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ORIGINAL ARTICLE

Comparison of Vitamin D Levels in Children with Musculoskeletal Pain with and without Hypermobility of Joints

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ABSTRACT:

Aim: This study aimed to compare vitamin D serum levels in Indian children with chronic musculoskeletal pain with and without hypermobility. **Materials and Methods:**A cross-sectional study was conducted in the Department of Pediatric. Total 100 children were diagnosed with chronic musculoskeletal pain were include in this study.The subjects were divided into two groups, with or without hypermobility. Hypermobility was diagnosed using Modified Criteria of Carter and Wilkinson. Serum 25-hydroxy vitamin D (25-(OH)D) level and baseline characteristics were compared, and 25-(OH)D <30 ng/mL was considered deficiency. **Results**: A total of 100 children (61 girls (61 %), and 39boys(39%))with a mean age of 8.48 ± 2.39 years were included. Most participants (78%) were 5 to 10 years old.87 patients (87%) were diagnosed with vitamin D deficiency (25(OH)D <30 ng/mL). Children without joint hypermobility had a lower vitamin D level and a higher prevalence of vitamin D deficiency compared to those with hypermobility. However, the difference was not statistically significant. **Conclusion:**We conclude the high prevalence of vitamin D deficiency among children and adolescents with chronic musculoskeletal pain, but the difference in vitamin D deficiency between children with and without hypermobility was not statisticallysignificant.

Key Words: Children, Chronic musculoskeletal pain, Joint hypermobility, Vitamin D

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INTRODUCTION

Joint hypermobility or laxity is having a range of motion beyond the limits of normal joint. It can affect one or more joints. Beighton scoring (BS), where in nine joints are evaluated, is used to define JH and BS 4-6/9 is reported as generalized joint hypermobility (GJH).[1,2] Hypermobility brings with it many problems as musculoskeletal or systemic manifestations. Musculoskeletal manifestations are traumas, degenerative joint and bone diseases, disturbed proprioception, muscle weakness and musculoskeletal traits. Systemic manifestations are cardiovascular involvements, skin, mucosae, fascia involvement, and nervous system involvement.[2]Joint hypermobility is common in childhood, occurring in 8–39% of school age children.[3-6] Prevalence depends on age, sex and ethnicity and decreases with increasing age. Girls are generally more hypermobile than boys and children from Asian backgrounds are generally more hypermobile than Caucasian children.[7]

Vitamin D is an essential component of bone and mineral metabolism. It is required to accelerate calcium absorption in the intestine and is essential for normal growth-plate calcification and bone mineralization. It plays a significant role in the homeostasis of calcium and phosphorus and is vital for bone mineralization, skeletal growth and bone health. A normal vitamin D status seems to be protective against musculoskeletal disorders (muscle weakness, falls and fractures), infectious disease, autoimmune disease, cardiovascular disease, types 1 and 2 diabetes mellitus, several types of cancer, neurocognitive dysfunction and mental illness.[8,9] An association between the vitamin D level and chronic pain conditions has been described in adults; the patients' pain condition improved with vitamin D supplementation.[10,11] Turkey receives a high level of sunlight, and vitamin D deficiency was thus thought to be unusual here; however, the reported prevalence of hypovitaminosis D is 40–65% in this country.[12,13]Our study, therefore, aims to evaluate the prevalence of vitamin D deficiency in Indian children with chronic musculoskeletal pain. We also compared vitamin D level in children with and without jointhypermobility.

MATERIALS ANDMETHODS

A cross-sectional study was conducted in the Department of Pediatric, after taking the approval of the protocol review committee and institutional ethics committee. After taking informed consent detailed history was taken from the patient or the relatives if the patient was not in good condition. The technique, risks, benefits, results and associated complications of the procedure were discussed with all patients. Total 100 children were diagnosed with chronic musculoskeletal pain were include in this study.The children underwent a thorough history and physical examination. Data, including age, sex, weight, height, body mass index (BMI), and hypermobility of joints

were recorded. Weight and height were measured (without shoes) using adigital scale and tape meter, respectively. BMI was calculated as weight in kilograms divided by height in squared meters. Diagnosis of joint hypermobility depended on the presence of at least 3 of 5 Modified Criteria of Carter and Wilkinson, including touching thumb to volar forearm, hyperextension of metacarpophalangeal joints so fingers parallel forearm, >10° hyperextension of elbows, >10° hyperextension of knees, and touching palms to floor with knees straight [14]. A 5 ml sample of venous blood was taken from each patient, centrifuged for 15 minutes and stored at -18° c until analysis. After completion of patient selection, all samples were analyzed. Serum 25-hydroxy vitamin D (25-(OH)D) was measured by radioimmunoassay method. A 25-(OH)D level of <30 ng/mL was considered deficiency.

Inclusion criteria

We included healthy children aged ≤ 18 years with recurrent episodes of musculoskeletal pain within the past month to most recently 7 days before attending our outpatient clinic, who were diagnosed with chronic musculoskeletal pain .

Exclusion criteria

Those with a history of fracture, vitamin D administration, and corticosteroid administration, any underlying rheumatologic disease, Ehlers–Danlos syndrome, Marfan syndrome, and serum calcium or phosphorus imbalance were excluded from the study. Children who had any abnormal signs on physical examination such as swelling, erythema, tenderness or limited range of motion of joints were also excluded.

Data Analyses

SPSS software version 21.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Data was shown by mean ±SD for continuous, and frequencies for categorical variables. Normal distribution was determined by Kolmogorov Smirnov test. The Pearson X2 test with Fisher's exact test were used for the assessment of categorical variables. Independent sample t-test (or Mann–Whitney U test) was used to compare continuous variables comparison. P-value < 0.05 was considered statisticallysignificant.

RESULTS

A total of 100 children (61 girls (61 %), and 39boys(39%)) with a mean age of 8.48 ± 2.39 years were included. Most participants (78%) were 5 to 10 years old. Based on Modified Criteria of Carter and Wilkinson, 50 children (50%) with musculoskeletal pain had joint hypermobility. Based on laboratory data, 87 (87%) children had vitamin D deficiency. Data was further compared across the two groups with and without hypermobility. Children with musculoskeletal pain and hypermobility were significantly younger and had significantly lower BMI compared to those without hypermobility. Children without hypermobility had a lower vitamin D level and higher prevalence of vitamin D deficiency compared to those with hypermobility. However, the difference was not statistically significant. demographic and clinical and laboratory characteristics of participants are shown in (Table.1and table 2.)

Table 1: Demographic Profile of Patients

Gender	With hyper laxity, n=50	%	Without hyper laxity, n=50	%	P-value
Male	17	34	22	44	0.3
Female	33	66	28	56	
Age					0.2
Below 5 years	7	14	5	10	
5-10	41	82	37	74	
Above 10 years	2	4	8	16	

Table-2: The clinical and laboratory characteristics of participants with and without hyperlaxity

BMI (kg/m2)	With hyper laxity, n=50	%	Without hyper laxity, n=50	%	P-value
Below 15	4	8	2	4	
15-20	43	86	38	76	0.021
Above 20	3	6	10	20	
Serum vitamin D, ng/mL	19.8±12.7		17±9.4		0.3
Vitamin D deficiency (<30 ng/mL)	41	82	46	92	0.2

DISCUSSION

Chronic musculoskeletal pain is one of the most common pediatric pain syndromes, and may occur together with joint hypermobility, which is another common condition in children and adolescents. The both conditions are associated with significant morbidity and healthcare costs.[15-17] Vitamin D supplementation has been suggested to improve the outcome in children with chronic musculoskeletal pain.[17-19]This study assessed the prevalence of vitamin D deficiency in children with chronic musculoskeletal pain, and compared vitamin D levels in children with

and without joint hypermobility. Our study results showed a high prevalence of vitamin D deficiency among children and adolescents with chronic musculoskeletal pain. The prevalence of vitamin D insufficiency (25-(OH)D<30 ng/mL) among our patients was 87 %, which is considerably higher than the prevalence of vitamin D insufficiency in healthy Indian children and adolescents reported in a recent systematic review and meta-analysis[20]. Our results are approximately similar to those of Decosteret al., who reported vitamin D levels of <30 ng/mL in 95% of Korean children and adolescents with nonspecific lower extremity pains[19], but higher than reports from UK and Canada.[21,22]Vitamin D deficiency is also highly prevalent in adults with musculoskeletal pain. According to Plotnikoff and Quigley, 93% of adult patients with persistent nonspecific musculoskeletal pain had 25-(OH)Dlevels <20 ng/mL.[23] Heidari et al. also reported vitamin D deficiency in 63.4% of Indian adults with chronic musculoskeletal pain.[24] Some studies have shown that vitamin D therapy can improve musculoskeletal pain in pediatric population. According to a pilot study by King et al., a 6-month prescription of vitamin D supplements reduces pain intensity and improves mobility and daily functioning in children with musculoskeletal conditions.[17] The positive effect of vitamin D on chronic musculoskeletal pain in children has also been shown by Daset al., who reported a significant reduction in pain intensity among children with growth pains after a single oral dose of vitamin D.[25] While joint hypermobility is regarded as a major predisposing factor for musculoskeletal pain, our results showed that the difference regarding the prevalence of vitamin D deficiency was not statistically significant, probably due to the high prevalence of 25-(OH)D deficiency in our patients.

CONCLUSION

We reported a high prevalence of vitamin D deficiency in Indian children diagnosed with chronic musculoskeletal pain. There was no significant difference regarding vitamin D deficiency between children with or without hypermobility. More attention should be paid to the role of vitamin D in the management of chronic musculoskeletal pain inpediatrics.

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