Serum vitamin D levels among patients with chronic low back pain attending BGS-GIMS hospital, Bangalore, India

Shilpashree M.K[1,*], Krishnamurthy N[2], K. P. Raju[3], B.N. Sharath[4]

[1,4]Assistant Professor, [2]Professor and Head, [3]Professor, Dept. of Biochemistry, [1-3]BGS Medical College and Research Centre, Kengeri, Bangalore, Karnataka, [4]ESIC Medical College and PGIMSR, Bangalore, Karnataka, India

***Corresponding Author: Shilpashree M.K**
Email: shilpa.madhav@gmail.com

Received: 10th July, 2018 **Accepted:** 20th September, 2018

Abstract

Introduction: In India, chronic low back pain is normally seen in adults. Studies suggests that serum vitamin D levels is directly or indirectly related to low back pain. We determined the serum vitamin D levels among patients with chronic low back pain.

Materials and Methods: A cross-sectional study was conducted during 2015-16 at a tertiary hospital in Bangalore. Patients were enrolled for the study based on a standard criteria. Serum vitamin D levels were estimated by using mass spectrometry.

Results: A total of 39 patients with low back pain were enrolled. The proportion of severe, moderate and mild vitamin D deficiency were found to be 11(28%), 8 (20%) and 20 (52%) respectively.

Conclusion: Majority of patients had some degree of vitamin D deficiency. Supplementation of vitamin D can be considered for all patients with chronic low back pain.

Keywords: Vitamin D, Chronic Low back pain, India.

Introduction

Generally, the chronic low back pain (LBP) is commonest debilitating condition seen amongst general population.[1] It leads to limitation of activities and absenteeism across the world and has led to direct or indirect economic burden on the individual and the communities also leading to huge disability adjusted life years (DALYs).[1] Asian population has nearly 28.5% prevalence of LBP while the lifetime prevalence is over 70%.[1] The global annual prevalence of LBP is found to be 38%. Children have lower prevalence (1-6%) but it increases with age; the adolescent population has 18-50% prevalence and it peaks during 45-59 years.[1]

The LBP usually gets resolved within few weeks, however, it may recur in 24-50% of cases in a span of one year.[1] By definition, low back ache is the pain localised to an area below the lower costal margins and above the inferior gluteal folds.[1] It is classified as 'specific' and 'non-specific; it is called specific when there is known patho-physiological mechanism while nonspecific if it is due to non-specific cause or unknown origin and 90% of them are found to be non-specific.[2] Though, the cause for non-specificity is still largely unknown, many a times patients are subjected to unnecessary lumbar surgeries.[4] Most of the times the chronic back pain is attributed to lack of physical exercise, sitting postures at working environment, menopause, lack of healthy diet.[2] The LBP is said to be acute when it persists for less than 6 weeks, sub-acute between 6-18 weeks and chronic when lasts for more than 18 weeks. Only limited information persists in regards to the role of hormones in early identification of the chronic low back problem. We conducted this study to evaluate the serum levels of Vitamin D in patients suffering from chronic back pain attending a tertiary health care facility, in south Bangalore, India.

Materials and Methods

Study Population and Recruitment of Participants: A cross-sectional study was conducted at BGS Global institute of Medical Sciences Hospital, a tertiary care hospital with an inpatient capacity of around 300 beds at Bangalore, Karnataka during the period 1st august 2015 to 30th July 2016. The hospital approximately has 400 out-patients visits daily. The primary inclusion criterion for chronic low back pain (CLBP) was defined as self-reported pain in the low back area for more than half of the time in the past 3 months, in accordance with standardised criteria proposed by Dionne et al.[2] All the cases attending the out-patient department of orthopaedics were screened for these criteria. All the patients were informed about the study and a written informed consent was obtained.

Data Collection: The socio-demographic characteristics like age and gender were recorded. The specific information regarding the lumbar pain like occurrence, frequency, intensity and its effect on daily activities were recorded. The pain frequency was defined as time with pain in the last four weeks as some days or most of the days or all days. The pain duration was defined as time since experiencing the pain as less than three months or more than three months. Typical pain intensity was measured using visual numeric scale 0-10 where higher number indicated more severe pain.[3]

Vitamin D Levels: The non-fasting venous blood was drawn from the patients. The serum 25 hydroxyvitamin was considered as a marker for the recent status of Vitamin D levels in the blood. The samples obtained were centrifuged immediately and processed. The values of serum 25 hydroxyvitamin were determined using mass spectrometry. The cut-off values considered for the study was < 25 nMol/L

(severe deficiency), < 50 nMol/L (moderate deficiency), < 75 nMol/L (mild deficiency) and > 75 nMol/L as normal.

Data Entry and Analysis: All the data were entered in electronic data entry format using EpiData (version 3.1) data version software and the data were doubly entered to affirm the correctness and were validated with the hardcopy if there were any discrepancies.[4] The data was analysed using Epi Data analysis software (version 2.1.1). Descriptive analysis was performed to determine the means and proportions.

Results

A total of 39 patients matching the study criteria of chronic low back pain were included for the study. There were 14 (36%) males and 25(74%) females. (Table 1) All the patients had some kind of vitamin D deficiency and the mean age of occurrence of any deficiency among males and females were found to be 47 and 40 years. Majority of them found with deficiency were aged above 35 years. The proportion of severe, moderate and mild Vitamin deficiency were found to be 11(28%), 8 (20%) and 20 (52%) respectively. Overall, the major proportion of severe and moderate deficiency occurred in females of all the age groups. (Table 2) The mean values of Vitamin D among all the patients were found to be 56 nMol/L. The mean value of VAS was found to be 4 (range 2-5).

Table 1: Distribution of age and sex among the study population

Age group	Males N(%)	Females N(%)
<35 years	4 (29)	10 (71)
35-55 years	6(50)	6 (50)
>55 years	4(31)	9(69)
Total	14(100)	25(100)

Table 2: Distribution of Vitamin D deficiency among different sex and age groups (N=39)

Age group	Sex	Severe deficiency N(%)	Moderate deficiency N(%)	Mild deficiency N(%)
<35 years (n=14)	Male	0(0)	1(50)	2(25)
	Female	4(100)	1(50)	6(75)
	Total *	**4 (36)**	**2 (25)**	**8(40)**
35-55 years (n=12)	Male	1(25)	0	1(16)
	Female	3(75)	2(100)	5(84)
	Total *	**4(36)**	**2 (25)**	**6 (30)**
>55 years (n=13)	Male	1(33)	1(25)	2(33)
	Female	2(76)	3(75)	4(67)
	Total *	**3(28)**	**4(50)**	**6(30)**
Total (n=39)	Male	2(18)	2(33)	9(45)
	Female	9(82)	6(67)	11(55)
	Total*	**11(100)**	**8(100)**	**20(100)**

*Column percentage

Discussions

It is one of the few studies conducted in South India to determine the levels of Vitamin D deficiency among patients with chronic low back pain. Our study findings revealed that 1 in 2 patients had moderate to severe vitamin D deficiency.

Currently, vitamin D deficiency is one of the major public health problems in India. The vitamin D has a major role in etiological and progression of the disease.[5] It exerts anatomical, hormonal, neurological and immunological influences on the expression of pain. The muscle weakness and pain is induced due to Vitamin D deficiency both in adults and children.[6] It can also be an underlying factor in undiagnosed musculoskeletal pain. The decrease in sun exposure is one of the major causes of vitamin D deficiency; it is also found that the length of exposure to sun for synthesis of vitamin D among dark people is more than 3-5 times when compared to people with fairer skin.[6,7] The vitamin D deficiency is also linked to obesity the hypothesis being vitamin D remains entrapped in adipose tissue.[6] There are studies that suggests that Vitamin-D supplementation might increase the plasma levels of 25(OH) D3 potentially correcting the effects of deficiency.[6] However, there have been contrasting evidences found in randomized and non-randomized clinical trials. A study by warner and aspringer has shown that there is no significant decrease in pain score even after administration of ergocalciferol 200000 IU/month for nearly three months; while some studies have reported a positive effect on decrease in pain after administration of regular Vitamin supplementation.[8]

The findings of our studies are similar to those conducted in North India.[9] The possibility of deficiency in our study population probably could be attributed to decreased exposure to sun owing to the chronic morbidity that restricts the patient's mobility outside the home and more so among the women due to the obligatory routine household chores. The risk factor for women aged above 45 years could be the post-menopausal hormonal changes.[10] There should be a massive drive among the community to generate the awareness among the population about the importance of

vitamin D, increasing exposure to sun and the various ways of sustaining Vitamin D levels in the body including supplementation.[11] An additional 4000 IU of Vitamin per day has profound effect on the morbidity especially chronic muscle pain.[6]

The limitation of our study is that we did not compare the vitamin D levels among the patients attending the hospitals for other ailments. The sample of the patients included in our study could be small to generalize the study findings to other populations and hence should be interpreted with caution.

To conclude, majority of the patients with chronic low back ache has vitamin D deficiency and supplementation of vitamin D should be considered. Further research is required to assess the prevalence of vitamin D among general population and the randomized control trails to determine the positive effects of vitamin D supplementation.

Ethics Approval: The Institutional Ethics Committee (IEC) approval was obtained from BGS Medical College-GIMS, Institutional Ethics committee, Bangalore.

Conflict of Interest: None.

Funding Information: There was no source of any funding for the study.

References

1. Khan AA. Association of Low Back Pain with Common Risk Factors: 2012;2012:50–55.
2. Dionne CE, Dunn KM, Croft PR, Nachemson AL, Buchbinder R, Walker BF, et al. A Consensus Approach Toward the Standardization of Back Pain Definitions for Use in Prevalence Studies. *Spine* (Phila Pa 1976) [Internet]. 2017;33(1):95–103. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18165754
3. D Gould. Visual Analogue Scale. [cited 2017 Jun 11];706. Available from: https://com-jax-emergency-pami.sites.medinfo.ufl.edu/files/2015/03/Visual-Analog-Scale-VAS-in-depth.pdf
4. Christiansen TB and Lauritsen JM. Comprehensive Data Management and Basic Statistical Analysis System. [Internet]. Odense Denmark, EpiData Association. 2010 [cited 2017 Jun 11]. Available from: http://www.epidata.dk/credit.htm
5. Çalık Y, Aygün Ü. Evaluation of vitamin D levels in patients with chronic low back-leg pain. *Acta Orthop Traumatol Turc* 2017;51(3):243–247.
6. Ghai B, Bansal D, Kanukula R, Gudala K, Sachdeva N, Dhatt SS, et al. Vitamin D supplementation in patients with chronic low back pain: An open label, single arm clinical trial. *Pain Physician* 2017;20(1):99–106.
7. Sandoughi M, Zakeri Z, Mirhosainee Z, Mohammadi M, Shahbakhsh S. The effect of vitamin D on nonspecific low back pain. *Int J Rheum* Dis [Internet]. 2017;18(8):854–858. Available from: http://doi.wiley.com/10.1111/1756-185X.12172
8. Warner AE AS. Diffuse musculoskeletal pain is not associated with low vitamin D levels or improved by treatment with vitamin D. *J Clin Rheumatol* 2008;14(1):12–16.
9. Lodh M, Goswami B, Mahajan RD, Sen D, Jajodia N, Roy A. Assessment of Vitamin D status In Patients of Chronic Low Back Pain of Unknown Etiology. *Indian J Clin Biochem* [Internet]. 2017;30(2):174–179. Available from: http://link.springer.com/10.1007/s12291-014-0435-3
10. e Silva AV, Lacativa PG, Russo LA, deGregario LH, Pinheiro RA ML. Association of backpain with hypovitaminosis D in post menopausal women with low bone mass. *BMC Musculoskelet Disord* 2013;12(14):184–192.
11. Glerup H, Mikkelsen K, Poulsen L, Hass E, Overbeck S, Thomsen J, et al. Commonly recommended daily intake of vitamin D is not sufficient if sunlight exposure is limited. *J Intern Med* 2000;247(2):260–268.

How to cite this article: Shilpashree MK, Krishnamurthy N, Raju KP, Sharath BN. Serum vitamin D levels among patients with chronic low back pain attending BGS-GIMS hospital, Bangalore, India. *Int J Clin Biochem Res* 2019;6(1):118-120.