies that children with ADHD when performed exercise showed positive outcome similar to our study. As we saw that physical therapy helps in reducing their impulsiveness, improves

attention and also shows better performance in task completion which is in agreement with our present study [57,58]. It is also observed that physical activity improves the symptoms of ADHD [59], however in our study the improvement was not seen to a large extent in the control group where only physical therapy was conducted. It is reported that physical therapy shows improvement in their execution of task and level of attention. However, what degree does it bring a meaningful change is still not quantified in most of the studies. Few studies have reported better mood, less irritability and depression in children who underwent physical therapy [60,61] which is similar to our present findings.

However, the studies where physical therapy or exercise was used as an intervention to assess the outcome associated with attention, emotional stability, alertness, motor skills and cognitive ability [62,63] did not compare the results with a different treatment modality. As they made a comparison with a group where no treatment was provided, so it became quite difficult to assess the results. The control group lacked any alternative treatment, therefore the therapy induced effects cannot be separated from other factors such as improved patient care, social interaction etc. Therefore, our study plays a very important role to bring out clear findings in presenting the outcome with physical therapy with or without communication therapy.

The children with ADHD find it difficult to process the perception associated with any task, surrounding or person. Hence, a feedback based approach has shown to improve their motor skills. Studies have shown that visual or verbal demonstration helps in reducing the symptoms [64-66]. It is seen that children who were guided at each step how to perform a task showed better results in their language and cognitive abilities than those who were given visual indications. This is in agreement with our study where by regular communication they started responding, made eye contacts and displayed better overall coordination [64].

The communication helped the children to engage themselves in a social environment during therapy sessions which developed self-love and confidence in them. The motor activities should be planned based on the need of the child affected with ADHD. Our regular interaction with their parents made us aware about their problems and difficulties. We tailored to their functional needs so that they showed better imitation skills, joint interaction in group activities and improved learning abilities.

In a study it was seen that when any fun activity is involved in children with ADHD they show better learning response [67,68]. As these children try to isolate themselves, avoiding interacting with their peer groups which also delays their learning capacity. Therefore, we kept this in mind when the kids came for their therapy sessions. We engaged them in friendly conversation, spoke in a pleasant tone and verbally praised them when they followed our commands. This in return helped in developing their verbal, listening, comprehension, and social skills.

We also repeated the numbers from one to ten whenever they came for the therapy sessions. This kept their mind attentive and helped them to be positively engaged while the physiotherapist performed the therapy sessions. Similar results have been shown in a study where in a classroom, the rules were repeated throughout the course of the day. A similar approach was used while explaining an assignment. The teacher reinforced each step [69]. After following this approach, it was seen that the performance of the students was greatly improved as seen with the children included in our study.

The children affected with ADHD demonstrate symptoms which limit their attention capacity and communication ability. It is seen through the study that age appropriate skills can be easily learned if they are given a proper treatment involving physical therapy and communication. The overall well-being largely depends on the way the parents and care givers express their emotions to them. Therefore, verbal communication plays a very meaningful role to bring out a positive behavior in these children. Furthermore, as we had a small sample size so randomized controlled studies with a larger number of participants should be conducted to follow this combination treatment in the future.

CONCLUSION

The foundation of behavioral change in a positive manner in children with ADHD is seen to be greatly influenced by the factors such as ability to remain calm, directing their attention while engaging them, giving them their personal space and promoting self-confidence by trusting their choices. These children need to take ownership of their life which can be provided by helping them in taking actions in a step by step manner. The ultimate goal of this combina-

tion therapy is to make them independent where they are comfortable in a social setting and learn to maintain a sense of self-control.

DECLARATIONS

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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