



## Physiotherapy

## EFFECT OF INDIAN CLASSICAL DANCE FORM-KATHAK IN DIAGNOSED CASES OF ADHD COMING TO A TERTIARY HOSPITAL SETUP IN RURAL AREA.

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**ABSTRACT** Attention Deficit Hyperactivity Disorder (ADHD) is a disruptive behavioural disorder with early childhood onset, characterized by inattention, hyperactivity and impulsivity and secondary motor problems. Physical activity improves symptoms of ADHD. Dance is a creative, non-competitive form of exercise. 30 children of age 7 to 10 years of both genders were selected by convenient sampling method and evaluated for motor problem with Movement ABC-2 scale (Modified version). They underwent sessions of basic steps of Indian Dance Form-Kathak for 30 minutes, thrice a week, after which they were reassessed. Data was analysed statistically. Significant improvements were seen in the timings and scores of the tasks of manual dexterity, aiming and catching and static balance. No significant improvements in the scores and timings in the tasks of dynamic balance.

**KEYWORDS :** ADHD, Indian Dance Form, Kathak, Attention

#### INTRODUCTION:

Motor behaviour is characterised by a response to the sensation received from an external and internal environment of a person. Sensory Integration is the process by which sensations from one's own body and from environment are organised and it is possible to use one's body effectively. Sensory integration leads to modulation at behaviour level. 1,2,3,4 and is directly related to the attention span of a person. 5

Attention Deficit Hyperactivity Disorder (ADHD), according to DSM-V, is a disruptive behavioural disorder with early childhood onset, characterized by symptoms of inattention, hyperactivity and impulsivity. 6 It is a complex disorder influenced by the interplay of multiple risk factors. Mostly genetic but other environmental factors also play a major role in the aetiology of ADHD. 7 Pathophysiology behind ADHD is multidimensional. ADHD is characterised by a delayed maturation, 8 under activity 9, 10 and subnormal activation 11, 12 of areas responsible for regulating attention. Catecholamine dysfunction has also been seen in ADHD children. 9, 13, 14

The symptoms of the ADHD include Inattention, Hyperactivity and Impulsivity. 7 A deficit in any of the stages which leads to formation of attention leads to disorganised movement. 1, 15 The pathologies of ADHD lead to inattention and, in turn leads to sensory processing deficits. 5, 16, 17 as well as motor skill dysfunction. 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 Motor skill dysfunction have also been found to be directly associated with anatomical differences in the central nervous system. 1, 11, 13, 27, 28

ADHD is a childhood condition which affects the academic performance, psychosocial adjustment, and future psychopathology and persists into adulthood in most of the cases. 2, 29 The prevalence of ADHD among Indian children in available literature is 2-11%. 30, 31, 32

It has been seen that physical activity has a positive effect on the motor problems either directly or indirectly. 13, 33, 34, 35, 36, 37, 38, 39, 40, 41 Dance is a creative and non-competitive physical exercise which has potential effects on physical, mental and emotional health. 42, 43, 44 It is the rhythmic organization of human energy. 45

Conventional therapies such as medications, behavioural therapy, educational accommodation, etc. are used for these children. Medications causes side effects on a long-term use 46 which calls for alternative therapies. 47 Behaviour therapy is being used as an effective adjunct to the medications 48 but adherence to the program tapers down with the time. Other alternative methods like yoga, meditation, tai chi, etc. 47, 48, 49 along with physical exercises proves

to be effective in this population. 33, 34, 35, 36, 37, 38, 39, 40, 41 Art therapies such as art, dance, music, etc. provide the creative way of exercises to the child.

Dance is considered to be instrumental in developing young people's creative and artistic, personal and social skills and thus may prove to be effective therapy along with conventional therapies. 50, 51 Dance brings social appreciation and in turn positive feedback to the child and thus adherence may be expected.

Various studies have been carried out throughout the world that prove Dance has an effect on children with ADHD. But literature providing the quantitative analysis of the effect of Dance is very few in Indian scenario. Indian classical dance form seems to be a promising therapeutic intervention for this population as it combines cueing techniques, cognitive movement strategies, balance exercises and physical exercise. 42, 51, 52

Hence, this study was undertaken to evaluate the effectiveness of the Kathak Dance in diagnosed cases of ADHD coming to a tertiary hospital setup in rural area.

#### MATERIALS AND METHODS:

The permission and approval to carry out the research work was obtained from the head of the Institution and the Institution's Ethical Committee. It was a Pre-test post-test design carried out on 30 subjects selected by convenient sampling method. Sample size was determined assuming mean difference of 2 between the pre-test and post-test for static and dynamic balance 53 with SD of 4. Required sample size for 80% power was 30. Therefore, 30 subjects were taken. Children diagnosed with ADHD, of age 7-10 years and both genders were included in the study. Children whose parents did not allow their child's participation and children with other neurological disorders were excluded from the study.

Movement ABC-2, a standardized tool was used to assess motor problems. It is reliable as well as valid tool. 54, 55, 56 The test uses various materials to assess the motor tasks of children, which are spread into three age bands-3 to 6 years, 7 to 10 years and 11 to 16 years. The test materials include-MABC-2 checklist and the test kit.

In present study, age band-2 of the original scale was considered.

Each task was scored on a scale of 1 to 3

1-Able to do with no difficulty

2-Able to do with difficulty

3-Unable to do

The scale has been validated on various populations.54,55,56 However, modifications has been done by assigning scores to the tasks. This modified scale has been pilot tested on 5 children before using in the main study. Selected subjects underwent Dance sessions of 30 minutes, thrice a week. (Figure 1) In one session, 10 minutes time was given for each of the components of Dance i.e. arm movements, foot movements and combined movements. 12 sessions were undertaken. Subjects were reassessed on Movement ABC-2(Modified version). Out of 30 selected sample, 25 children completed the study protocol.



Figure 1: Basic steps of Indian classical dance- Kathak

**RESULTS:**

Results of the present study showed that there was statistically significant improvement in the performance of the children on movement ABC-2 scale (Modified version) with respect to time in manual dexterity skills, aiming and catching and static balance.(Table 1) In terms of quality of performance, a statistically significant improvement was seen in the placing pegs from manual dexterity, throwing bean bag from aiming and catching, static balance with both legs and hopping with both legs. All other tasks did not show statistically significant change. (Table 2)

**Table 1: Analysis of quantitative variables of Movement ABC-2 (modified version) pre and post administration of Kathak dance sessions.**

Tasks	1		2		3		P-value
	pre	post	pre	post	Pre	Post	
<b>MANUAL DEXTERITY</b>							
Placing pegs(R)	76.67%	92%	23.33%	8%			0.083
Placing pegs(L)	73.33%	92%	26.67%	8%			0.0455
Threading Lace	60%	40%	84%	16%			0.0142
Bicycle Trail	76.67%	88%	23.33%	12%			0.083
<b>AIMING AND CATCHING</b>							
Two hand catch	76.67%	80%	23.33	20%			0.1573
Throwing bean bag	76.67%	92%	23.33%	8%			0.0253
<b>STATIC BALANCE</b>							
Right	53.33	72%	43.33	28%	3.33		0.0047
Left	43.33	68%	53.33	32%	3.33		0.0047
<b>DYNAMIC BALANCE</b>							
Hopping in squares(R)	26.67%	40%	60%	52%	13.33%	8%	0.0455

Hopping in squares(L)	23.33%	36%	50%	52%	26.67%	12%	0.0082
Heel to toe walking	16.67%	24%	56.67%	44%	26.67%	32%	0.3173

**Table 2: Analysis of qualitative variables of Movement ABC-2 (modified version) pre and post administration of Kathak dance sessions.**

Variables	observations	mean	std. dev	P value
<b>MANUAL DEXTERITY</b>				
1. Placing pegs				
Right				
Pre	25	37.28	18.14185	
Post	25	32.96	17.53919	
Diff.	25	4.32	7.69047	0.0097
Left				
pre	25	40.6	19.51495	
post	25	51.2	23.42897	
diff	25	5.04	6.470961	0.0007
2. Threading lace				
pre	25	62.8	30.23519	
post	25	51.2	23.42897	
diff	25	11.6	11.03781	0.0000
3. Bicycle trail				
pre	25	35.08	21.62737	
post	25	30.12	17.88463	
diff	25	4.96	8.324062	0.0065
<b>AIMING AND CATCHING</b>				
Two hand catch				
pre	25	34.64	19.40979	
post	25	26.36	13.43155	
diff	25	8.28	10.36629	0.0005
Throwing bean bag				
pre	25	31.76	12.18018	
post	25	24.44	11.00788	
diff	25	7.32	7.116413	0.0000
<b>STATIC BALANCE</b>				
One board balance				
right				
Pre	25	11.88	8.146165	
Post	25	16.84	8.744903	
diff	25	-4.96	5.231953	0.0001
left				
Pre	25	8.8	4.907477	
Post	25	14.08	6.020244	
diff	25	-5.28	3.657413	0.0000
<b>DYNAMIC BALANCE</b>				
Hopping in squares				
right				
Pre	25	6.08	4.480699	
Post	25	6.68	4.413238	
diff	25	-0.6	5.780715	0.6085
Left				
Pre	25	7.08	7.152622	
Post	25	7.72	5.029248	
diff	25	-0.64	6.244197	0.6130
Heel to toe walking				
Pre	25	13.84	13.04058	
Post	25	11.96	10.07257	
diff	25	1.88	7.85981	0.2434

## DISCUSSION

Significant improvement in the timings of the tasks of all of three except for the dynamic balance was seen in this study along with improvement in scores for tasks of placing pegs, throwing bean bag, static balance and hopping squares.

A study by Erna Gornuld(2005) on 2 boys with ADHD showed improvement in the performance of all the skills on the Movement ABC 2 scale on timing as well as the quality of the tasks especially static balance.<sup>53</sup> Shilpa J and Asha Shetty(2015) found improvement on the post test score in ADHD children on SNAP-IV which indicated an improvement in fine motor skills.<sup>57</sup> Magdalena Majorek(2004), found an improvement in motor skills like coordination and attention span using therapeutic eurythmy.<sup>58</sup>

Various studies showed that physical activity improves symptoms of ADHD.<sup>34,35,36,37,38,39,40,41</sup> Indian Classical Dances are being used as a form of exercise and meditation since ages. Kathak is a type of Indian Classical Dance which used foot work and spins as its peculiarity. Foot stomping actions in Kathak are known to let go the aggression.<sup>42</sup> It has also been seen that there is an improvement in attention span and diversion with the practice of Kathak dance.<sup>59</sup>

In the present study the children were taught to perform the steps on the counts of 1 to 8, rhythmically. The alternate feet stepping was associated with verbal cueing of the counts. The Hand movements were associated with further addition of visual cueing.

Visual-motor perception difficulties are present in children with ADHD which are phenomena secondary to inattention.<sup>56</sup> Intact eye hand coordination/visuo motor coordination is required to carry out any task smoothly.<sup>56</sup> Visual cueing helps in orienting for the target and attending it without any change in eye or head position. This improves visuo motor coordination. <sup>5,60</sup> This might have helped the subjects in improvement in the quality of the task.

Listening to music and rhythmic patterns can improve attention in children with ASD.<sup>50,61</sup> Auditory feedback is used to aid in proprioceptive muscular control according to the set rhythm. Intact rhythm processing functions affect the sensory integration.<sup>62</sup> The brain, through multiple inputs of visual and verbal cueing combine rhythm with body movement through proprioceptive input and enhance the neural processing of rhythm within the sensory processing brain regions, and thus promote sensory integration resulting into an increased attention span.

Dance as exercise is also known to increase the neurotransmitters called endorphins and epinephrine levels.<sup>36</sup> Epinephrine in the circulation is associated with improved arousal, thus better attention.<sup>36</sup>

Motor problems in ADHD are mostly secondary to inattention.<sup>17,18,19,20,21,22,23,24,25,26,27</sup> Thus an improved attention by above mechanisms showed an improvement in the scores as well as the timings of the tasks in the Movement ABC-2 scale(modified version) in the present study. Dance being a gross motor task, might not have directly affected the fine motor or the tasks in the manual dexterity. Normal motor development pattern follows a sequence of gross to fine. An improvement in the balance tasks or the gross motor tasks might have formed a foundation for improvement in the fine motor tasks.<sup>63</sup>

## CONCLUSION

Dance has been proven to be effective as an adjunct therapy for children with ADHD. Findings of the study showed that, administration of basic steps of Indian Dance form- Kathak, improved the fine as well as gross motor skills.

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