Original Article

Frequency of Vitamin D Deficiency in Patients of Low Backache

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Objective: To determine frequency of hypovitaminosis D in low backache patients and to correlate their social, physical and nutritional styles with it.
Study Design: Descriptive Case Series.
Place and Duration: Pakistan institute of medical sciences, Islamabad over a period of fifteen months in 2008-2009.
Materials and Methods: All adult patients of either gender who had low backache were included in the study. Nonprobability consecutive sampling technique was used. After selection of patients per criterion and informed consent designed proforma regarding demographic, physical, nutritional and social details was filled and serum calcium, alkaline phosphatase and vitamin D levels were done. In some patients DEXA (Dual energy X-ray absorptoimetery) scans were also done.
Results: We enrolled 243 patients. Age ranged from 13-74 years (mean =26.7). Out of these 81 % had suboptimal vitamin D levels (cut off value= 30ng/ml) which comprised of 83.3% females and 16.7% males. Females usually spend more time in indoor activities may be because of lack of sufficient sun exposure they had high number in Vit D deficient group. In our patients 34.5% had reduced calcium and 49% had increased alkaline phosphatase levels. One glass of milk (250ml) was taken daily by 67% patients out of whom 82% had abnormal vitamin D level. Amongst females 39.7% observed veil and 86% of them had hypovitaminosis D. Seventeen patients underwent DEXA scan and only 2 showed normal results.
Conclusion: Vitamin D deficiency is frequent in backache patients, which may be contributed by insufficient sun exposure, improper diet and hormonal factors.
Key words: Low back pain, Vitamin D deficiency, cholecalciferol.

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Introduction

Backache is a common problem in any community, mostly its not given due care or may be labeled as idiopathic. In order to avoid this curse our diet plan needs to be focused upon, as suboptimal Vitamin D levels may serve as a valid cause. Despite of sufficient sun exposure our community displays frequent backaches, and we lack in data of our country.

Everybody experiences backache or back pain some time in life. The intake of certain foods is important to strengthen the system from within. In the context of back pains and backaches the diet plan needs to focus on fortifying the back. The key to having a strong back lies in strengthening the bones. So how can we make the bones strong?

Vitamin D, calcium phosphorus and the essential trace minerals are essential for healthy bone. Vitamin D deficiency is a known risk factor for osteopenia and bone fractures.[1] Hypovitaminosis D is common in general medical inpatients, including those with vitamin D intakes exceeding the recommended daily amount and those without apparent risk factors for vitamin D deficiency.[2] It has been estimated that 1 billion people worldwide have vitamin D deficiency or insufficiency.[3] Multiple studies estimated the prevalence of hypovitaminosis D in selected populations at particular risk for vitamin D deficiency. A multicentre

study done on residents of nursing homes and people over the age of 65, showed vitamin D deficiency in 25 - 54 percent.[4] Another such study claimed it was found to be 57% in nonselective indoor patients of general medicine.[2] Backache is one of the common ways of vitamin D deficiency presentation.[2]

We conducted this study to find out vitamin D deficiency in our population especially who complaint of low back pain, so that it may be investigated properly and if vitamin D is found insufficient, should be replaced.

Materials and Methods

Either gender with adult patients of low backache were included, which was conducted in outdoor of General medicine, Pakistan Institute of Medical Sciences (PIMS) Islamabad, over a period of fifteen months from January 2008 to April 2009. Either gender with adult patients of low backache were included. Non probability consecutive sampling technique was used. Patients of malabsorption syndromes and renal disease were excluded from this study. Patients were also evaluated for co morbids such as diabetes and hypertension.

There is no conflict of interest and no ethical issue was involved. After selection of patients per criterion, informed consent was taken. Then a brief history regarding demographic details, backache, dietary habits, profession, sun exposure (especially house lay out, degree of sunshine coming inside house and time spent in indoor activities) and veil (pardah) observation was taken and a thorough examination was conducted. Patient's laboratory investigations e.g. serum Calcium, Albumin, Alkaline phosphate and Vitamin D levels were done. Few patients also underwent DEXA scan.

The vitamin D values are relation to observing veil and intake of milk and depicted in table I and II respectively.

In this study we took lowest normal value of vitamin D at 30 ng/ml. We divided vitamin D levels into mild (above 20 and below30ng/ml), moderate (above 10 and below 20ng/ml) and severe (<10ng/ml) deficiencies. After the data collection was accomplished, results were analyzed by SPSS version 11.

Results

Total number of patients was 243, There were 62 males and 181 females. Age of patients ranged 13-74 years (mean = 26.7). Total number of 197 (81%) had abnormal vitamin D levels (below 30 ng/ml) amongst which 164 (83%) were female and 33 (16.7%) were male.

In our data 118 patients belonged to rural areas and 125 came from urban background, however distribution of vitamin D deficiency was almost equally distributed amongst them. Moreover in both urban and rural groups majority of vitamin D deficient patients were female.

All patients presented with the complaint of low backache, moreover 35% had complaint of paresthesias in addition and 78% of patients also had easy fatigability. Majority of the patients having additional symptoms of paresthesias or easy fatigability fell in group of abnormal vitamin D levels.

The vitamin D values in relation to observing veil and intake of milk are depicted in table I and II respectively. Male patients majorly showed mild to moderate deficiency, which was seen in adolescents and elderly people, whereas females mainly showed moderate to severe vitamin D deficiency majority of which belonged to child bearing and elderly age groups (Table III).

Serum calcium below 8mg/dl was considered abnormal and it was seen in 12(19.3%) males and 72 (40%) females. Alkaline phosphatase was noticed to be raised amongst 34 (54.8%) males and 85 (47%) females which majorly included patients from elder age group.

Daily milk intake is necessary for bone health in any age, especially in younger and elderly population. 163 (67%) of our patients used to take one glass (250ml) of milk daily, out of which 134 (82%) had abnormal vitamin D levels and 80 (33%) patients did not take milk on daily basis, amongst them 63 (78%) had abnormal vitamin D levels (p=0.15). Exposure to sunlight is considered necessary for activation of vitamin D. Out of 181 female patients 72 (39.7%) observed veil (pardah) majority of which belonged to rural background and younger age group. So there is possibility that their low vitamin D level could be because of deficient sunlight exposure. (Table I)

Table I: Vitamin D values in female patients with veil observation (n=243)

	Normal Vit D		Abnormal Vit D		Total
	Urban	Rural	Urban	Rural	
Veil observer	6	4	15	47	72
Non Veil observer	7	0	57	45	109
Total	**13**	**4**	**72**	**92**	**181**

Table II: Daily intake of one glass of milk with Vitamin D values (n=243).

	Normal Vit D			Abnormal Vit D			Total
Age (years)	**<20**	**20-50**	**>50**	**<20**	**20-50**	**>50**	
Daily milk intake	0	18	11	46	57	31	163
No daily milk intake	2	11	4	22	12	29	80
Total	**2**	**29**	**15**	**68**	**69**	**60**	**243**

Twenty two males were suffered with diabetes and 21 had hypertension, 13 patients had both of them, whereas amongst female patients 42 were diabetic, 38 were hypertensive and 21 had both. Patients with these comorbids were predominantly found vitamin D deficient. Out of our patients 38 males and 21 females were found to be smoker, a dominant fraction of these came from rural background and owned abnormal vitamin D levels.

Table III : Showing age of the patients with their vitamin D concentration (n=243)

	Vitamin D level	Age < 20yrs	20-50 yrs	>50 yrs	Total
	<4 ng/ml	0	0	2	2
	<10 ng/ml	1	3	0	4
	< 15 ng/ml	6	1	3	10
Males	<20 ng/ml	3	2	4	9
	< 29 ng/ml	5	0	3	8
	>30 ng/ml	2	19	8	29
	<4 ng/ml	7	8	12	27
	<10 ng/ml	23	9	23	55
	< 15 ng/ml	15	28	2	45
Females	<20 ng/ml	6	17	5	28
	< 29 ng/ml	2	1	6	9
	>30 ng/ml	0	10	7	17
Total		**70**	**98**	**75**	**243**

Our female patients had children in range of 0 to 7 and 13 of them had history of abortion or poor obstetric history, all of which belonged to rural background. A total number of 58 female patients were postmenopausal, 47 of postmenopausal women had age of above 50 years and 11 were below 50, out of which 5 had amenorrhea as a result of postsurgical complications. Almost all of these postmenopausal patients were deficient in vitamin D ($p<0.05$). We did the DEXA scan of 17 postmenopausal patients, 7 showed osteopenia, 8 displayed osteoporosis and 2 had normal scan, all of which had suboptimal Vitamin D concentrations.

Socioeconomically 72% of patients had lower and lower middle class and patients of these backgrounds were mainly found vitamin D deficient. (Figure I)

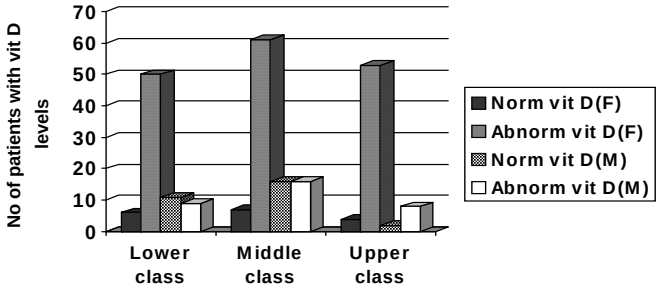


Figure I: Vitamin D Level with socioeconomic status

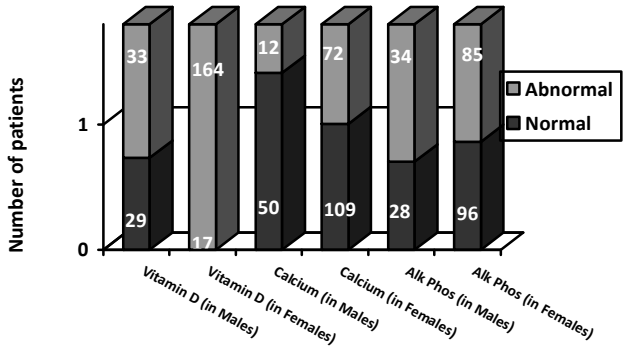


Figure II: Some serum chemical ingredients plotted against number of patients

Discussion

Vitamin D is actually a hormone that helps maintain bone strength by regulating the minerals like calcium and phosphorus in bone. Vitamin D also regulates the absorption of calcium and phosphorous from the intestines, thereby regulating bone turnover and mineralization. Inadequate intake of calcium and vitamin D leads to reduced calcium absorption, increased serum parathyroid hormone concentrations, and bone loss. Low bone mass is a strong predictor of

fracture.[5] Chronic low back pain is an extremely common problem in practice, where it is often labeled idiopathic.[6] No sufficient studies have been conducted to analyze the contribution of hypovitaminosis D to the etiology of chronic low back pain in populations wherein vitamin D deficiency is endemic.

In our study low levels of vitamin D were found in 81% of low back pain patients, where cut off value of vitamin D was 30ng/ml. A study in Saudi Arabia showed that 83% of the low back pain patients had an abnormally low level of vitamin D and after treatment, clinical improvement in symptoms was seen in 95% of all the patients.[7] In Egyptian low backache patients it was found to be 81%.[6] In other studies in Saudi Arabia, the United Arab Emirates, Australia, Turkey, India, and Lebanon 30 to 50% of children and adults had 25-hydroxyvitamin D levels under 20 ng/ ml.[8-10]

Our patients mainly came up with complain of low back pain, 35% of them had additional paresthesias and 78% had an additional complaint of easy fatiguability. Vitamin D deficiency is a major contributor to chronic low back pain in areas where vitamin D deficiency is endemic.[7] Patients may also present with loss of bone mineralization and spontaneous fractures.[11]

Vitamin D level was assessed in our study and was categorized in mild moderate and severe deficiency. Amongst male patients it occurred in young and elderly patients, young patients mainly showed moderate and elderly displayed moderate to severe vitamin D deficiency. Female patients of late adult and elderly age groups showed markedly low levels of vitamin D which was of moderate to severe category predominantly. Whereas calcium was abnormally low in 19.3% male and 39.7% female patients, majorly in patients of age above 50 years. Absorption of calcium[12] and possibly of vitamin D[13] and production of vitamin D[14]by he skin declines with aging.[11]Supplementation of Vitamin D and calcium reduces bone loss and risk of nonvertebral fractures in elderly patients.[11,15] Daily recommended dose of vitamin D is 1000IU[16,17] because of its vital role in absorption of calcium and phosphorus, without it only 10-15% of dietary calcium and 60% of phosphorus is absorbed.[18-20]

Rate of bone turn over is more in females in comparison to males[21,22] and vitamin D deficiency is also more prevalent in females, especially post menopausal women. This may be suggestive of hormonal contributing factors in calcium, phosphate and vitamin D metabolism. Different studies claim prevalence of hypovitaminosis D 50%[18] and 64%[23] in post menopausal women. Replacement of Calcium and vitamin D significantly reduces bone loss in middle aged and postmenopausal ladies.[24-26]

Milk and other dairy products are natural resources of calcium, phosphorus and vitamin D but manufactured milk formulas are not fully fortified so people taking them can be vitamin D deficient.[27] Even 32% of medical staff of a british hospital taking a glass of milk and multivitamin daily was found to be vitamin D deficient.[28]Out of our data 67% patients used to take a glass of milk daily but out of these patients only 18% had normal vitamin D levels, may be because of impurity or under fortification of milk. So fortification of milk and infant milk formula with vitamin D and calcium is necessary, as it has shown an important role in elimination of rickets in children and osteomalacia in adults.[29]

Sunlight exposure of the skin is known to be the most important source of vitamin D. Under exposure to sunlight is another cause of vitamin D deficiency but overexposure doesn't cause intoxication.[18] In fact humans get vitamin D from sunlight exposure, their diet and dietary supplements.[19, 20, 30] In a Danish study ethnic Muslim veil observing women despite of taking 600 IU of vitamin D daily were still vitamin D deficient.[16] According to our data 86% of veil observing women were found to have suboptimal vitamin D levels.

Conclusion

Vitamin D deficiency is frequent in backache patients, which may be contributed by insufficient sun exposure, improper diet and hormonal factors.

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