FREQUENCY OF VITAMIN D DEFICIENCY AND HYPOCALCEMIA IN PATIENTS PRESENTING WITH LOW BACK PAIN TO A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Vitamin D is a prohormone and responsible for various functions such as balance of serum calcium levels, regulation of immune system and anti-inflammatory activities. Among other factors, serum Vitamin D level imbalance is also considered as important factor in pathogenesis of low backache.

Objective: To determine the frequency of Vitamin D deficiency and hypocalcaemia in patients of lower backache.

Material and methods: This descriptive cross sectional study was carried out in 182 patients with low backache for less than month duration. The study duration was from January 2018 to December 2018 at Khyber Teaching hospital, Peshawar. Non probability consecutive sampling technique was used. After selection of patients as per inclusion and exclusion criteria, an informed consent was took from the patients. The demographic and clinical findings were recorded on a pre-designed Performa. The serum from patients' blood was separated and analyzed for vitamin D and serum calcium on eletro-chemiluminescence based immunoassay.

Results: The mean age of patients included in study was 48.2 years (SD±15.7) with a range of 9 to 76 years. Out of 182 patients, 64% were male and 36% were female. The age groups of 16 to 45 years and >45 years, were almost equally suffered from low back pain i.e. 53% and 44% respectively. Hypocalcaemia was present in 26 (15%) patients with low back pain while 154(85%) patients have normal serum calcium levels. Most of the patients have sub-optimal level of vitamin D with 20(11%) patients having deficient levels of vitamin D, out of which 6(3%) were male and 14(8%) were female. Similarly 132(74%) patients have insufficient level of vitamin D, having 29% male and 45% female patients with complaint of low backache while 28(15%) have normal levels of vitamin D, having 4% male and 11% female. On comparison, the results of serum levels of vitamin D and calcium were statistically insignificant.

Conclusion: The deficiency of Vitamin D and hypocalcaemia is present in most of the patients and mainly affecting female gender. It is a contributing factor to idiopathic low back pain, the cause of which must be identified and dealt with.

Keywords: Low back pain, Vitamin D, hypocalcaemia.

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INTRODUCTION

Vitamin D is a hormone precursor involved in various functions such as calcium homeostasis, immune modulation and anti-inflammatory process.[1] Vitamin D is essential for calcium absorption and bone health. Inadequate vitamin D intake can result in softening of bone surfaces, or osteomalacia, that causes pain. The lower back seems to be particularly vulnerable to this effect.[2] Backache is a common problem in any community, mostly it's not given due care or may be labeled as idiopathic. A strong back lies in strengthening the bones. Vitamin D, calcium, phosphorus and other essential trace minerals are required for healthy bone.[3] Hypovitaminosis D is common in general medical inpatients, including those with vitamin D intake exceeding the recommended daily amount and those without apparent risk factors for vitamin D deficiency.[4] It has been estimated that 1 billion people worldwide have vitamin D deficiency or insufficiency.[5] A study done claimed that vitamin D deficiency was found to be 57% in non-selective indoor patients of general medicine. Backache is one of the common ways of vitamin D deficiency presentation.[4]

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Vitamin D3 supplementation prevents bone loss, but this supplementation needs to be supported with increased calcium intake otherwise only vitamin D3 does not affect bone density nonproves fractures risk by osteoporosis.[6] Vitamin D deficiency causing bone disease is linked with serum 25(OH) vitamin D levels of < long /ml worldwide.[7] Most of the data from Pakistan has reported a deficiency as <20ng/ml. Sub optimal levels 10-30 ng/ml of vitamin D are termed as vitamin D insufficiency. Optimal levels of vitamin D are more than or equal to 30 ng/ml. since every age group has its own vitamin D requirements therefore, it is possible that optimal levels might differ.[8,9,10] Scientists describe worldwide that "population reference ranges for vitamin D vary widely depending on the ethnic background, age, geographic location and the sampling season". [7] In northern latitude locations in particular, the level of vitamin D in 73% of population is less than 20ng/ml during winter season.[11]

There are two possible reasons for relation between vitamin D deficiency and lower backache. First possible reason is that vitamin D deficiency in lower backache causes diffuse pain in muscle and bone.[12,13] Second is there is decreased in anti-inflammatory cytokines and increase in pro inflammatory cytokines leading to increased inflammation in endplates of vertebrae.[14-16]

MATERIAL AND METHOD

This was a descriptive cross sectional study conducted on 182 patients presented in outpatient department with low backache for less than month duration. This study was carried out between Jan 2018 to Dec 2018 at Khyber Teaching Hospital, Peshawar. The sampling was done via non-probability consecutive technique. The radiological studies were performed to rule out structural pathology of spine. In case of mechanical or neurological causes of low back pain, the patients were excluded from study. Similarly, the patients with osteoporosis, and chronic liver and renal disease were also excluded form study. Pregnant or lactating women as well as those receiving vitamin supplements were not included in study. After obtaining informed consent from the patient, the demographic and clinical findings were recorded.

5cc blood was drawn from each patient. After separating the serum, the specimen was analyzed for Vitamin D and serum calcium on Electro-chemiluminescence based immunoassay analyzer Cobas e411 (Manufacturer Roche Diagnostics, North America). The following categorization was adopted from the clinical practice guidelines of endocrine society[17]

Deficient	<20 ng/dL
Insufficient	20-50 ng/dL
Sufficient	>50 ng/dL

The serum calcium was categorized18 as below

Low	<8.5 mg/dL
Normal	8.5-10.2 mg/dL
High	>10.2 mg/dL

The demographic, clinical and lab data was analyzed by Statistical Package for Social Sciences (SPSS) version 22; SPSS Inc. Chicago, IL, USA. The quantitative variables were expressed as mean and standard deviation while the qualitative variables are presented as frequency with percentages. The p-value was calculated where applicable.

RESULTS

The mean age of patients included in study was 48.2 years (SD±15.7) with a range of 9 to 76 years. Out of 182 patients, 64% were male and 36% were female (fig 1). In our study, the age group of 16 to 45 years and >45 years were almost equally suffered from low back pain i-e 53% and 44% respectively(table 1). In this study, 26 (15%) patients with low back pain have hypocalcaemia while 154(85%) patients have normal serum calcium levels (table 1).

Most of the patients have sub-optimal level of vitamin D with 20(11%) patients having deficient levels of vitamin D, out of which 6(3%) were male and 14(8%) were female. Similarly 132(74%) patients have insufficient level

Table 1: General features of patients presented with low back pain.

Features		Male	Female	Total
Age groups	Below 15 years	2 (1%)	4 (2%)	6
	16 to 45 years	36 (20%)	60 (33%)	96
	More than 45 years	28 (15%)	52 (29%)	80
Serum Calcium	Hypocalcemia	14 (8%)	12 (7%)	26
	Normal	52 (29%)	102 (56%)	154
	Hypercalcemia	0	2 (1%)	2
Vitamin D	Deficiency	6 (3%)	14 (8%)	20
	Insufficiency	52 (29%)	82 (45%)	134
	Optimal	8 (4%)	20 (11%)	28

Table 2: Comparison of Serum Calcium and Vitamin D levels in patients presented with low back pain.

Vitamin D	Serum Calcium			p-value
	Hypocalcemia	Normal	Hypercalcemia	
Deficiency	2	8	0	0.957*
Insufficiency	9	57	1	
Optimal	2	12	0	

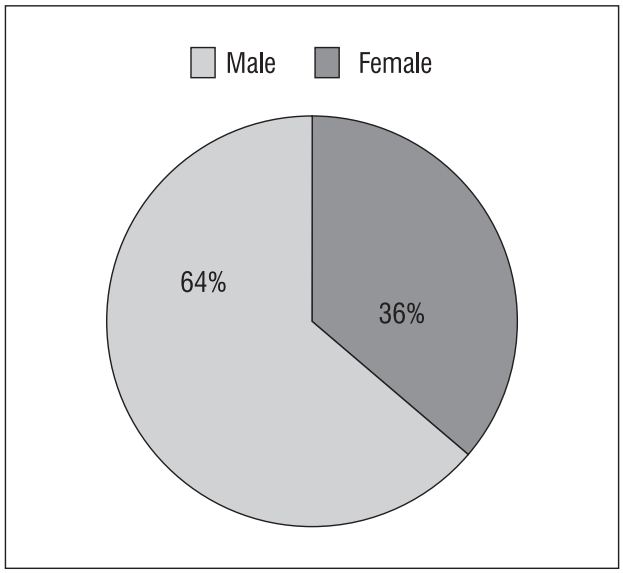

Figure 1: Gender Distribution of patients

of vitamin D, having 29% male and 45% female patients with complaint of low backache while 28(15%) have optimal levels of vitamin D, having 4% male and 11% female (table 1). On comparison, the serum level of vitamin D and calcium, the results were not found statistically significant (table 2).

DISCUSSION

In present study a total of 182 patients were investigated for vitamin D and serum calcium levels, who presented with low back pain, the mean age of patients included in this study was 42.8 years with 64% male and 36% female. Vitamin D deficiency was seen in 20(11%) of patients, out of which 6(3%) were male and 14(8%) were female. Similarly 132(74%) patients have insufficient level of vitamin D, having 29% male and 45% female patients with complaint of low backache while 28(15%) have optimal levels of vitamin D, having 4% male and 11% female. A similar study was conducted by Yasir Iqbal et al, in which a total of 400 patients were tested for vitamin D levels who presented with body aches the mean age of patients was 33 years with 43.5% male and 56.5% female, vitamin D deficiency (<20ng/ml) was seen in 80.25% insufficiency (20-30ng/ml) in 12.75% and adequate level were found (30-115ng/ml) in only 7% of patients. Overall 93% patients were having inadequate levels of vitamin D.[19]

The results of our study were also in concordance with the results of study conducted in Saudi Arabia, which reported that 83% of the patients attending spinal and internal medicine clinics in Saudi Arabia over six years who had experienced low back pain with no obvious cause for more than six months were found to have an abnormally low levels of vitamin D.[20]

Another study conducted at Aga Khan University in apparently healthy adults, showed deficient vitamin D in 69.9% and 21.1% insufficient serum vitamin D levels.[21]

A recent study aimed to provide insight on vitamin D's role in chronic low back pain in India in which they compared 200 patients with low back pain with 200 healthy controls. Research found that patients with chronic low back pain had significant diminished vitamin D levels when compared with healthy controls $P<0.0001$. Half of the patients with low back pain were vitamin D deficient.[22] The results of these studies were also similar to the results of current study.

In one study of 360 patients with chronic low backache were found to have inadequate levels of vitamin D. After taking vitamin D supplements for 3 months, symptoms were improved in 95% of the patients.[2] Most of the interventional studies reported a positive effect of supplementation with calcium and vitamin D on bone and muscle health.[23] In another study in patients with low backache vitamin D levels were determined and 88.4% patients had below normal vitamin D levels, while 10% had normal.[24] while on comparison of serum level of vitamin D and calcium, the results were not found statistically significant in the present study.

A study conducted by Shahjee at el determined the frequency of vitamin D defining in patients of low back ache and it was found to be 81% in which 83.3% were female and 16.7% male while 34.5% patients had reduced serum calcium also.[25] while in our study 85% of patients had normal serum calcium levels. All patients with persistent, musculoskeletal pain are at high risk of the consequences of unrecognized and untreated vitamin D deficiency. Current clinical guidelines for management of low back pain should include assessment of vitamin status together with advice on appropriate vitamin D supplementation in those found to be deficient.

CONCLUSION

Vitamin D deficiency and hypocalcaemia affected mainly female gender and is a contributing factor to idiopathic lower back pain, the cause of which must be identified and dealt with.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Rahman S: Conceptualization, Data Collection Manuscript Writing.

Sharif N: Proof Reading.

Rahman S: Data Analysis, Manuscript writing.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.