Section: Miscellaneous

Original Research Article

IMPACT OF FOUR WEEKS OF VESTIBULAR STIMULATION BY ROCKING CHAIR ON COGNITIVE FUNCTIONS IN CHILDREN WITH ADHD

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ABSTRACT

Background: Attention deficit hyperactivity disorder (ADHD) is commonly observed in children as well as adolescents. However, the diagnosis and management of ADHD is still a challenging task in the medical field. Application of vestibular and visual rotational stimulation also showed improvement in children with ADHD. **Aim and objectives:** The present study was undertaken to observe the impact of four weeks of vestibular stimulation by rocking chair on cognitive functions in children with ADHD.

Materials and Methods: A total of 20 children with ADHD were part of the study after obtaining the assent from the parents/ legal guardian. After recording the baseline values, the participants were trained about the rocking chair therapy and then started with the treatment sessions. Each session is for 30 minutes and five sessions in a week for four weeks. The frequency of stimulation is 30 cycles per minute. Spatial and verbal memory test was used to assess the cognitive functions that are memory in specific.[13] 100 pin dexterity test was used to test the motor coordination.

Results: There was a significant increase in the spatial memory scores followed by the vestibular stimulation (P=0.0011). Verbal memory scores also improved but it was not statistically significant. There was a significant decrease in the duration of 100 pin dexterity test. However, it was not statistically significant.

Conclusion: The study results support that vestibular stimulation through rocking chair has beneficial effects on cognitive functions and motor coordination in the children with ADHD. Further detailed studies are required in this area to recommend the vestibular stimulation by rocking in the management of ADHD.

Key words: vestibular system, Rocking chair, Memory, Cognition, motor coordination.

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is commonly observed in children as well as adolescents. However, the diagnosis and management of ADHD is still a challenging task in the medical field.[1] Non-pharmacological treatments were reported to be effective in the

management of ADHD.[2] Patients with ADHD also present with comorbidities like depression, substance abuse, etc. Hence, a treatment plan was suggested for this.[3] These symptoms in children may continue occurring in adolescents and adults.[4] The vestibular system consists of small receptors located in the inner ear. The vestibular system plays a key role in cognitive functions as it has connections with the hippocampus, which is a key structure for the consolidation of memory. Earlier studies applied vestibular stimulation by motion apparatus.[5] Stochastic vestibular stimulation was reported to improve cognitive functions especially the reaction time and the word recall task in the children with ADHD.[6] Further, the application of optimal random noise stimulation has been reported to show promising improvement in ADHD subjects.[7] Application of vestibular and visual rotational stimulation also showed improvement in children with ADHD.[8] Interestingly, vestibular hypofunction was observed in children with ADHD. That indicates that adequate stimulation of the vestibular system might improve cognitive functions in ADHD. However, related studies are sparse in our location. Hence, the present study was undertaken to observe the impact of four weeks of vestibular stimulation by rocking chair on cognitive functions in children with ADHD.

Aim and objectives: The present study was undertaken to observe the impact of four weeks of vestibular stimulation by rocking chair on cognitive functions in children with ADHD.

MATERIALS AND METHODS

A total of 20 children with ADHD were part of the study after obtaining the assent from the parents/ legal guardian. The study was an experimental study. The study protocol was approved by the institutional human ethics committee. Subjects were recruited by advertisements in the clinics. They were screened for inclusion criteria. Children between 6-12 years of age group with mild to moderate ADHD were recruited in the study.[10] Children with any severe complications were excluded from the study. After the recruitment, the participants underwent general physical examination followed by examination by the psychiatrist. After collecting the baseline data of the participants, vestibular stimulation was administered for four weeks using a rocking chair and post intervention data was collected after four weeks. The participants served as self-controls. After recording the baseline values, the participants were trained about the rocking chair therapy and then started with the treatment sessions. Each session is for 30 minutes and five sessions in a week for four weeks. The frequency of stimulation is 30 cycles per minute. The rocking chair used in the study was designed by Sahayarani et al in their earlier studies.[11,12] Same was adopted in the present study. Spatial and verbal memory test was used to assess the cognitive functions that are memory in specific.[13] 100 pin dexterity test was used to test the motor coordination.[14] All the parameters were assessed after the four week of intervention. All the participants were given 3 sessions of training about the parameters before the actual recording.

Statistical analysis: Data was analysed using SPSS 20.0. Student t test was applied to observe the significance of difference between the parameters. A probability value of less than 0.05 was considered significant.

RESULTS

Table 1 presents the demographic data of the participants. Table 2 presents the comparison of the parameters before and after the intervention. There was a significant increase in the spatial memory scores followed by the vestibular stimulation (P=0.0011). Verbal memory scores also improved but it was not statistically significant. There was a significant decrease in the duration of 100 pin dexterity test. However, it was not statistically significant.

Table 1: Demographic data of the participants

Parameter	Mean and SD
Age (years)	8.38±1.30
Height (cm)	127±16.4
Weight (kg)	26.5±4.84

Data was expressed as mean and SD.

Table 2: Cognitive parameters and motor coordination before and after intervention

Parameter	Before (n=20)	After (n=20)	P value
Spatial memory	2.18±0.98	3.58±0.79	0.0011**
Verbal memory	2.27±0.90	2.91±0.70	0.0799
100 pin dexterity test (min)	17±2.69	14.5±2.51	0.0513

Data was expressed as mean and SD. (**P<0.01 is significant)

DISCUSSIONS

The present study was undertaken to observe the impact of four weeks of vestibular stimulation by rocking chair on cognitive functions in children with ADHD. There was a significant increase in the spatial memory scores followed by the vestibular stimulation (P=0.0011). Verbal memory scores also improved but it was not statistically significant. There was a significant decrease in the duration of 100 pin dexterity test. However, it was not statistically significant. Lack of attention and increased activity are commonly observed in the children with ADHD. Impaired cognitive functions are most commonly reported in the children with ADHD. Especially memory and execution of task were severely affected.[15-17] Vestibular system helps to regulate the vital reflexes of the body and hence, it is called as sixth sense.[18] Vestibular exercises were reported to improve the balance, motor planning and attention in children with ADHD. The duration of intervention is two months.[19] Vestibular stimulation was reported to improve the cognitive functions in children and adolescents. Vestibular system is connected with the hypothalamus and infact, a healthy vestibular system is needed for normal functioning of hippocampus.[20,21] Improved motor functions are reported followed by the vestibular stimulation in children.[22,23] Animal studies also supports the improvement in the motor functions followed by the vestibular stimulation.[23] The present study results are in accordance with the earlier studies as there was improvement in the memory and motor coordination followed by the vestibular stimulation by rocking.

CONCLUSION

The study results support that vestibular stimulation through rocking chair has beneficial effects on cognitive functions and motor coordination in the children with ADHD. Further detailed studies are required in this area to recommend the vestibular stimulation by rocking in the management of ADHD.

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