

ASSESSMENT OF BILATERAL COORDINATION IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER IN INDIAN CONTEXT

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ABSTRACT

Objectives: To evaluate the bilateral coordination in children with and without developmental coordination disorder in Indian context. **Method:** 10 children with Developmental Coordination Disorder were included in the study. Convenient sampling procedure was employed to select the participants. After getting informed consent signed, these children have been assigned into the baseline evaluation using BOTMP. Children were classified as DCD based on their poor scores on the BOTMP, 5 children included in the study scored poor on BOTMP and these children has been invited to participate and the remaining 5 children's were excluded as they have been identified as MR. **AMCD subtest and Test of Backward tandem walking and alternate pronation and supination of bilateral forearm was examined for all the participants to evaluate the bilateral coordination in DCD children. Results:** Bilateral coordination of children with DCD showed they have higher incidence of fall when attempted tandem walking compared to their peer groups. **Conclusion:** The present study concluded that children with DCD are significantly less consistent in executing bilateral coordinated limb movements while exhibiting the variety of motor tasks.

Key words: Bilateral coordination ,Developmental Coordination Disorder, Assessment of Children, Indian Context

I.BACKGROUND

Bilateral coordination or integration is an important indicator of cognitive development in children. Impaired bilateral coordination of limbs can result in failure to acquire adequate fine and gross motor skills which is in need to accomplish every days living task. However this impairment will adversely affect academic performance and activities of daily living. When evaluating children with DCD they have difficulties with performing the basic motor skill but without any marked neurological impairment and they have IQ greater than 70 %.

Common ADL tasks these DCD children's finds difficulty to perform includes tying up shoelaces, playing ball games with their peer group, driving a bicycle and dancing. The most difficult skill observed in Children with DCD is executing a task that requires organized movement of Bilateral limb movements in a coordinated manner as like running and catching a ball and they have difficulty in exhibiting a motor skill that is needed to perform without previous training and exposure. Majority of researchers have highlighted that these children without proper assessment in the baseline they have the persistent difficulty in motor coordination in adolescence.

Bilateral coordination requires the controlled and organized movement of bilateral upper limb and lower limb in execution of motor task. Children with DCD have difficulty in handwriting skill, because writing needs coordinated movements in bilateral upper limb with skillful manner. A child acquires the development of bilateral coordination as early in life. This coordination difficulty has been observed preliminarily by the parents as the child develops difficulty in identifying right and left extremity and they prefer activity that avoids executing a new, modified movement and any task that needs crossing of midline has been avoided by these children with DCD.

Teachers and parents reports the clinical features observed in children with DCD. They were commonly referred by the teachers as clumsy and awkward as they adapt a bad posture in sitting in the classroom and during their performance in ADL. Therapist working with these children has difficulty in early assessment of classifying these

children as DCD, because of no gold standard assessment tool in classifying children as DCD in Indian context.

METHOD

The children with DCD were invited to participate in the research study if they met the DSM IV criteria for DCD (APA, 1994). After getting informed consent signed, Baseline assessment test in BOTMP was done to include children with diagnostic features of DCD and a brief neurological examination was done to exclude children with Pervasive developmental disorder and neuromuscular dysfunction. The earlier version, the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP), is used as a standardized assessment tool in evaluating children with DCD, totally 46 items has been grouped into 8 tests, it has been used to assess the motor coordination. This test includes both fine motor and gross motor activity and the test identifies children with DCD but fails to identify children without DCD and it involves motor tasks in the form of games as it can be easily performed by these children with difficulty in English language skill. Due to the limitations of BOTMP subtest in identifying bilateral coordination, AMCD subtest of bilateral coordination has been assessed. A detailed examination of integrity of cranial nerve has been done at the baseline. Further, the Clinical test of tandem walking and finger to nose test with right and left upper limb was examined for all the participants to evaluate the coordination difficulty in DCD children

TABLE 1- DEMOGRAPHIC DATA IN CHILDREN WITH DCD

S.NO	VARIABLE	CHILDREN WITH DCD- MEAN VALUE
1	AGE	7.5
2	BMI	25
3	PA SCHOOL	3
4	IQ SCORE	87
5	BOTMP PERCENTILE	4

TABLE 2- AMCD SUBTEST PARAMETERS IN CHILDREN WITH DCD

S.NO	TEST	MEAN
1.	Catching a small bag of sand	2.2
2.	Kicking a ball into the goal	3.1
3.	Kicking a rolling ball into the goal	1.4
4.	Bouncing a tennis ball on the ground and catching it with both hands	2.2
5.	Bouncing a 20-cm ball on the ground and catching it with both hands	1.1
6.	Bouncing a tennis ball on the ground and catching it with hand of preference	1.0
7.	Catching a tennis ball with both hands	0.1
8.	Catching a tennis ball with hand of preference	0.8
9.	Throwing a tennis ball overhand at a target with hand of preference	1.1
10.	Throwing a 20-cm ball overhead at the wall and catching	1.1
11.	Catching a tennis ball using a cloth sack	1.0

PROCEDURE

After the Baseline assessment of children with the BOTMP. A practice of bilateral coordination tests has been given to them for familiarization; Body Coordination (BC) has been assessed in BOTMP as under a subtest item 1 and 5. AMCD subtest consist of 11 ball skills items like Catching a small bag of sand, Kicking a ball toward the goal, Kicking a rolling ball into the goal, Bouncing a tennis ball on the ground and catching it with both hands, Bouncing a 20-cm ball on the ground, Bouncing a tennis ball on the ground and catching it with hand of preference, Catching a tennis ball with both hands (ball bounced by the examiner), Catching a tennis ball with hand of preference (ball bounced by the examiner), Throwing a tennis ball at a target with hand of preference, Over-head throw of a 20-cm ball at a wall and catching it and Catching a tennis ball using a cloth sack.

There were also three items that required whole body movements, hopscotch, simple jumping jacks and symmetrical stride jump and one that required hand movements (i.e., the Drumming Game). Each test was scored in a 3-point scale, where 1 ☐☐unable, 2 ☐☐accomplish the task with errors and 3 ☐☐perform with no errors.

Task that assess the coordination of upper limb alone has been assessed with Ball games and remaining subtest measures simultaneous coordination of upper limbs with lower limbs. For example jumping skills has been assessed. Performance trail numbers has been calculated and a raw score has been assigned to number of jumps and number of catches in ball games. The raw score has been converted into numerical scores at the end of the trial. The Bilateral Coordination test measures the ability of children with DCD in playing sports with peer groups and in recreational games. Task require for playing sports require coordinated movements of bilateral upper limb and lower limb with sequence. These children with DCD can perform the task which requires the identical limb involvements and fails to perform the task that requires coordinated movement.

DISCUSSION

Children with DCD perform coordinated arm and hand movements on the isolated limb, they show synchronized movement pattern in the distal extremity of the right or left upper limb and lower limb, but have difficulty with coordinated arm/hand and leg/foot movements when the limbs on the opposite sides of the body are assessed. Parents and teachers were unaware of these deficits and neglect it. Without early assessment, these difficulties persist into adulthood and children with DCD are frequently accompanied by psychiatric illness and they have been isolated both at home and at school by the peer groups and family members, so early assessment program should be done to evaluate bilateral coordination to insist on delivering appropriate treatment strategy. Before data collection, a pilot trial was done on the test procedures, the children were assessed in a large therapy session room used for practice. The therapist involved in assessing children with DCD was previously trained on conducting the test, they have been asked to stand in front of the child giving adequate instruction of the test. For test–retest reliability, all the children participated in the study was tested twice, with a minimal interval of 5 days and a maximum interval of 10 days. The research protocol was approved by the Research Ethics Committee of the institution.

CONCLUSION

Tests used for the evaluation of DCD, such as the M-ABC (Henderson and Sugden, 2007) and the BOTMP (Bruininks, 1978), have not been standardized for Indian Children. In the absence of appropriate assessment tools for the diagnosis of DCD, , thereby increasing the risk of academic failure and psychiatric illness .The study concludes that children with DCD have impairment with bilateral coordination, but the assessment tool used in identification of disorder is one of the subtest of BOTMP and AMCD is poor in identifying the bilateral coordination in detail, There is a need for standardize motor coordination assessment for Indian children.

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