Case Report

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# Vitamin D Adequacy and Improvements In Children with Developmental Coordination Disorder

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## Abstract

Children and adults with Developmental coordination disorder are more prevalent in vitamin D deficiency. Vitamin D – Sunshine vitamin is deficient because of poor physical activity in the green land. Vitamin D plays a vital role in muscle coordination & neural activation. It also enhances immunity, boosts metabolism and protects against secondary infections. When research articles related to vitamin D level supplementation are reviewed, it has been identified that the focus of the research was on risk-benefits. Researches were focused towards general interpretations of the test result. Vitamin D requirement for normal population is 20 ng/mL to 30 ng/mL (75 nmol/L). wide literature search has proved that a person with cancer, autoimmune disease, Cardiovascular disorders and the person with any developmental disability and DCD must consider 40 ng/mL (100 nmol/L) as a minimum level to avoid co-morbidities. Children and adults with DCD need adequate physical activity in green land, which facilitates sunlight exposure and there should be a compulsory oral supplementation. This study examines vitamin D requirements for the musculoskeletal system and improvements in children with DCD and it insists on the need for vitamin D for enhancing performance in ADL.

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## INTRODUCTION

Adults and children with DCD require much health care than their age-matched peer group. Adequate vitamin D is essential to maintain optimum physical well-being (Vanlint *et al.*, 2008; Greenway and Zacharin, 2003). A literature survey explores that Vitamin D deficiency occupies the first place among the topmost nutritional deficiencies in the world and the positive factor underlying it is, it can be easily treated. Vitamin D surpasses the beneficial effects produced by calcium and phosphorus. Till date, no researcher has focused on the detrimental effects of vitamin D and physical activity. Majority of the research studies focused on the prevalence of Vitamin D deficiency and its associated comorbidities, but vitamin D insufficiency is high as compared to other nutritional disorders in children with DCD (Sinot A N, 2014), majority of the children were obese, those with greater cardio-vascular disorder and impaired gastrointestinal absorption of vitamin D, those children were in need of oral administration of vitamin D supplementation and other medications to enhance the liver function to

**Table 1: Demographic Profile**

| Gender | Male=2, Female=1 |
|---|---|
| Age | 10 Years |
| Skin Type | Light=1, Dark=2 |
| Sunlight Exposure | n = 0 |
| BMI | Obese=2, Normal=1 |
| Physical Activity | Limited |
| Peer Group Interaction | Limited |
| Behavioral Problems | + |

**Table 2: Vitamin D Status**

| Vitamin D status at baseline | Vitamin D Status at 6 months | Vitamin D Status at 15 months |
|---|---|---|
| Deficient (n=0) | n = 0 | 0 |
| Insufficient(n=3) | N =2 | 0 |
| Sufficient(n=0) | N =1 | 3 |
| Total= 3 | 3 | 3 |

improve cytochrome P450 activity (Mimaki *et al.*, 1979; Mikati *et al.*, 2006).

Children with DCD and avoid peer group interaction and avoid playing and performing physical activity in the green land. Lack of physical activity leads to a long-term effect on bone mineral density and vitamin D deficiency (Krishnamoorthy *et al.*, 2009). Low level of the sunshine vitamin is the leading cause of balance problem and the majority of falls in the elderly is related to the low level of vitamin D. catabolism of vitamin D leads to medical comorbidities in children with developmental coordination disorder.

Original research on an intervention to deal with bone mineral density following vitamin D deficiency is left without research attention have and there should be sufficient intervention to balance bone mineral density loss. By considering the individual differences in relation to age, gender, nutritional intake, BMI, exercise pattern, individually tailored exercise intervention protocol should be developed for children and adults with vitamin D deficiency. Several qualitative research data explores the health benefits of vitamin D. Nevertheless, only those with developmental defects are supplemented with vitamin D. Considering the difficulties and costs of oral supplementation of vitamin D, and there has been an established educational program and awareness campaign, that insist to have adequate sunlight exposure and to have frequent participation in exercise program. Children with DCD are prevalent in having Vitamin D deficiency and low bone mineral density as they stay indoors and lack physical activity in green land, the propensity to obesity (Fischer *et al.*, 1988; Dong *et al.*, 2010). These children were, therefore, have a higher incidence of osteopenia , osteoporosis and respiratory infections (Al-Shaar *et al.*, 2014).

## MATERIALS AND METHODS

Children aged 10 years with a documented diagnosis of developmental coordination disorder in the therapy center in and around Chennai (Kancheepuram) in August 2018 were included in the pilot study (Sankar and Monisha, 2018). They had been diagnosed as DCD and confirmed with DCDQ. Few parents of children with DCD want to drop out of the study; after filling up the withdrawal statement, they were allowed to drop out of the study. Thus 2 children were excluded from the study. Up to July 2018, children with DCD received conventional therapy. From August 2018 onward, all the participants received vitamin D oral supplementation recommended by the IOM –Institute of medicine.

### Data collection

After getting the information sheet signed, informed consent form has been signed by the parents or caregivers of the child with DCD. Baseline information and history (past) has been collected from the parents and patient files were accessed to gather information provided by the pediatrician. DCDQ has been submitted to the parents and they were explained regarding the questionnaire and they have to mark the appropriate information to assess their child status. Further details on the amount of physical activity and the duration of sun exposure were gathered. The children were examined with blood monitoring

at the baseline $2018^{th}$ July (baseline) and 6 months later and at the end of 2019 (15 months).

**Statistical analysis**

Paired t-test, unpaired t-test, analysis of variance, correlation, and linear and multiple regression were applied to the data using SPSS, version 22. The level of significance was a P value of <0.05.

## RESULTS AND DISCUSSION

We included 3 out of 5 children with DCD. Two were excluded because the follow-up was incomplete. Patient demographic data are listed in Table 1. All those included are aged 10 years, are Indians, and have a good liver function. At baseline, the vitamin D status of 3 was deficient. These children received standard care at baseline.

From baseline assessment, all children received supplemented doses of vitamin D ranging from 400 to 1200 IU/day. The difference change in 25-(OH) D between 6 and 15 months Is not statistically significant (P= 0.021). After 15 months, sufficient vitamin D status found. Results were found in 100% of all the 3 children with an insufficient vitamin D status. The effects of supplementation on vitamin D status are listed in Table 2.

In this study, we tried to associate the factors which underlie the low level of vitamin d production in children with DCD. We found that a higher BMI was associated with lower 25-(OH)D concentrations both at baseline and at 15 months. Childhood Obesity has already been identified as a risk factor for vitamin D deficiency in children with DCD.

## CONCLUSIONS

All children reached a sufficient vitamin D status after supplementation. The current study needs to be carried out over large samples to analyze the factors responsible for the low level of vitamin D in children with DCD.

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