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Prevalence of Vitamin D Deficiency in Primary School Children with Developmental Coordination Disorder (DCD)

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ABSTRACT

The majority of mothers and caregivers of children with DCD were not aware of vitamin D deficiency and its relations to cardiovascular abnormalities and many other non-skeletal abnormalities. It is well known that skeletal muscle integrity and metabolism are boosted by sunray vitamin and Young women's and children were the victims of vitamin D deficiency. Vitamin D oral supplementation is under routine practice in a western country. However, it has been frequently documented in studies, but there are limited data on the prevalence of Vitamin D deficiency among children with DCD in the Indian population. The study aims to find out the prevalence of vitamin D deficiency in children with DCD in primary schools. 20 children with DCD underwent physical examination on the blood test and physical activity assessments. (50%) were vitamin D deficient (serum 25OHD level), of whom 4% were severely vitamin D deficient and physical activity were significant independent predictors of hypovitaminosis D. Indian mothers of children with DCD were having poor perception regarding their child's green land play and they constrain the children's towards academic activities. Thus they were at higher risk of osteoporosis and osteopenia as there is a higher prevalence of vitamin D deficiency encountered in children with DCD.

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INTRODUCTION

Vitamin D is otherwise best known as the sunshine vitamin and its best source is from sunrays. In order to maintain metabolism and skeletal muscle integrity, there should be adequate vitamins and minerals. Vitamin D helps to boost immunity (American Psychiatric Association, 1994; Ganapathy Sankar U, Monisha R, 2018, 2019). There are innumerous health benefits from vitamin D. In spite of its health benefits, the majority of children and adults were deficient towards Vitamin D. when children with DCD were examined, the characteristics of the disorder make the child prone for Vitamin D deficiency. Developmental coordination disorder will affect the activities of daily living and those chil-

dren will avoid peer group interaction and be isolated. Thus they avoid playing outdoor. Children with DCD were isolated because of isolation; they were more prone to be affected because of psychiatric problems (Ganapathy Sankar, Saritha, 2011).

Limited research has been done to examine the impact of lack of physical activity in green land in terms of blood parameters. There is a tremendous need to examine the mineral and vitamin level of children with DCD as like the assessment of participation level in academics and physical activity (Ganapathy Shankar U, 2019). Physical and occupational therapists have to advertize the caregivers about the importance of vitamin D and what are the sources of vitamin D. they have to be insisted on the need for physical activity participation with peer groups in green land (Ganapathy Sankar U, 2018). Mothers of children with DCD need to be educated regarding DCD and its prevalence worldwide. Vitamin D deficiency triggers osteopenia and osteoporosis, thus maintaining the standardized level as specified by the medical standards will help to maintain skeletal muscle integrity and maximize the functions of immune system regulation among adults and children with DCD. Vitamin D2 and D3 are the variants of vitamin D complex. Vitamin D3 helps in bone metabolism and it's the most active form (Ganapathy Shankar U, Monisha R, 2019; Boonen *et al.*, 2006; R, 1995).

Dr. Ganapathy Sankar, in his research on Life Impact of Developmental Coordination Disorder: Qualitative Analysis, he described that personal interview sessions with parents revealed that these children experience a serious psychiatric illness as a result of incompetence in performing everyday activities. Avoided by the same age peers in playing will have a greater impact on Childs psychological state. Isolation and loneliness make the child psychologically ill and he/she keeps themselves inside the home and avoids participation in physical activity sessions and also avoids academic activities. This homebound will makes the child prone to vitamin D deficiency (Witham *et al.*, 2010; Forman *et al.*, 2007; Dobnig, 2008).

When Indian children with DCD were examined, they were confounded by so many factors. The mother's perspectives will have a greater impact on the child. The caregiver's lack of knowledge in understanding the advantages of physical activity makes the children homebound and makes them less prone to sunlight. Indian mothers want their child with DCD to get better in academics rather in motor coordination (Wang *et al.*, 2008; Giovannucci, 2008; Black and Scragg, 2005). Their perception of the child's activity is wrong. Thus there is a tremendous need for enhancing the knowledge regarding the DCD and the importance of physical activity in green land as an indirect facilitator of vitamin D absorption (Janssens *et al.*, 2010).

MATERIALS AND METHODS

This study adopted a cross-sectional study-survey design. The survey was conducted by Door to door interview and diagnosis was confirmed using the Developmental Coordination Disorder Questionnaire. A hundred Children (n=100) were initially recruited in the study. Both genders were included children age 5-10 years were included and this study was carried over by the primary author Dr. Ganapathy Sankar over a similar geographical area in an entirely different time frame. The time frame which study has been conducted is 2011 after 9 years; again, in 2019, the prevalence estimate has been calculated, but with the primary objective of this current research is to examine the vitamin D deficiency in children with DCD.

The Developmental Coordination Disorder Questionnaire (DCDQ) will assess the coordination difficulty existed by the children and it concludes whether the children were suspect or not a suspect of DCD (Stephenson *et al.*, 2007; Wolfenden *et al.*, 2008; V, 2006). Parents were instructed to fill in their child's engagement in motor activity using a Likert scale. This questionnaire follows a standardized methodology to evaluate the child's coordination in ADL. It has 15 divisions, which analyzes three identical factors. The first factor includes a number of items specific to motor control when the child was in a dynamic environment, or while an object was in motion, and is labeled "Control during Movement." The second factor analyzes the "Fine Motor and Handwriting" skill and the third factor analyzes the "General Coordination." To complete the questionnaire, it takes 10-15 minutes. Data collection procedure was done by explaining the purpose of the study to panchayat union officers and data is collected about a number of children with DCD at each house at Kancheepuram. Door to door survey was done and consent forms were obtained. The study involves analyzing the vitamin D status for the children with DCD, the procedure has been explained in the information sheet and submitted to the parents. The Developmental Coordination Disorder Questionnaire (DCDQ) was circulated and requested to be filled properly by the concerned parents. The primary investigator explains the DCDQ in detail and clarifies their doubts (Ferrari *et al.*, 2011; Wilkinson *et al.*, 2000). Data was collected for further analysis.

Table 1: The prevalence of vitamin D deficiency in children with Developmental Coordination Disorder (DCD) among the age group of 10 years at Kattankulathur

S.No	Age	Total Sample	Number of Children with Vitamin D Deficiency
1	5- 5.11	2	1
2	6- 6.11	5	1
3	7- 7.11	2	1
4	8- 8.11	5	1
5	9- 9.11	6	6
Total	5- 10 Years	20	10

RESULTS AND DISCUSSION

Twenty children with DCD (n=20) participated. The age range was 5 to 10 years (Table 1). Serum levels of 25-hydroxyvitamin D (25OHD) and physical activity variables that were potential risk factors for hypovitaminosis D. Descriptive statistics were used to examine the data collected. The result of this study revealed that 50 children met the criteria for a diagnosis of Developmental Coordination Disorder (DCD) and they were also (50%) vitamin D deficient (serum 25OHD level). It indicates that the prevalence rate at Kattankulathur is 8.2% and it has been increased significantly from the year 2011. By 2011 the prevalence estimate in Kattankulathur is 3.22% of children (Ganapathy Shankar U, Monisha R, 2019).

The results show that 7.5 % of children have Vitamin D deficiency among children with Developmental Coordination Disorder.

Vitamin D deficiency affects the overall bone health and generalized metabolism of the child and for children with DCD it may be prevalent to a higher percentage as because of the child's coordination problem, they lack green land exposure and outdoor play is considered to be the most easy mode to attain vitamin D from sunlight. But in the Indian context, the parents of children with DCD constrains the child with DCD to focus on the academic activity rather than peer group interaction and green land play. They have a wrong perception of physical activity and its necessity for their children with DCD. Developmental Coordination Disorder (DCD) is commonly having a major impact on children's handwriting, reading and mathematics problem-solving in academics. Researchers have concluded that there exists a perfect relationship between poor academics and psychiatric disorders. A research study conducted by the primary author Dr. Ganapathy Sankar on mother's perspectives of the children with DCD has explored that Indian mothers have negative perspectives over physical activity and they were not allowing children to participate in physical activity sessions. They constrain their child towards indoor activities like playing chess and they avoid their child to play with a peer group in the green land. Mothers were conscious about the child's coordination difficulty and they have a fear of fall; this is considered to be the reason behind the physical activity avoidance in these children. In the current study, the primary objective was to estimate the prevalence of vitamin D deficiency in children with DCD.

Results revealed that 7.5 % were screened as having Vitamin D deficiency in 2019. Still, in India, Ganapathy Sankar & Saritha reported that the prevalence of DCD is 1.26% at Kattankulathur, Tamilnadu, by the year 2011. The current study findings concluded that DCD children were also considered to be having Vitamin D deficiency and the prevalence rate is increased. Further study is recommended to be conducted in other geographical areas of India

CONCLUSIONS

The current study found that the prevalence rate is 7.5%. Awareness program and screening program on vitamin D and B12 needs to be conducted periodically in primary school for the early identification of DCD

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