Effect of Vitamin-D supplementation in adults presenting with chronic lower back pain

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Abstract

Introduction: Chronic pain in the lower back of adults is a common problem and mostly associated with Vitamin D deficiency. Along with standard treatment, vitamin D supplementation can help in early and better relief from back pain.

Objective: To assess the effectiveness of vitamin D supplementation in patients with chronic lower back pain.

Study Design & Methods: This Quasi-experimental trial was conducted at the Department of Orthopaedics, Benazir Bhutto Hospital for 6 months. The patients aged between 15 to 55 years with chronic low back pain were included and pain score was noted by using a visual analogue scale (VAS). Patients were prescribed with oral vitamin D3 with a dose of 50,000 IU weekly for eight weeks (induction phase) and oral vitamin D3 with a dose of 50,000 IU once monthly for 6 months (maintenance phase). Outcome parameters included pain measured by VAS, Oswestry disability score at baseline, 2nd, 3rd, and 6 months post-supplementation.

Results: The mean age of patients was 44.2 ± 11.92 years. There were 337 (56.2%) male patients while 263 (43.8%) female patients. Baseline mean vitamin-D levels were 13.32 ± 6.10 ng/mL and increased to 37.18 ± 11.72 post supplementation (P < 0.0001). There was a significant decrease in the pain score after 2nd, 3rd & 6th months (61.7 ± 4.8, 45.2 ± 4.6 & 36.9 ± 7.9, respectively) than 81.2 ± 2.4 before supplementation (P < 0.001). The modified Oswestry disability score also showed significant improvement after 2nd, 3rd & 6th months (35.5 ± 11.4, 30.2 ± 9.4 & 25.8 ± 10.6, respectively) as compared to baseline 46.4 ± 13.2 (P < 0.001). About 418 (69.7%) patients attained normal levels after 6 months.

Conclusion: Prescription of Vitamin D in addition to standard therapy for chronic lower back pain can be beneficial in getting relief from pain and improving the functional ability of the patient.

Keywords: Vitamin D supplementation, pain, functional disability, chronic lower back pain.
Chronic lower back pain is the most common disorder of the spine in adults and the most common complaint among the pain of musculoskeletal structures. It is a serious disorder, which may cause the loss of functional ability and also reduce the movements of the body as well. It can be characterized in three types, depending on the duration of pain: acute type (lasting <6 weeks), sub-acute type (lasting from 6 to 12 weeks), and the chronic type (lasting >12 weeks). About 30% of acute low back pain becomes chronic. Literature highlights that the deficiency of serum vitamin D causes prolonged chronic pain in the musculoskeletal system as well as neuromuscular disorder. People usually complain more predominantly about pain in the lower extremity of the spine. The weakness of the proximal muscles causes the trouble during a walk and a disturbed gait or abnormal walking array. Therefore, chronic lower back pain is considered as the symptom which indicates the deficiency or insufficiency of vitamin D in the blood. Chronic lower back pain may also disturb and reduce the quality of life and leads to functional disability, thus harm social life activities. The prevalence of vitamin D deficiency is high in the Indo-Pak subcontinent and observed from 50 to 90% in this region. It is known that less intake of dietary vitamin D as well as the skin color and altering lifestyle of people in this region regardless of the availability of sufficient sunlight. Alfaraj et al., found that about 83% individuals of chronic lower back pain had vitamin D deficiency in the blood, while this rate was 81.7% as reported by Lotfi et al., Hwan-Kim et al., reported the frequency in 74.3% cases while lowest in a study by e Silva et al., i.e. 22.5%. The association of chronic lower back pain with vitamin D deficiency is more prominent in females of old age as compared to males of the same age group. But, Kim et al., conducted a study on 350 individuals diagnosed to have chronic lower back pain, and found no relationship of vitamin D insufficiency with the sex of the individuals. Numerous hypotheses clarify the fact that the insufficiency of vitamin D is associated with lower back-ache. It has been discovered through previous literature that in cases of vitamin D deficiency, the neuromuscular disorders can happen as a consequence of hypersensitivity and sensorial hyper-innervations in the muscles.

The rationale of the study was to find the beneficial role of vitamin D supplementation in addition to the standard treatment of chronic lower back pain. The findings of this study would help us to obtain the beneficial role of vitamin D supplements to prescribe to individuals who have chronic lower back pain in a local clinical set-up.

### Material & Methods

**Objective**

To assess the effectiveness of vitamin D supplementation in patients with chronic lower back pain.

**Study Design:** Quasi-experimental trial.

**Venue:** Department of Orthopaedics, Benazir Bhutto Hospital, Rawalpindi.

**Duration:** Two year period i.e. from March 2015 to March 2017.

**Sample size:** A sample size of n = 600 was estimated by keeping confidence level = 95%, a margin of error = 4%, and percentage of efficacy from previous literature i.e. 66%, after supplementation of vitamin D for treatment of chronic lower back pain.

**Sampling technique:** Non-probability, consecutive sampling.

**Selection criteria:** Patients age 15 to 55 years of both genders who had chronic lower back pain were recruited for the study. Patients of spinal stenosis, disc prolapse, degenerative spinal pathologies, neurological disease, metabolic bone disorder (hypoparathyroidism), pregnant women, chronic kidney failure, and chronic liver disease were not included.

**Data collection Method:** Patients fulfilling selection criteria were enrolled from OPD. Informed consent was taken and demographics were noted. A blood sample was taken and sent to the laboratory for assessment of vitamin D level at presentation. Patients were also assessed for pain intensity by using VAS and functional disability assessed by the modified Oswestry disability score. Then individuals were prescribed oral vitamin D3 supplements of dose 50000 IU weekly for eight weeks (induction phase) and then oral vitamin D3 with a dose of 50000 IU once monthly for 6 months (maintenance phase). Then all the patients were followed-up in OPD after 2, 3, and 6 months. On each visit, a blood sample was taken and sent to the laboratory for assessment of vitamin D level and patients were assessed for pain intensity by using VAS and functional disability assessed by using a modified Oswestry disability score scale. Vitamin D3 levels were measured and labeled as normal if vitamin
D level > 29 ng/mL post supplementation. All the data was gathered on preformed proforma.

Data analysis: Gathered information was entered into SPSS and was also analyzed. Change in pain score modified Oswestry disability score, vitamin D level were assessed by applying paired sample t-test. P-value ≤ 0.05 was considered significant.

Results

The mean age of patients was 44.21 ± 11.92 years. There were 337 (56.2%) male patients while 263 (43.8%) female patients. The mean duration of chronic back pain was 3.1 ± 1.1 years. About 454 (75.66%) patients have deficient vitamin-D3 levels. (Table 1)

Baseline mean vitamin-D levels were 13.32 ± 6.10 ng/mL and increased to 37.18 ± 11.72 post supplementation (P<0.0001). There was a significant decrease in the pain score after 2nd, 3rd& 6th months (61.7 ± 4.8, 45.2 ± 4.6 & 36.9 ± 7.9, respectively) than 81.2 ± 2.4 before supplementation (P < 0.001). The Modified Oswestry disability score also showed significant improvement after 2nd, 3rd& 6th months (35.5 ± 11.4, 30.2 ± 9.4 & 25.8 ± 10.6, respectively) as compared to baseline 46.4 ± 13.2 (P < 0.001). (Table 2)

In the study, 418 (69.7%) individuals achieved normal levels (>29 ng/mL) after 6 months of supplementation. (Figure-I)

| Table 1: Demographics of patients |
| n | 600 |
| Age | 44.21 ± 11.92 years |
| Gender | |
| Male | 337 (56.17 %) |
| Female | 263 (43.83%) |
| Duration of symptoms | 3.1 ± 1.1 years |
| Vitamin D deficiency at baseline | 454 (75.66%) |

| Table 2: Change in outcome after vitamin D supplementation |
|-----------|---------|---------|---------|---------|---------|
|           | Baseline | After 2 months | After 3 months | After 6 months | P-value |
| Vitamin D level | 13.3 ± 6.1 | 21.22 ± 4.9 | 29.6 ± 6.3 | 37.18 ± 11.7 | <0.000 |
| Pain score | 81.2 ± 2.4 | 61.7 ± 4.8 | 45.2 ± 4.6 | 36.9 ± 7.9 | <0.000 |
| Modified Oswestry Disability score | 46.4 ± 13.2 | 35.5 ± 11.4 | 30.2 ± 9.4 | 25.8 ± 10.6 | <0.000 |

Chronic lower back-ache or back pain is the common disorder of spine in adults all over the world. It causes hindrance in daily life activities, decreased social functioning, and weakened the quality of lifestyle. It has been observed and identified that insufficiency and deficiency of serum vitamin D are significantly involved in several chronic spinal diseases and also chronic painful disorders. A significant relationship between lower back pain and deficiency of serum vitamin D has been reported in the literature. But, there is a lack of adequate convincing proof concerning the ideal concentration of vitamin D in blood in such conditions.

In our study, the mean vitamin-D levels at baseline were 13.32 ± 6.10 ng/mL and increased to 37.18 ± 11.72 post supplementation (P < 0.0001). Pain was
supplements to the standard therapy can efficiently interrupt the malicious cycle of the lower back pain along with significant improvement in the vitamin D concentration in the body, effective pain relief and significant functional improvement of back-bone without compromising the health of an individual or any side effects. Improvement in the concentration of the vitamin D in the blood is insignificantly associate to its concentration at the initial level and obese persons show significantly less improvement. 

Conclusion

Prescription of Vitamin D in addition to standard therapy for chronic lower back pain can be beneficial in getting relief from pain and improving the functional ability of the patient. Thus in the future, we can be able to get a better outcome of treatment of chronic back pain and more satisfaction of the patient.

References