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Vitamin D3's Role in Children who Experience Idiopathic Musculoskeletal Discomfort

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ABSTRACT

Background: In the metabolism of bones and muscles, vitamin D is crucial. Several studies have examined the role of vitamin D in musculoskeletal pain, and some have found that taking vitamin D supplements can relieve musculoskeletal pain and improve related physical functioning.

Aims & objectives: The primary goal of the current study was to compare the vitamin D levels in children with IMSP to those in healthy controls. Secondary goals included comparing the serum calcium, phosphorus, and alkaline phosphate levels in these kids.

Methods: The study was an observational cross-sectional hospital-based investigation that took place from January 2015 to April 2016 in the IPD and OPD of pediatric medicine in central India. We did a pilot study on eight children with IMSP and eight controls because there had been no prior research on vitamin D levels in Indian children with IMSP compared to controls. For each of the two groups, a determined sample size of 60 people was needed. Thus, it was agreed to use 60 kids as cases and controls, respectively.

Results: In controls, we discovered a comparatively high frequency of vitamin D insufficiency (26%) Additionally, the difference in vitamin D mean value between the patients and themselves was statistically significant (P 0.001). In this study, more children with IMSP and controls had mild vitamin D deficiency (43%/0%), and this was most pronounced in the age group of 6 to 9 years with IMSP.

Conclusion: Assessment of vitamin D in all children with IMSP may be helpful because vitamin D may play a role in the condition.

Key Word: Vitamin D, musculo-skeletal pain, IMSP

INTRODUCTION

Idiopathic musculoskeletal pain (IMSP) is a type of persistent pain that affects the body's musculoskeletal systems but has no known cause[1]. Variable pain duration (from 6 weeks to 3 months) has been used in a number of IMSP studies to characterize these instances. Additionally, the phrases idiopathic MSP and non-specific MSP have been used interchangeably. According to studies, these kids' lives are of poor quality and they experience social disruption, loss of education, psychosomatic issues, and bad health. Physical hypermobility, feminine gender, psychosocial issues, and vitamin D insufficiency are among the reported risk factors for IMSP[2-5]. Children frequently endure musculoskeletal pain, which is a universal feeling. Acute musculoskeletal pain is common, and its origin is typically clear.

In children with idiopathic musculoskeletal pain, there are typically no overt or evident noxious stimuli to account for the pain, which makes diagnosing and treating chronic pain challenging[6]. There have been reports of feminine gender, physical hypermobility, psychosocial issues, and vitamin D deficiency, particularly in older age groups, as risk factors for idiopathic musculoskeletal pain. Since vitamin D plays a crucial part in the metabolism of bones and muscles, a lack of it results in improper mineralization of the osteoblasts' newly formed bone matrix. Only a few research have examined vitamin D's function in musculoskeletal pain. There have been conflicting reports regarding the effects of vitamin D supplementation on musculoskeletal pain and related improvements in physical functioning[7].

Previous studies' findings on the levels of vitamin D in serum in people with idiopathic musculoskeletal pain were ambiguous.

Aims & objectives: The primary goal of the current study was to compare the vitamin D levels in children with IMSP to those in healthy controls. Secondary goals included comparing the serum calcium, phosphorus, and alkaline phosphate levels in these kids.

METHODS

Study Location: Central India's Pediatric Medicine Outpatient and Inpatient Department (OPD). Timeline: (January 2015 to April 2016) Definition of Issue Musculoskeletal pain in any appendicular or axial body component that has lasted at least six weeks without an identifiable explanation is referred to as idiopathic musculoskeletal pain. Population definition: Patients who will be admitted to the pediatric medicine department make up the study population. Vitamin D levels in the blood and a clinical assessment are study factors. Cross-sectional observational study conducted in a hospital. Research design: interventional. Non-random allocation is used.

Sample size calculation:

We did a pilot study on eight children with IMSP and eight controls because there had been no prior research on vitamin D levels in Indian children with IMSP compared to controls. For each of the two groups, a determined sample size of 30 was necessary. Thus, it was agreed to use 30 kids as cases and controls, respectively.

A type of design Patients will be enrolled in the study after providing informed consent, and in accordance with the following criteria:

Inclusion standards:

1. From 3 to 12 years old.

2. Musculoskeletal discomfort that is idiopathic

Exclusion criteria:

1. People whose musculoskeletal discomfort has known causes, such as JIA, RA, trauma, growing pains, hypermobility, myositis, fibromyalgia, reflex sympathetic dystrophy, etc.

2. People who have tuberculosis, heart disease, kidney illness, malabsorption, etc. as well as other chronic systemic diseases that are clinically evident.

3. Participants who had taken steroids, anticonvulsants, vitamin D and calcium supplements within the previous three months will not be allowed to participate in the study.

60 kids aged 3 to 12 with idiopathic musculoskeletal pain were included in the sample.

Equal numbers of children of the same age and sex who appeared healthy and did not report any musculoskeletal pain were used as controls.

Techniques for Gathering Data: By employing an oral questionnaire approach to obtain pertinent medical history from the patient or patient party, using additional clinical tools, sending routine investigations to the lab, and charting all of the results on a template for case records. Name, age, sex, height, weight, body mass index (BMI), history about the kind of diet, daily calcium intake, and sun exposure will all be noted for every patient in both groups.

We will gather data on the characteristics of idiopathic musculoskeletal pain in children, including its duration, location, and frequency, as well as any associated disability, the existence of aggravating factors, and any associated headaches or abdominal pain.

Analytical statistics

Epi Info (TM) 3.5.3 was employed to help with the statistical analysis. The Centers for Disease Control and Prevention is the owner of the trademark EPI INFO. The connection between the various research variables was examined using the 2 test. The means were contrasted using the t-test. The level of significance was fixed at 0.05.

RESULTS

Table 1: Age Distribution

Age (yrs)	Frequency	Percent
4 to 6	18	30.0%
6.1 to 9	30	50.0%
9.1 to 12	12	20.0%
Total	60	100.0%

In our study, more children with IMSP and controls had mild vitamin D deficiency (43%/0%), and this was most pronounced in the age group of 6 to 9 years with IMSP. Although children in our study with numerous sites of pain and more frequent pain episodes had relatively lower vitamin D levels than children with single site pain, the precise importance of this discovery needs to be further investigated with bigger multicenteric studies. In a 3-month follow-up conducted in situations where vitamin D deficiency was present, the majority (67%) of patients reported reduced pain symptoms.

Table 2: Sex Distribution among cases and control group

Sex	Case	Control	TOTAL
Female	28	28	56
Row %	50.0	50.0	100.0
Col %	46.7	46.7	46.7
Male	32	32	64
Row %	50.0	50.0	100.0
Col %	53.3	53.3	53.3
TOTAL	60	60	120
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

Table 3: Mean Vitamin- D in case and control group

		Min	Max	Mean	SD	p-value
Vit-D	Case	16.2000	82.7000	37.9333	22.9014	<0.001
	Control	45.0000	105.0000	79.0900	16.9771	

We discovered that controls likewise had a very high prevalence of vitamin D deficiency (26%) and that the difference in vitamin D mean values between the controls and the patients was statistically significant (P 0.001).

Table 4: Level of Vitamin- D in case and control

VitD1	Case	Control	TOTAL
<25(Moderate)	26	0	26
Row %	100.0	0.0	100.0
Col %	43.3	0.0	21.7
25.1-50(Mild)	16	4	20
Row %	80.0	20.0	100.0
Col %	26.7	6.7	16.7
50.1-75 (Insufficient)	8	12	20
Row %	40.0	60.0	100.0
Col %	13.3	20.0	16.7
>75 (Normal)	10	44	54
Row %	18.5	81.5	100.0
Col %	16.7	73.3	45.0
TOTAL	60	60	120
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

This correlation was statistically significant (p<0.001).

Table 5: Distribution of Joint involvement in cases

Joint invovement	Frequency	Percent
No	24	40.0%
Yes	36	60.0%
Total	60	100.0%

Availability of Children with vitamin D insufficiency from both groups were given 6 lakh units of vitamin D3 (cholecalciferol) and were monitored for 3 months after treatment.

Table 6: Distribution of After 3 month treatment in cases

After 3 month treatment	Frequency	Percent
Improved	40	66.7%
persist	20	33.3%
Total	60	100.0%

DISCUSSION

Even though idiopathic musculoskeletal pain affects children in many negative ways, little is understood about the pathogenesis of these problems. Some earlier research have proposed that a vitamin D deficiency may contribute to the development of IMSP[8]. Since they could consistently articulate their pain problems, we included kids older than 4 years old. In our investigation, the mean ages of the cases and controls were comparable. The majority (50%) of the individuals were between the ages of 6 and 9. According to past research, adolescents are the age range when IMSP is most common[9,10]. Our study was conducted in a hospital, thus its prevalence in the general community might not be accurate. Males (53.3%) outnumbered girls (46.7%) in this study. According to El Metwally et al., girls were more likely than boys to develop idiopathic musculoskeletal discomfort. In contrast, no association between gender and idiopathic musculoskeletal pain was found by Paladino et al. The majority of male participants in our study may reflect the social context in which males are more frequently brought by parents to medical facilities than females. Our study's findings on related complaints are consistent with those of past investigations. Increased stressor perception by people with chronic pain has been linked to sleep disturbances and behavioral disturbances. We discovered that a significant portion (83.3%) of patients with IMSP had varying degrees of vitamin D deficiency[11,12]. Studies on both adults and children have found a significant frequency of vitamin D deficiency (varying from 83 to 95.4%) in those with low back pain and musculoskeletal discomfort. However, some research found no connection between musculoskeletal pain and vitamin D deficiency. We discovered that controls likewise had a very high prevalence of vitamin D deficiency (26%) and that the difference in vitamin D mean values between the controls and the patients was statistically significant (P 0.001). Szalay et al. found conflicting results in their investigation of vitamin D deficiency in 46 children, 46 of whom had pain and 46 of whom did not (p=0.52). They found no discernible difference between the vitamin D levels in the two groups[13]. In our study, more children with IMSP and controls had mild vitamin D deficiency (43%/0%), and this was most pronounced in the age group of 6 to 9 years with IMSP. Although children in our study with numerous sites of pain and more frequent pain episodes had relatively lower vitamin D levels than children with single site pain, the precise importance of this discovery needs to be further investigated with bigger multicenteric studies. In a 3-month follow-up conducted in situations where vitamin D deficiency was present, the majority (67%) of patients reported reduced pain symptoms. During a three-month follow-up period, controls receiving vitamin D deficient treatment did not exhibit any signs of pain[15]. Our study's findings, such as the higher frequency of mild and moderate vitamin D deficiency in children with IMSP compared to controls, lower vitamin D levels across the board in children with IMSP, and a higher frequency and improvement in pain after vitamin D replacement, all imply that vitamin D may play a role in IMSP[16].

CONCLUSION

The results of this study imply that vitamin D may have a role in IMSP since more children with IMSP had mild or moderate vitamin D deficiency than controls did, children with IMSP had lower vitamin D levels overall, and pain was more common and got better after vitamin D replacement. Vitamin D testing for all children with IMSP may be helpful because it may have a role in the condition. To have the finding broadly accepted, longer-term research with more children of diverse ethnicities are needed.

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