HYPOVITAMINOSIS D CAUSING IDIOPATHIC MUSCULOSKELETAL PAIN IN CHILDREN

Rahida Karim[1], Jahanzeb Khan Afridi[2], Hameed Ullah[3], Muhammad Batoor Zaman[4], Afnan Amjad[5], Sobia Naeem[6], Maha Amjad[7]

ABSTRACT

OBJECTIVES

To determine the frequency of hypovitaminosis D in children presenting with Idiopathic musculoskeletal pain IMSP).

METHODOLOGY

The cross-sectional research was carried out at Peshawar's Hayatabad Medical Complex's Department of Pediatrics. The study duration was 6 months. The study comprised 151 patients with non-specific musculoskeletal pain who were tested for vitamin D levels to diagnose hypovitaminosis.

RESULTS

The age range of the participants was 3 to 15 years with a male predominance of 72.8%. The sample's average weight was above the 25th percentile. Hypovitaminosis D was found in 23.2%. Decreased sun exposure was documented in 82.85% of cases with hypovitaminosis. Hypocalcemia, hypophosphatemia and increased alkaline phosphatase were documented in 71.4%, 11.4% and 42.8% participants respectively with hypovitaminosis.

CONCLUSION

Hypovitaminosis D Is one of the risk factors for non-specific musculoskeletal pain but the current study revealed only 23.2% of participants had hypovitaminosis and inadequate sun exposure was a major risk factor for hypovitaminosis.

KEYWORDS: *Idiopathic Musculoskeletal Pain (IMSP), Hypovitaminosis, Vitamin D, Sunlight Exposure*

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Correspondence
[2]Jahanzeb Khan Afridi, Associate Professor
✆: +92-346-9090107
✉: zarakbehram@yahoo.com
[1]Associate Professor Paediatrics, KGMC Peshawar
[3]Specialist, DHQ Charsadda
[4]TMO Surgery, Khyber Teaching Hospital
[5]TMO Anesthesia, Lady Reading Hospital
[6]TMO Anesthesia, Lady Reading Hospital
[7]Medical Student, Rehman Medical College

INTRODUCTION

Idiopathic musculoskeletal pain is intermittent pain in three or more body parts for a minimum of three months without any organic cause. vitamin D deficiency, hypermobility, female gender, and psychological issues have all been recognized as possible risk factors for IMSP.[1] Vitamin D is obtained primarily through sun exposure as well as foods.[2] UVB radiation from the sun penetrates the skin and starts the vitamin D synthesis process. It is a fat-soluble steroid hormone which can be obtained from sterols either as vitamin D2(Ergocalciferol) or vitamin D3(Cholecalciferol) then metabolized in the liver and kidneys to 25-hydroxycholecalciferol and 1, 25-hydroxy cholecalciferol. 25-hydroxycholecalciferol has a half-life of 2to 3 weeks and reflects vitamin level in the human body. Nutrition and sun exposure are required to maintain adequate vitamin D levels. Vitamin D is required for calcium hemostasis, and enhances calcium and phosphorus absorption.[3] It is pleotropic vitamin regulating 200 genes.[4] Vitamin D receptors have been discovered in the brain and

spinal cord as well as in the nuclei and plasma membranes of skeletal muscle cells in mammals, showing a link between vitamin D and skeletal muscle pain.[5,6] Several decades ago, Abraham Jacobi documented myalgia to be a symptom of hypocalcemia in children. He also hypothesized that myalgia and nocturnal cramps in adults have the same etiology.[7] Myalgia has recently been related to vitamin D and calcium insufficiency by other researchers. Myalgia is nothing more than a clinical manifestation of hypovitaminosis.[8] One billion of the world's population is suffering from vitamin D deficiency and 50% from insufficiency. Hypovitaminosis prevalence among children and adolescents varies globally from 5% to 95%.[9] The goal of this study is to determine the prevalence of vitamin D deficiency in patients with nonspecific musculoskeletal pain. The findings will provide an updated and up-to-date analysis, which will be valuable for clinicians, planners, and policymakers in developing relevant interventions at both the clinical and community levels.

METHODOLOGY

The cross-sectional study was carried out at Pediatric Department, Hayatabad Medical Complex Hospital, Peshawar. The study duration was 6 months (15-02-2019 to 15-08-2019). The consecutive non-probability sampling technique was used. The sample size was calculated by using the WHO software of sample size determination with the following assumption. At 95% confidence level and 7% absolute precision. All children with nonspecific musculoskeletal pain for at least 3 months duration or more all the children in the age range 3-15 years were included in the study. The exclusion criteria were organic causes (trauma, malignancies and rheumatological) of musculoskeletal pain were ruled by history, examination, and relevant lab tests. All the patients with chronic renal and liver diseases, and malnutrition along with all patients having muscular dystrophies. Before the trial began, permission from the hospital's ethics council was obtained. The study included all children who presented with a history of nonspecific musculoskeletal pain in the outpatient and emergency departments. Parent's informed written consent was obtained. Full history from the parents was taken, followed by a thorough clinical assessment of the cases. The children's blood was drawn and sent to the hospital laboratory for analysis of serum calcium, phosphorus, and alkaline phosphatase levels, as well as 25-hydroxyvitamin D levels. A pre-designed proforma was used for documentation of preceding information, along with the inclusion of name, age, weight, gender, and address. To control confounders and bias in the study outcomes, a strict exclusion criterion was used. SPSS version 20 was used to analyze the data. Biochemical findings (serum calcium, serum phosphorus, serum alkaline phosphatase, vitamin D levels) and quantitative variables including age, weight, and sun exposure length were described in terms of means ± standard deviation. Hypovitaminosis was stratified by age, weight, gender, and sun exposure time to examine how the effects changed. The chi-square test was used after stratification, with a P value of 0.05 considered significant. Tables and graphs were used to present all the findings.

RESULTS

The research involved 151 youngsters who had non-specific musculoskeletal discomfort. We looked at the vitamin D levels in the blood and the prevalence of hypovitaminosis in these kids. The sample minimum age is three years, while the maximum age is fifteen years, and the mean age was7.93±3.76years. We divided the sample into three age groups. When it came to gender distribution, we found male versus female ratio was 72.8%:27.2% (Table 1). All children in the study had weights above the 25th centile. Twenty-nine out of 35 participants with hypovitaminosis had sun exposure of fewer than 30 minutes/day (Table 2). In this study vitamin D deficiency/insufficiency and sufficiency is defined as a serum level of vitamin D < 12ng/ml, < 20ng/ml and > 20ng/ml respectively.[10] Hypovitaminosis D was found in 23.2 per cent of children, according to the operational criteria. (Table 3). Age, gender, weight, and duration of solar exposure, biochemical (calcium, phosphorus, and alkaline phosphatase) are used to stratify hypovitaminosis in the tables below.

Table 1: Age and Gender-Wise Stratification of Hypovitaminosis

		Hypovitaminosis f(%)		P-Value
		Yes	No	
Age Groups	3-5 years	18(32.1)	38(67.9)	0.095
	>5-10 years	11(21.2)	41(78.8)	
	>10-15 years	06(14.0)	37(86.0)	
Gender	Male	17(15.5)	93(84.5)	<0.001
	Female	18(43.9)	23(56.1)	

Table 2: Exposure to Sunlight-Wise Stratification of Hypovitaminosis

Sun Exposure Categories	Hypovitaminosis, f(%)		P-Value
	Yes	No	
<30minutes/day	29(40.8)	42(59.2)	<0.001
>30 minutes/ day	06(7.5)	74(92.5)	

Table 3: Serum Vitamin D Level and Hypovitaminosis (N=151)

Variables	Min	Max	Mean±SD
Serum Vit D level (ng/ml)	06.00	30.00	22.1±6.6

Table 4: Comparison between Serum Calcium/Phosphorus, Alkaline Phosphatase and Vitamin d3 Level (N=151)

Variables		Frequency(%)/ Mean±SD
Hypovitaminosis	Yes	35(23.2)
	No	116(76.8)
Mean calcium(mmol/L)		02.43±0.22
Serum calcium	Normal	118(78.1)
	Low	33(21.9)
Mean phosphorus(mmol/L)		01.23±0.38
Serum phosphorus	Normal	144(95.4)
	Low	07(4.6)
Mean alkaline phosphatase(U/L)		319.35±176.82
Alkaline phosphatase	Normal	127(84.1)
	High	27(15.9)

Table 5: Stratification of Hypovitaminosis among Serum Calcium, Serum Phosphorus and Alkaline Phosphatase (N=151)

Variables		Hypovitaminosis		P-Value
		Yes	No	
Serum Calcium	Normal	10	108	0.00
	Low	25	08	
Serum Phosphorus	Normal	31	113	0.05
	Low	04	03	
Alkaline Phosphatase	Normal	20	107	0.00
	High	15	09	

DISCUSSION

In most of the studies conducted on IMPS, the age range was 5-15 years therefore mean ages of 7.72 7.8 and, 8.05 years have been documented while in Mahmoodzadehs study age range was 3 - 14 years with a mean age of 7.01±2.42years which matches our study.[11,12] The female gender is more likely to suffer from idiopathic musculoskeletal pain as found female: male 59%:41%, similarly 95 girls and 72 boys were reported by Mahmoodzadeh.[13,14] Mir inamul Haq also reported 61 males and 39 females.[11] There were 110 subjects in our study the reason for male preponderance is male dominating society and guardians want to avail health services for them. The prevalence of vitamin D deficiency in the current study was 23.2%. In 2011 Yoon, et al. measured serum vitamin D levels in 171 Korean children aged 2 years and found that 29.8% of them had vitamin D insufficiency (serum level less than 30 ng/mL).[15] In contrast, vitamin D deficiency was reported in 94% of children by Sobia Qamar et al, similarly, 87% of children in Mir Inamul Haq study had Hypovitaminosis.[11,13] Kim, et al studied the prevalence and risk factors of vitamin D deficiency in 2062 Korean teenagers and discovered that their average blood vitamin D level was 17.68 ng/ml comparable with the current study.[16] In the present study prevalence of hypovitaminosis D was unexpectedly lower than that reported for cohorts in the United Kingdom (40%) and Canada (39.7%), both of which live at a higher latitude (UK: 51.5° N, Canada: 4,5.4° N).[17,18] This contrast might be due to Peshawar city being at lower a latitude. Sobia Qamar documented hypocalcemia in 26%, hypophosphatemia in 3% and high alkaline phosphatase in 51.39% subjects with hypovitaminosis while in the current study 71.4% had hypocalcemia, hypophosphatemia in 11.42% and high alkaline phosphatase in 42.8%. Paecey reported normal phosphorus levels in 81% of participants.[19] A study conducted for nutritional assessment of patients with rickets revealed hypovitaminosis D at 100% and hypocalcemia at 86.6%.[20]

LIMITATION

Study limitations include unmeasured variables like height, diet, parathyroid hormone levels, and response to vitamin D supplementation. These values should be measured in future studies as well as be performed on a large scale.

CONCLUSION

Hypovitaminosis D Is one of the risk factors for non-specific musculoskeletal pain but the current study revealed only 23.2% of participants had hypovitaminosis and inadequate sun exposure was a major risk factor for hypovitaminosis.

CONFLICT OF INTEREST: None

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CONTRIBUTORS
1. **Rahida Karim** - Concept & Design; Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision; Supervision; Final Approval
2. **Jahanzeb Khan Afridi** - Concept & Design; Data Analysis/Interpretation; Critical Revision; Final Approval
3. **Hameed Ullah -** Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision
4. **Muhammad Batoor Zaman** - Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision
5. **Afnan Amjad** - Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision
6. **Sobia Naeem** - Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision
7. **Maha Amjad -** Data Acquisition; Drafting Manuscript

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