PREVALENCE OF INADEQUATE LEVEL OF VITAMIN D IN PATIENTS PRESENTING WITH MUSCULOSKELETAL PAIN IN SWAT REGION

Yasir Iqbal¹, Asif Hanif², Muhammad Iqbal³, Anis ul Haq⁴

ABSTRACT

BACKGROUND: Vitamin D (25-Hydroxy) is a fat soluble vitamin. It is either absorbed through skin or by oral intake. It helps the body in absorbing calcium and phosphorous from intestine and inhibits the release of PTH, resulting in maintaining healthy bone in the body, whereas chronic deficiency of vitamin D leads to decreased bone mineralization.

OBJECTIVE: The objective of this study was to find prevalence of inadequate level of vitamin D in patients presenting with musculoskeletal pain in swat region.

MATERIAL & METHODS: This was a cross sectional study that was conducted at Swat Medical Complex from 24th Nov, 2015 to 24th Feb 2016. A total of 400 patients were tested for their Vitamin D levels who presented to our Complex with generalized body aches. Non-probability purposive sampling was adopted to collect data from patients aged 18-80 years of either gender. Their blood sample was taken in aseptic measures and was sent to hospital Laboratory. The data reports were collected and their vitamin D level was noted. All data was entered and analyzed using SPSS version 20.

RESULTS: The mean age of patients was 33.44 ± 12.67 with minimum and maximum age of 18 and 80 years. There were 174(43.5%) male and 226(56.50%) female patients in this study. Mean level of Vitamin D was 12.93 ± 14.23 (S.D is higher due to huge variation in these values). According to standard criteria, vitamin D Deficiency (< 20 ng/dl) was seen in 321(80.25%), Insufficiency (20-30 ng/ml) was seen in 51(12.75%) and adequate level of vitamin D (30-115ng/ml) was measured in 28(7%) only. Overall prevalence of inadequate level of vitamin D [< 20 ng/dl] was observed in 372 (93%) among these patients.

CONCLUSION: The prevalence of Vitamin D deficiency in our community is considerably high in our community. Both genders and people of all ages are exposed to the risk of Vitamin D deficiency. It is the need of the hour to increase awareness about the importance and sources of Vitamin D in general population and for this purpose, health care professionals, government and electronic and/or social media can play significant role.

Keywords: Sun exposure, vitamin D, bone health, body pain, musculoskeletal

INTRODUCTION

Vitamin D, also described as “the Sun Vitamin” is a steroid with hormone like activity. It regulates the functions of over 200 genes and is essential for growth and development. There are two forms of vitamin D. Vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol). It is an established fact that adequate vitamin D status is important for optimal function of many organs and tissues throughout the body, including the cardiovascular (CV) system. Moreover, Vitamin D receptors (VDRs) are also present on a large variety of cell types, including myocytes, cardiomyocytes, pancreatic beta-cells, vascular endothelial cells, neurons, immune cells, and osteoblasts as well as play a crucial role in calcium homeostasis and bone health.

The vitamin D consists of 2 bioequivalent forms. Vitamin D2 (D2), also known as ergocalciferol, is obtained from dietary vegetable sources and oral supplements. Vitamin D3 (D3), also known as cholecalciferol, is obtained primarily from skin exposure to ultraviolet B (UVB) radiation in sunlight, ingestion of food sources such as oily fish and variably fortified foods (milk, juices, margarines, yogurts, cereals, and soy), and oral supplements. Aside from rich sources such as oily fish, the vitamin D content of most foods is between 50 and 200 IU per serving. This value varies greatly by region of the world because fortification markedly improves the availability of vitamin D through diet.

Vitamin D deficiency is defined by most experts as a 25-hydroxyvitamin D level of less than 20ng per milliliter (50nmol per liter). Several risk factors are associated with hypovitaminosis D in developing countries. Female sex and particular age groups (neonates, preschool children or the elderly) are the most consistently reported risk factors for hypovitaminosis D. Nutritional status, obesity, skin pigmentation, clothing style and seasonal variation affect vitamin D levels in developing countries. Unfortunately, Over a billion people...
worldwide are vitamin D deficient or insufficient\textsuperscript{7}. Approximately 25% to 50% or more of patients commonly encountered in clinical practice are deficient in vitamin D\textsuperscript{4}. A report from Australia indicated 1 in 3 Australians as Vitamin D deficient\textsuperscript{6}. A local data reported from Faisalabad, Punjab reported that 77.5% of the sample showed Vitamin D deficiency whereas 18% were in the category of Vitamin D insufficiency\textsuperscript{6}, vitamin D deficiency can result in various health complications and may lead to rickets in children and osteomalacia and osteoporosis in adults\textsuperscript{3}. Vitamin D deficiency is also associated with high incidence of cardiovascular diseases\textsuperscript{10}. Deficiency in vitamin D may also cause secondary hyperparathyroidism, high bone turnover, bone loss, mineralization defects, and hip and other fractures. Rare consequences include myopathy and fatality.\textsuperscript{11} Due to serious health hazards associated with Vitamin D deficiency, little awareness regarding its importance and sources and need to renew local statistics we aimed to conduct this study.

**MATERIALS AND METHODS**

This was a cross sectional study that was conducted at Swat Medical Complex from 24\textsuperscript{th} Nov, 2015 to 24\textsuperscript{th} Feb 2016. A total of 400 patients were tested for their Vitamin D levels who presented to our Complex with generalized body aches. Non-probability purposive sampling was adopted to collect data from patients aged 18-80 years of either gender. Their blood sample was taken in aseptic measures and was sent to hospital Laboratory. The data reports were collected and their vitamin D level was noted. It was measured as 25-hydroxyvitamin D (25[OH]D) by ELISA method. The levels of Vitamin D were categorized as Vitamin D Deficiency (< 20 ng/dl), Insufficiency (20-30 ng/ml), Vitamin D desirable (30-115ng/ml) and Vitamin D intoxication (> 150 ng/dl). All data was entered and analyzed using SPSS version 20. Mean ± S.D was used for quantitative data and frequency and percentages were used for categorical data.

**RESULTS**

The mean age of patients was 33.44 ± 12.67 with minimum and maximum age of 18 and 80 years. There were 174(43.5%) male and 226(56.50%) female patients in this study. Mean level of Vitamin D was 12.93 ± 14.23 (S.D is higher due to huge variation in these values). The minimum and maximum Vitamin D values were 1 and 70ng/dl. According to standard criteria, vitamin D Deficiency (< 20 ng/dl) was seen in 321(80.25%), Insufficiency (20-30 ng/ml) was worldwide are vitamin D deficient or insufficient\textsuperscript{7}. Approximately 25% to 50% or more of patients commonly encountered in clinical practice are deficient in vitamin D\textsuperscript{4}. A report from Australia indicated 1 in 3 Australians as Vitamin D deficient\textsuperscript{6}. A local data reported from Faisalabad, Punjab reported that 77.5% of the sample showed Vitamin D deficiency whereas 18% were in the category of Vitamin D insufficiency\textsuperscript{6}, vitamin D deficiency can result in various health complications and may lead to rickets in children and osteomalacia and osteoporosis in adults\textsuperscript{3}. Vitamin D deficiency is also associated with high incidence of cardiovascular diseases\textsuperscript{10}. Deficiency in vitamin D may also cause secondary hyperparathyroidism, high bone turnover, bone loss, mineralization defects, and hip and other fractures. Rare consequences include myopathy and fatality.\textsuperscript{11} Due to serious health hazards associated with Vitamin D deficiency, little awareness regarding its importance and sources and need to renew local statistics we aimed to conduct this study.

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<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Vitamin D (ng/dl)</th>
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<tbody>
<tr>
<td>Mean</td>
<td>33.4425</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>12.67432</td>
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<tr>
<td>Range</td>
<td>62.00</td>
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<td>Minimum</td>
<td>18.00</td>
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<tr>
<td>Maximum</td>
<td>80.00</td>
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Table-1: Descriptive Statistics of Age (years) and Vitamin D level (ng/dl)
DISCUSSION
Vitamin D deficiency is a critical health issue and at the same time, unfortunately, remains to be highly prevalent in South Asian population. Although, it is unexpected in tropical countries such as Pakistan and India, where there is abundant overhead sun for most or all of the year. Nevertheless, hypovitaminosis D, resulting in severe osteomalacia and other health issues, has been observed to be considerably high in these populations\textsuperscript{12}. Many social and cultural problems in our country such as skin pigment, more urbanization in recent years causing more buildings and lesser sun exposure, unrevealing clothing, and lesser outdoor activities all contribute to vitamin D deficiency. The Centers for Disease Control and Prevention has reported that the percentage of adults achieving vitamin D sufficiency as defined by 25(OH)D of at least 30 ng/mL has declined from about 60% in 1988-1994 to approximately 30% in 2001-2004 in whites and from about 10% to approximately 5% in African Americans during this same time. Furthermore, more people have been found to be severely deficient in vitamin D [25(OH)D<10 ng/mL]\textsuperscript{13}. Even in healthy adolescents vitamin D deficiency/insufficiency may reach 42% using a cut-off point of 20 ng/ml (50 nmol/L) for serum 25-OHD\textsuperscript{14}. The situation may worsen if female gender, old age and pregnancy are involved. It is therefore important to assess the current prevalence of vitamin D deficiency in our local community.

In our study, the mean level of Vitamin D was 12.93 ± 4.23 (S.D is higher due to huge variation in these values). The minimum and maximum Vitamin D values were 1 and 70 ng/dl. According to standard criteria, vitamin D Deficiency (<20 ng/dl) was seen in 321 (80.25%), Insufficiency (20-30 ng/ml) was seen in 51 (12.75%) and adequate level of vitamin D (30-115 ng/ml) was measured in 28 (7%) only. Overall prevalence of inadequate level of vitamin D [<20 ng/dl] was observed in 372 (93%) among these patients.

In England, a cross-sectional study compared 98 patients from the ethnic Asian community, who were being followed up in rheumatology clinics, with 36 control individuals. The mean serum 25-OHD was 6.6 ng/ml (16.5 nmol/L) in the study patients and 8.2 ng/ml (20.5 nmol/L) in the controls. The prevalence of severe vitamin D deficiency (25-OHD below 8 ng/ml) was 78% and 58%, respectively in the two groups\textsuperscript{15}. Bener et al reported that the prevalence of vitamin D deficiency among the studied Qatari children was (68.8%), mostly in the age group (11-16) years (61.6%). Vitamin D deficiency was more common among girls (51.4%) than boys (48.6%). Exposure to sunlight was limited in both groups; but even lower in vitamin D deficient children (57.5%) than in normal children (70.6%)\textsuperscript{16}. Daly et al showed in their study that the prevalence of vitamin D deficiency (<50 nmol/l) was 31% (22% men; 39% women); 73% had levels <75 nmol/l\textsuperscript{16}.

One Pakistani study reported that females had significantly higher mean Vitamin D deficiency (56.2%) compared to males (15.3%). Insufficiency was reported by 11.3% individuals with 9.65% females and 1.65% males. The rest of the subjects (17.2%) were normal including 10.5% females and 6.7% males\textsuperscript{17}. Yet another Pakistani study reported the highest prevalence of vitamin D deficiency in females. The study showed that 87% pregnant women were having Vitamin D deficiency, 10% were having Vitamin D insufficiency while only 3% had normal levels\textsuperscript{18}. Another study from Karachi in 305 premenopausal females, showed 90.1 % vitamin D deficiency\textsuperscript{19}. In our study, however, inadequate level of Vitamin D was statistically same in male and female patients of all age groups (p-value> 0.05). Our study could provide basis for further research in this area, which is much needed now. More researches are recommended to explore the risk factors associated with vitamin D deficiency and devise strategies to improve the situation.

CONCLUSION
The prevalence of Vitamin D deficiency in our community is considerably high in our community. Both genders and people of all ages are exposed to the risk of Vitamin D deficiency. Skin pigmentation, more urbanization, lesser sun exposure, unrevealing clothing especially for females, and lesser outdoor activities all may contribute to vitamin D deficiency. It is the need of the hour to increase awareness about the importance and sources of Vitamin D in general population and for this purpose, health care professionals, government and electronic and/or social media can play significant role.
REFERENCES