

Original Article

## Comparison of motor skills in Children with developmental coordination disorder and normal peers

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**Objectives:** Developmental Coordination Disorder (DCD) is a motor skill disorder which impacts upon a child, s ability to perform age- appropriate activity of daily living and academic performance. They have problems in gross & fine motors, their upper limb coordination are impaired, too .In this way, we decided to compare motors skills with BOTMP test in children with DCD and their normal peers.

**Method:** In this study 30 children with DCD (age range is 6/5-8/5) have studied and compared with their normal peers.Bruininks- Oseretsky Test of Motor Proficiency (BOTMP) was used.

**Results:** The study showed Motor skills in DCD children are significantly poorer than their normal peers ( $p<0/001$ ).Gross motor and Fine motor skills and the upper limb coordination are significant impaired in DCD children.

**Conclusion:** In the process of evaluation Children with DCD, standard instruments, like BOTMP can be used.BOTMP detected deficiency in gross & fine motor and other area like, upper limb coordination .We need accurate informations for better treatment.BOTMP can be used in the process of evaluation for every DCD child , after that goals of treatment will be clearer.

**Key Words:** Motor skill, Developmental Coordination Disorder, BOTMP

### Introduction:

First years of life is named sensory- motor. In this year cognition is raised from environment and development is from motor. (1) Some of children have difficulties in motor skills; they struggle to perform accurately the motor activities of daily life. (2) Therefore they have problems in self-esteem, learning, academics functioning and daily living. In the 1930s, the term clumsy child syndrome began to be used in the literature to denote a condition of awkward motor behaviors that could not be correlated with any specific neurological disorder or damage. This term continues

to be used, but often with social rejection. (1, 2). Now they are children with Developmental Coordination Disorder (DCD). (3) Motor problems in DCD are not a unique and standard model. Motor models are depended ages, temperament and environmental conditions. (4) Tsiotre in 2006 studied in DCD prevalence in Canadian & Greek children. In Greek children, it was higher. (19to8%)

Children with Attention – Deficit Hyperactivity Disorder (ADHD), Learning disorder (LD) have deficiency in motor skills, too. DCD is with some of co morbidities like ADHD and LD. (5) Inter-

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vention for children with DCD utilizes multiple modalities. (6) Before any intervention, correct evaluation is important. Younger DCD children have problems in playing, writing and other gross & fine motors, in this time with more evaluation detect that other motor deficiency is related to gether. (7) Dan ford evaluated 89 children with 5-10 years old who have been referred as DCD, it was detected that 1/3 of them accurately was DCD. (8) Therefore in the process of evaluation, standard test is needed. With accurate test, decreasing the costs and preventing stigmatization will be done. There are some standard motor tests. (9) Two approaches must be done in DCD. Descriptive – Observational and Neurological approaches. In Descriptive – Observational approaches teachers and parents are involved, but in Neurological approaches specialists are involved. (10) In these areas children with DCD have deficiencies:

Fine motor, gross motor, low motor tone, body awareness, sensory integrity, visual perception, visual coordination and dyspraxia. (11) There are standard tests for evaluating. Bruininks- Oseretsky Test of Motor Proficiency is one of them. BOTMP has 46 items in 8 sub tests; it designed for motor skills deficiency in 4/5 – 14/5 years. (9)

**Method:**

This research is cross-sectional research. Our main group was children 6.5-8.5 years. The inclusion Criteria were:

- Children with DCD
- IQ>90
- Chronological age 6.5-8.5 years

The exclusion Criteria were:

- Impairment in visual area that doesn't correct with glasses.
- Severe impairment in auditory area.
- History of metabolic, Orthopedic or Epilepsy.
- History of Moderate to severe cardio- pulmonary diseases.

At first 57 children selected from rehabilitation clinics, all of them were visited with psychiatrist and only 30 of them can participate. (15 girls

& 15 boys)

Control group was a group of children that matched with the first group from socio-economic class and craniological age. These children were studying in school without any major problem.

After interview with parent(s), BOTMP test had done. This test had 46 items, in 8 areas.

- Running speed & agility
- Balance
- Bilateral coordination
- Strength
- Upper – Limb coordination
- Response speed
- Visual – motor control
- Upper limb speed & dexterity

Each test was done 45-60 minutes. There was, 2 chairs with a table, child was sitting in chair his legs were on the floor, and his hands were on the table easily.

1-2-3-4 areas are in gross motors, 6-7-8 are in fine motors. 5 is for upper coordination. In some of area, test was done 2-3 times and the better response was written.

T- Test and Mann-Whitney were used in statistically method.

**Results:**

Children with DCD were 30, 15 girls & 15 boys. Normal children had matched with them. Table – 1 show the average range of years for two groups.

**Table1:** Average range of years (months) in two groups

group	number	Years (months)
Normal	30	90
DCD	30	88/8

In table- 2 dexterity is shown of two groups. 86.7% of normal, 76.7% of DCD children were right hand & foot. 13.3 % of normal, 23.3% of DCD children were left handed.

**Table2:** Distribution of dexterity in two groups

Variables			Number	%
Dexterity (hands)	N	R.H	26	86.7
		L.H	4	13.3
	DCD	R.H	23	76.7
		L.H	7	23.3
Dexterity (feet )	N	R.F	26	86.7
		L.F	4	13.3
	DCD	R.F	23	76.7
		L.F	7	23.3

In table-3 shows gross & fine motor, upper coordination in BOTMP.

**Table3:** BOTMP index in two groups

Variables		median	SD
Gross motor	N	51.13	7.44
	DCD	29.60	3.31
Fine motor	N	58.23	5.52
	DCD	32.83	3.59
Upper coordination	N	17.50	2.59
	DCD	10.23	1.69

In gross motor  $Z = -6.65$ ,  $P$  value  $<0.001$ . Difference in gross motor between two groups is meaning.

In fine motor  $Z = -6.66$ ,  $P$  value  $<0.001$ . Difference in fine motor between two groups is meaning.

In upper motor co- ordination  $t=12.83$ ,  $P$

value  $<0.001$ . Difference in upper motor co- ordination between two groups is meaning.

In table 4, shows statically index in Global Motor Coordination.

In upper motor co-ordination, there is mark able difference between boys & girls. ( $t=2.25$ ,  $p=0.02$ ) table 5 show this part.

**Table4:** Statistically index in Global Motor Coordination

variables		median	SD	Z	P. Value
G.M.C	N	126.86	12.84	-6.65	0.000
	DCD	72.66	6.72		

**Table5:** Differences between boys & girls in upper motor co-ordination

variables		median	SD	f	t	P(v)	Df
U.M.C	boys	15.06	4.33	2.53	2.25	0.02	58
	girls	12.66	3.89				

Gross motor skills between two groups are different. In Table -6 median differences is showed. ( $P <0.001$ )

**Table6:** Difference in gross motor

variables		median	SD	Z	P.Value
G.M.C	N	51.13	7.44	-6.65	0.000
	DCD	29.60	3.31		

At last about gross and fine motor co-ordination in boys and girls, we have shown in Mann- Whitney. There was no meaningful difference between two groups. In gross motor co-ordination  $Z=-1.79$ ,  $P=0.07$  and fine motor co-ordination  $P=0.88$ ,  $Z=-0.14$ . In global motor co-ordination  $Z=-1.47$ ,  $P=0.14$ . In table 7, in formations are seen.

**Table 7:** Gross & fine motor co-ordination

Variables		Z	P(v)
Gross motor	boys	- 1.79	0.07
	girls		
Fine motor	boys	-0.141	0.88
	girls		
Global motor coordination	boys	- 1.47	0.14
	girls		

**Discussion:**

Children with motor co-ordination disorder have many problems in motor skills; their gross and fine motor is impaired. (12).Sub tests of BOTMP that assessed gross motor are, Balance, running, skipping, sports doing. Children with co- ordination disorder have abnormal gross motor skills. Mac nab (2001) showed children with co-ordination disorder are poor in some gross motor aspects like balance. Balance problems were high in co-ordination children than normal children. (13) Guez in 2003 showed; balance in children with co-operation disorder, when they are standing on one foot with close eyes is poorer than normal children. Balance in standing needs processing sensory inputs by motor system. (14)Cherng was studied in sensory inputs , processing for few modalities was more impaired than one modality in

co-operation disorder In this study gross motor was impaired, too. Median is meaningfully different, 51.13 in normal children and in Co-ordination patients are 29.60. BOTMP is a test for fine motor, too. It has subtests for reaction time, control visual -motor abilities and upper limbs abilities. They test motor tone, hands- eyes coordination, perception for visual – motor, grasp for things, copying, perceptual- writing. Smith – Engelsman (2001) studied that, Messy or illegible writing in co-ordination patients was impaired. (15) In our study Fine motor skills in children with co-operation disorder was 32.83 and in normal children was 58.232. Waelvelde in 2006 was studied in upper motor co-ordination , rhythmic movements was significantly impaired in

co-operation disorder. In our research, upper motor co-ordination was significantly different. Upper motor coordination in normal children was 17.5 and in

co-ordination disorder was 10.23. (Table-5) Results are like other studies. Parker (1999) was showed that 31% of children with co-ordination disorder in short form of BOTMP have poor global

motor functioning. (16) In our research, difference in this area was meaningful.

(Median in  $N=126.86$ ,  $CO=72.86$ ) This difference needs more studies. Panek (2007) was showed, there isn't different between sex and perceptual communities. (17)Tsiotra in Canada and Greek (2006) studied in co-ordination disorder, motor skills in boys with BOTMP is higher than girls. (18) In our research, upper motor skills (boys=15.06, girls=12.66) was different.

In normal children, there was difference, too. Cultural differences about sexual role can be effective. Therefore children with co-ordination disorder are lower in gross and fine motor than their normal peers. Hence, all of children with co-ordination disorder must be examined by motor tests. With some of tests like: BOTMP disabilities can be better detected.

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