



The prevalence of developmental co-ordination disorder among primary school

Ganapathy Sankar U, Monisha R*

SRM College of Occupational therapy, SRM Institute of Science and Technology, Kattankulathur, Chennai- 603203, Tamil Nadu, India

Article History:

Received on: 30 May 2020

Revised on: 15 Jul 2020

Accepted on: 22 Jul 2020

Keywords:

Prevalence,
Developmental
co-ordination disorder,
Kancheepuram

ABSTRACT

Developmental Co-ordination Disorder will have an impact in the gross motor, and the fine motor co-ordination of daily living activities of children and the academic performance of children with Developmental Co-ordination Disorder is low due to handwriting difficulty. There are also deficits in reading skills, working memory skills and mathematical skills. There may be problems associated with psychosocial aspects in relationship with peers and socialisation, low self-esteem, anxiety and low mood. The DCD prevalence in the United States is 5-8%, 5.6% in Egypt, 5.7% in Greek and 1.8% in the United Kingdom and 5.9% in Canada, 30% in Brazil and India it is found to be 1.6% in West India, 21.6% in Karnataka. In Tamil Nadu at Kattupakkam, it was found to be 3.22%, and Kattankulathur had 1.37%. Since there is no evidence of DCD prevalence in Primary schools at Tamil Nadu, the current study aims at finding the prevalence of DCD among primary school children at Kancheepuram. This Survey, with a cross-sectional study, was initiated. Two hundred children participated in the study. The Developmental Co-ordination Disorder Questionnaire (DCDQ) was used to identify DCD in primary school children at Kancheepuram. Seventy children were identified as DCD, and it revealed that the prevalence rate was 120.20 in 1000 children. The prevalence estimate was high in boys than in girls. There is a prevailing estimate of 120.20 in 1000 children of Developmental co-ordination disorder between the age group of 5 and 11 years exists among primary schools at Kancheepuram. The study concluded the need for early identification and intervention to promote awareness among parents and teachers in a school setting about developmental co-ordination disorder.



*Corresponding Author

Name: Monisha R

Phone: 9940228679

Email: dreamsfuture000@gmail.com

ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11i4.3538>

Production and Hosted by

IJRPS | www.ijrps.com

© 2020 | All rights reserved.

INTRODUCTION

Developmental Co-ordination Disorder will have an impact in the gross motor and the fine motor co-ordination of daily living activities of children. Despite its high prevalence, knowledge about Developmental Coordination Disorder is not familiar and less recognised in Primary schools and other medical settings. The academic performance of children with Developmental Co-ordination Disorder is low due to handwriting difficulty. There are also deficits in reading skills, working memory skills and mathematical skills. There may be problems associated with psychosocial aspects in relationship with peers

and socialisation, low self-esteem, anxiety and low mood. The sequence of all these issues leads to low performance in school. Therefore, while evaluating and managing a child with DCD considering all factors which hinder motor performance must be evaluated (Wright and Sugden, 2008).

The co-activations of the cerebellum, prefrontal cortex and the basal ganglia is required when a task is complicated, when a task demands condition change, or when it needs quick response and adequate concentration required to perform the task. Another relationship between the motor and cognitive abilities states that these abilities might have a similar developmental timeline with skills increasing appropriate to the age between 5 and 10 years.

Concrete processing like perception and decision-making are affected, where processing this information will be difficult while performing skilled movements. The information input is associated with the anticipation for decision-making and cognitive abilities. The motor abilities and cognitive skills of children with Developmental Coordination Disorder have a relationship between each other, as the rhythmic co-ordination, walking pattern and posture, catching and stopping action describes the impaired cognitive skills like forward modelling, executive function, and components of sensory-perceptual function (Landgren *et al.*, 1996).

The abilities of children with DCD are limited and slow in the cognitive decision-making process in comparison with normally developing children. The children with DCD exhibit poor motor ability performance. This led to underachievement in academic performance due to gross motor and fine motor difficulties (Gueze and Borger, 1993).

The children with DCD exhibit their functional difficulties from 3 domains as postural alignment, motor learning skills, and sensorimotor co-ordination tasks. The difficulty lies in of daily living like dressing up, tying a shoelace, handling utensils, riding tricycles and bikes, ball catching, and writing. Eventually, DCD affects the child in all of these aspects and the quality of life, especially if there is the presence of any co-morbid condition like ADHD (Sankar and Monisha, 2018).

Children with DCD have the following problems in performing daily living activities like eating and dressing. Using utensils, cutting food into small pieces are the problematic areas for these children. Trouble in Drinking milk without spilling and picking food from the plate in right proportions results in frustration for both the child and their families (Sankar and Monisha, 2019).

Dressing issues occur while handling fasteners, and

learning several steps to tie shoes can be difficult. These children with DCD have an overall slow speed dressing and even at eating when the skills which they possess are inadequate, This becomes more troublesome when the child's age is increasing as their demands increases in dressing and hygiene, for instance, thoroughness in hair washing, and tooth brushing (Wilson *et al.*, 2009).

When children tend to initiate their academic life, they struggle with motor coordinating activities and motor planning in academic performance, outdoor sports activities and group activities. In sports and outdoor activity skills, the children with DCD face problems in throwing and catching a ball, balancing, skipping, hopping, or jumping. The parents and caregivers of children with DCD refer; their children do not come under the category of sports performing kind in comparison with other children. In a classroom setting, these children exhibit difficulties in dexterity and fine motor skills and gross motor activities or even both in certain situations (Sankar *et al.*, 2020).

The prevalence of developmental co-ordination disorder is increasing worldwide, as they are connected with the children's quality of life. They face difficulties in action planning, organising, adapting to movements and learning new skills, which affects the daily living activities, play, and academic performance. The DCD prevalence in the United States is 5-8%, 5.6% in Egypt, 5.7% in Greek and 1.8% in the United Kingdom and 5.9% in Canada, 30% in Brazil and India it is found to be 1.6% in West India, 21.6% in Karnataka. In Tamil Nadu at Kattupakkam, it was found to be 3.22%, and Kattankulathur had 1.37%8. Since there is no evidence of DCD prevalence in Primary schools at Tamil Nadu, the current study aims at finding the prevalence of DCD among primary school children at Kancheepuram.

METHODOLOGY

Participants

This cross-sectional study-survey design was initiated after getting institutional ethical clearance from the SRM Institute of Science and Technology. After getting informed consent signed from the parents of children with DCD, Door to door survey was conducted by using the Developmental Co-ordination Disorder Questionnaire.

Two hundred Children (n=200) participated in the study. Both boys and girls between the ages of 5-11 years (Mean age=7.5 years with a standard deviation of 1.2 years) were included, and this study was a review study and has been conducted by the same author over the similar geographical area in an

entirely different time frame.

The time frame the study has been initially conducted is 2011 after ten years; again in 2019-2020, the prevalence estimate has been calculated at Kancheepuram. Children were selected based on the specific inclusion and exclusion criteria, and their demographic data are listed in Table 2.

Inclusion criteria

1. Primary school children
2. Age group 5 to 11 years
3. Both gender

Exclusion criteria

1. Pervasive developmental disorder
2. Children physically handicapped

The developmental co-ordination disorder questionnaire was distributed after obtaining permission from the corresponding principals of primary schools at Kancheepuram. The DCDQ were distributed to the parents, teachers and student counsellor and the filled questionnaires were collected back for scoring and interpreting the scores for data analysis (Table 1).

Descriptive statistical analysis was used to identify the prevalence of Developmental Co-ordination Disorder among primary school children at Kancheepuram. The results revealed that the prevalence of DCD in primary school at Kancheepuram was 120.20 in 1000 children (Table 3)

DISCUSSION

"Developmental co-ordination disorder" is a neurodevelopmental disorder chiefly categorised by deficits in gross and fine motor co-ordination which is considerably below than predictable for an individual's age, in the absence of neurological and intellectual deficits. Therefore the difficulties in co-ordination harm daily living tasks and individual wellbeing. It was found to affect 5% of school-aged children (Missiuna *et al.*, 2008).

The current study was carried out to estimate the prevalence rate of Developmental Co-ordination Disorder amongst "primary school" children at Kancheepuram. In this study, two hundred children at risk were included in the study. The result revealed that seventy children were screened with DCD. The prevalence of DCD found in West India was

1.16%, where children between the age of 5 and 15 years participated in the study.

According to the DSM- 5 criteria, the prevalence rate was 0.8% in southern India. Besides with the physical aspects, children with DCD tend to exhibit psychosocial issues secondarily, of which it includes emotional or behavioural disorders, low self-esteem, anxiety and depression, poor social and peer relationships.

Children diagnosed with DCD face emotional and behavioural problems. They are exhibited as internalising and externalising problems according to the individual. These internalising and externalising problems can be considered as subgroups of emotional or behaviour problems. Internalising behaviours are inward-directed while externalising behaviours manifest themselves as outward excessive worries. Externalising behaviours include a child violating the social norms or rules, ignoring teacher's instructions or hyperactive behaviours (Valentini *et al.*, 2012).

DCD has also been found with increased levels of anxiety, depression, and introversion and expression of defiant behaviours. While talking about depression and DCD, the most commonly affected are the adolescents with DCD and ADHD as comorbidity exhibit depressive symptoms, due to their poor co-ordination skills.

In general children with DCD experienced slower reaction times and less accuracy in bimanual tasks, timing and sequencing problems. Besides, the performance deficits in DCD also include difficulties with preparing oneself for the upcoming action, rhythmic co-ordination, executive functions like set-shifting, attention and flexibility, walking pattern and posture, catching and interceptive action, and components of sensory-perceptual function, e.g. Visual-sensory processing, tactile perception, kinaesthesia, processing speed. It is also found that children with DCD experienced strength and power deficits in knee extension and flexion tasks. They also find difficulties in motor planning and modulation activities.

While discussing the academic achievement of children with DCD, they display other types of a developmental trait as difficulties in communication, disabilities in learning, and being hyperactive. Additionally, there are academic deficits, along with working memory and arithmetical skills (Sankar and Monisha, 2020).

They experience psychosocial problems like low self-esteem, anxiety and eventually leads to poor performance in school. It is suggestive that children should be engaged in physical activity and it

Table 1: DCDQ - Interpretation

Age group (Years)	Indication of, or suspect for DCD	Probably not DCD
5.0 -7.11	15-46	47-75
8.0-9.11	15-55	56-75
10.0-10.11	15-57	58-75

Table 2: The demographic Data

Age group (years)	Boys (n=80)	Girls (n=120)	Total (N=200)
5.0 - 5.11	10	15	25
6.0 - 6.11	6	10	16
7.0 - 7.11	20	15	35
8.0 - 8.11	10	15	25
9.0 - 9.11	4	20	24
10.0- 10.11	30	45	75
5.0-10.11 years	80	120	200

Two hundred children participated in the study out of which 80 were boys, and 120 were girls.

Table 3: The prevalence of DCD from age group of 5.0 to 11.0 years among primary schools at Kancheepuram

Age group (Years)	Prevalence	
	Number of DCD children	Prevalence (in 1000)
5.0 - 5.11	10	122.21
6.0 - 6.11	5	70.12
7.0 -7.11	15	217.39
8.0 - 8.11	12	110.09
9.0 -9.11	13	152.36
10.0 - 10.11	15	200.19

can reduce the co-ordination difficulties. The current study was conducted in primary school children, where the schools decided to choose children who had co-ordination difficulties and distributed the developmental co-ordination disorder questionnaires to the parents of children with co-ordination difficulties. The current study shows a difference in both genders, which might be due to the behaviour of boys exhibiting motor in co-ordination and their corresponding difficulties at home and classroom.

CONCLUSION

The study established that 120.20 in 1000 children at risk of "developmental co-ordination disorder" between five and eleven years of age in primary school children at Kancheepuram. The study concludes that there is a need for an awareness program and screening for Developmental Co-ordination Disorder, and that has to be done regularly in a school setting. Educational camps on developmental co-

ordination disorder promote awareness effectively among teachers and parents.

ACKNOWLEDGEMENT

We thank the parents and children who participated in the study.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

Funding Support

The authors declare that they have no funding support for this study.

REFERENCES

Gueze, R., Borger, H. 1993. Children who are clumsy: five years later. *Adapted Physical Activity Quarter*, 10(1):10-21.

- Landgren, M., Pertersson, R., Kjellman, B., Gillberg, C. 1996. ADHD, DAMP and other neuro-developmental/neuro-psychiatric disorders in six-year-old children: epidemiology and comorbidity. *Dev Med Child Neurol*, 38(10):891-906.
- Missiuna, C., Gaines, R., Mclean, J., DeLaat, D., Egan, M., Soucie, H. 2008. Description of children identified by physicians as having developmental coordination disorder. *Developmental Medicine and Child Neurology*, 50(11):839-844.
- Sankar, U. G., Monisha, R. 2018. Evaluation of Cardio-Vascular Risk in Children with Developmental Coordination Disorder in Indian Context-Pilot Study. *Research Journal of Pharmacy and Technology*, 11(12):5405-5407.
- Sankar, U. G., Monisha, R. 2019. Life Impact of Developmental Coordination Disorder: Qualitative Analysis of Patient and Therapist Experiences. *Biomedical and Pharmacology Journal*, 12(1):491-494.
- Sankar, U. G., Monisha, R. 2020. Evaluation of Multiple Interacting Factors Associated with Developmental Coordination Disorder (DCD). *International Journal of Research in Pharmaceutical Sciences*, 11(4):6286-6289.
- Sankar, U. G., Monisha, R., Doss, C. A. V., Palanivel, R. M. 2020. Relationship between Sensory Responsivity, Loneliness, and Anxiety among Indian Adults with Developmental Coordination Disorder (DCD). *Biomedical and Pharmacology Journal*, 13(02):895-898.
- Valentini, N. C., Coutinho, M. T. C., Pansera, S. M., dos Santos, V. A. P., Vieira, J. L. L., Ramalho, M. H., de Oliveira, M. A. 2012. Prevalence of motor deficits and developmental coordination disorders in children from South Brazil. *Revista Paulista de Pediatria*, 30(3):377-384.
- Wilson, B. N., Crawford, S. G., Green, D., Roberts, G., Aylott, A., Kaplan, B. J. 2009. Psychometric Properties of the Revised Developmental Coordination Disorder Questionnaire. *Physical & Occupational Therapy In Pediatrics*, 29(2):182-202.
- Wright, H. C., Sugden, D. A. 2008. A two-step procedure for the identification of children with developmental co-ordination disorder in Singapore. *Developmental Medicine & Child Neurology*, 38(12):1099-1105.