https://doi.org/10.3329/bjns.v13i2.74127





## *Original Article*

# Association between Pre-operative Vitamin-D level and Short-term Clinical Outcomes Regarding Pain & Disability following PLID surgery.

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**Conflict of interest:** There is no Conflict of interest relevant to this paper to disclose.

**Funding Agency:** Was not funded by any institute or any group.

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**Received:** October 05, 2023
**Accepted:** November 02, 2023

## Abstract:

***Background:*** *Low back pain (LBP) is a common problem affecting 70% of the population in the developed countries and prevalence is also increasing in the developing countries. There were strong associations between vitamin D deficiency and LBP. According to the latest report in Bangladesh 86% (eighty-six percent) people had hypovitaminosis-D. A high prevalence of vitamin D deficiency is seen in patients with degenerative diseases of the spine. Considering the hypovitaminosis D led to musculoskeletal issues we want to examine the level of vitamin D in patients before PLID surgery and observe its impact 01 month postoperatively regarding pain & disability outcomes by Visual Analogue Scale (VAS) & Oswestry Disability Index (ODI).*

***Objectives:*** *The objective of this study was to evaluate an association between pre-operative Vitamin-D level and short-term outcome regarding pain & disability following PLID surgery.*

*Materials and Methods: This cross-sectional observational study will be conducted in the Department of Neurosurgery, Bangabandhu Sheikh Mujib Medical University. Patient's data will be collected in questionnaire/ data collection sheet. All the patient will be evaluated by serum Vitamin-D level preoperatively. Patient will be clinically assessed by VAS (Visual Analogue Scale) score and ODI (Oswestry Disability Score) preoperatively and 01 month postoperatively. Then our aim is to determine a relationship between pre-operative Vitamin-D level and mean difference between pre and post-operative VAS & ODI Score.*

*Statistical analysis: Data was processed and analyzed by using computer software SPSS (Statistical Package for Social Sciences) version 22. Appropriate statistical test for data analysis (Unpaired T-test) was done. Statistical significance was set at p-value <0.05.*

***Results:*** *In this study population, the mean age was 42.84 ± 10.14 years ranging from 31 to 78 years. Out of 38 patients 17 (45%) patients had hypovitaminosis-D and 19 (55%) patient had normal vitamin-D level. 15 (39.5%), 11 (28.9%), 10 (26.3%) and 2 (5.3%) patients were service holder, housewife, Businessman and other (retired) respectively. T-test & Chi square test showed positive association between pre-operative vitamin-D level and post-operative clinical outcome regarding pain and disability, with a significant p-value of p = <0.05.*

***Conclusion:*** *Our study has showed an association between Pre-operative Vitamin-D level and post-operative clinical outcome regarding pain & disability, that is, insufficient Vitamin-D level leads to decrease alleviation of symptoms following PLID surgery.*

*Bang. J Neurosurgery 2024; 13(2): 75-85*

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## Introduction

With the advent of rapid urbanization and adoption of sedentary lifestyle, the number of patients with obesity and low back pain are gradually increasing[1]. The reported prevalence of vitamin D deficiency in obesity is high[2]. Low back pain (LBP) is a common problem affecting 70% of the population in the developed countries and prevalence is also increasing in the developing countries[3]. Low back pain is among the most common chronic pain conditions, with significant personal suffering as well as remarkable economic consequences at both individual and community level. Intervertebral disc degeneration and prolapse, that is evident in MRI is one of the commonest causes of low back pain[4]. There were strong associations between vitamin D deficiency and LBP[5]. There are some genetic conditions related to Vitamin-D receptor gene are more frequently associated with multilevel and severe disc degeneration and disc herniation[6].

Vitamin D is a steroid derivative. It has enormous role in our body. Its main function is to regulate calcium-phosphorus metabolism and regulate the mineralization of collagen matrix in human bone[7]. Secondary parathyroid hormone secretion induced by hypovitaminosis D is one of the pathophysiological mechanisms of osteoporosis[8]. Vitamin-D deficiency has a high incidence rate worldwide. According to the latest report in Bangladesh 86% (eighty-six percent) people had hypovitaminosis-D[9].

Disc degeneration diseases are common in patients with musculoskeletal disease. Some studies have shown that low back pain is associated with hypovitaminosis D[5] (Zadro J. et al., 2017) and

supplement vitamin-D can relieve the pain and improve musculoskeletal strength[10]. Vitamin-D can affect the cellular metabolism in the nucleus pulposus as well as the transformation of types I and II collagen[11].

Vitamin-D Deficiency promotes skeletal muscle hypersensitivity and Sensory hyperinnervation[12]. Vitamin-D has exhibited an association with the regulation of nerve growth factor (NGF) synthesis. NGF is responsible for the growth and survival of neurons. A high prevalence of vitamin D deficiency is seen in patients with degenerative diseases of the spine. We assessed patient preoperatively and 01-month post operatively by Visual Analogue Scale (VAS) & Oswestry Disability Index (ODI). There are many scales available for pain measurement[13]. Among them Visual Analogue Scale (VAS) is the most popular and widely used scale. Usually, low back pain is associated with some sort of disabilities. Oswestry Disability Index (ODI) is the most appropriate tool for measuring the amount of disabilities due to back pain and radiculopathy. Considering the hypovitaminosis-D led to musculoskeletal issues we measured the level of vitamin D in patients before PLID surgery and observe its impact 01 month postoperatively regarding pain & disability outcomes by Visual Analogue Scale (VAS) & Oswestry Disability Index (ODI)[13].

### Vitamin-D- Source & Metabolism:

Vitamin-D is a fat-soluble vitamin present in many foods. It can be endogenously produced by ultraviolet rays from sunlight when the skin is expose. Vitamin-D is biologically inert when obtained from sun exposure or diet, it must first be activated in human beings before functioning. The kidney and the liver play here a crucial role by hydroxylation of vitamin-D to 25-hydroxyvitamin D in the liver and to 1,25-dihydroxyvitamin D in the kidney. Vitamin-D deficiency is involved in many diseases, i.e. osteomalacia, osteopenia, primary and secondary osteoporosis, Intervertebral disc degenerative disease and musculoskeletal pain. The two main forms of vitamin D are: vitamin D3 or cholecalciferol and ergocalciferol or vitamin D2. The differences are in the side chain. Vitamin D3 is synthesized in the skin during sunlight exposure or it is obtained from nutritional sources, especially from fatty fish. Vitamin D3 or cholecalciferol is hydroxylated in the liver into 25-hydroxyvitamin D3 (25(OH)D) and subsequently in the kidney into 1,25-dihydroxyvitamin D3 (1,25(OH)2D). This is the active metabolite, which stimulates the calcium absorption from the gut[14]. The active metabolite 1,25(OH)2D enters the cell and binds to the vitamin-D receptor. The classic effect of 1,25(OH)2D on active calcium transport occurs in the intestinal cell. Calcium enters the cell through membrane proteins. In the intestinal cell, 1,25(OH)2D binds to the vitamin-D receptor and the calcium binding protein is synthesized and this regulates the active transport through the cell. The calcium is transported to the extracellular fluid by an ATP dependent mechanism. The 1,25(OH)2D has its effect on the classic target organs bone, intestine and kidney and stimulates calcium transport from these organs to the blood. The production of 1,25(OH)2D is stimulated by parathyroid hormone (PTH). There is negative feedback through calcium which decreases PTH and direct negative feedback from 1,25(OH)2D to PTH. The active metabolite 1,25(OH)2D also shows rapid actions through a membrane receptor.

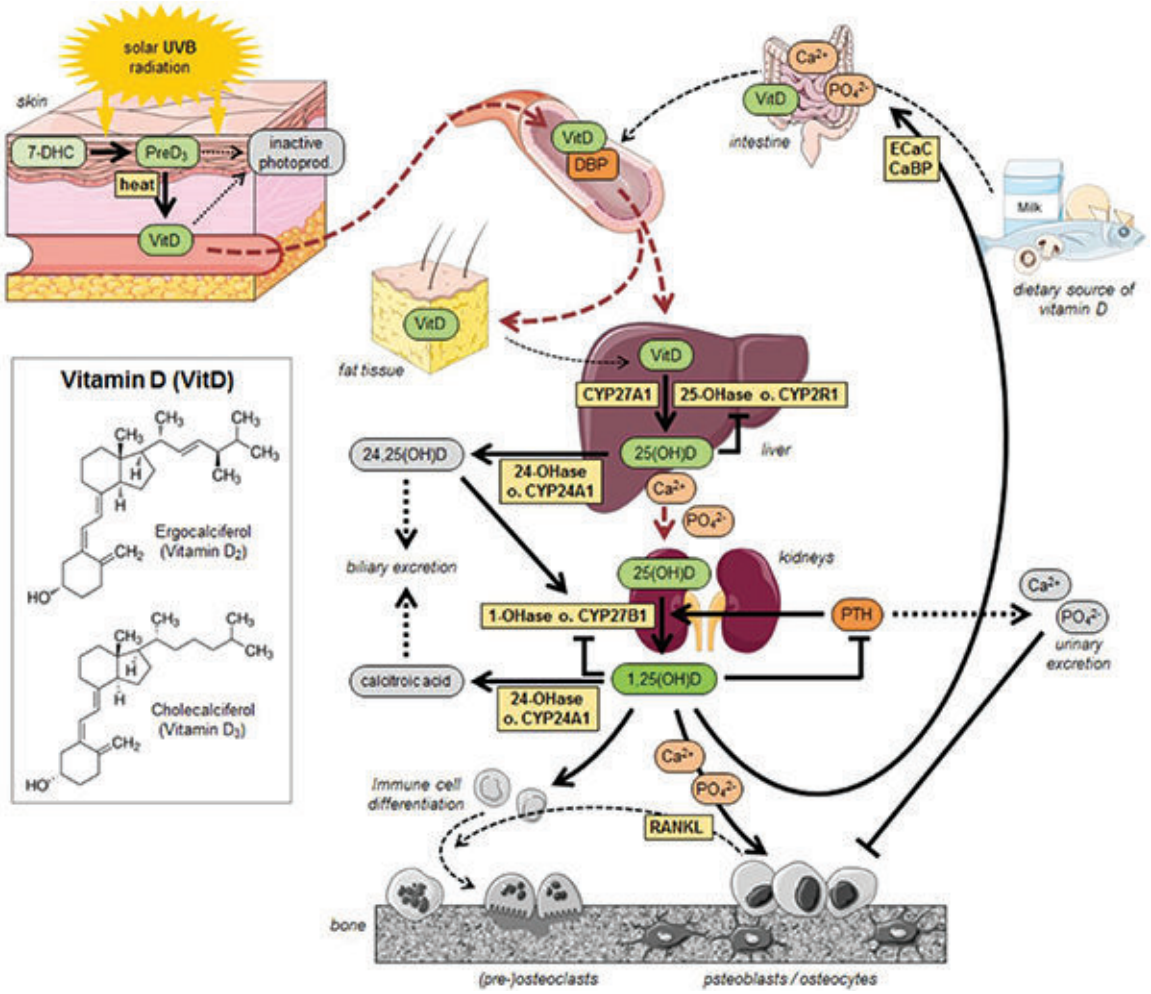


**Figure 1:** *Schematic representation of admission and metabolism of vitamin D.*

**Vitamin D, back pain & musculoskeletal pain:**

The pathogenesis of more severe preoperative chronic low back pain and the decrease of postoperative quality of life caused by vitamin D deficiency is as follows: Appropriate vitamin D concentration promotes the proliferation of nerve cells and relieves neuropathic pain; vitamin D deficiency promotes nerve hyperesthesia and muscle hypersensitivity[12]. Inflammatory markers such as PGE2, TNF-a, NO and P cytokine production in monocytes or macrophages exacerbates pain[15]. Adequate vitamin D decreases levels of inflammatory markers and can alleviate lower back pain. Bone turnover markers system always modulated by vitamin D and the levels of inflammatory cytokines could be indirectly influenced. Vitamin D deficiency made muscles weaker[10], which can lead to spinal instability. In the same time, the spinal instability also aggravated the low back pain and disc degeneration. A number of studies have suggested a link between low levels of vitamin D and higher incidence of chronic back pain[16]. There is a well-established link between low vitamin-D and pain due to osteomalacia and osteoporosis leading to micro-fracture of bones and formation of osteophytes.

Chronic musculoskeletal pain poses major social and economic burdens. Approximately one-third of adolescents and one-half of adults suffer from this disorder[17]. Up to 93% of those reporting nonspecific musculoskeletal pain are deficient in vitamin-D (serum 25-hydroxyvitamin D[25(OH)D] > 20 ng/ml)[18], suggesting that insufficient levels of this secosteroid may contribute to the etiology of musculoskeletal pain. There is evidence that dietary vitamin supplementation can relieve musculoskeletal pain[19]. Nonetheless, the role of vitamin in musculoskeletal pain remains controversial, as conditions that encourage vitamin D deficiency (obesity, sedentary lifestyle, female and post-menopausal) also predispose individuals to



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musculoskeletal pain[20]. Vitamin D deficiency causes deep tissue mechanical hypersensitivity. Vitamin D affects many cell types through nuclear vitamin D receptors that regulate gene expression and cell membrane VDRs that mediate non-genomic rapid responses. VDRs are activated by the vitamin D hormone metabolite, 1,25-dihydroxy vitamin D [1,25(OH)2D], which is converted from circulating 25(OH)D. A study shows that, unmyelinated neurons in dorsal root ganglia (DRGs) express VDRs. And these presumptive pain sensing neurons respond to active vitamin D metabolites[12].

**Methods:**

It was repeated measure cross sectional type of study which was studying in the department of

Neurosurgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka within November 2020 to January 2022. The study population was included all patients diagnosed clinically and radiologically as a case of prolapsed lumbar intervertebral disc in the Department of Neurosurgery of Bangabandhu Sheikh Mujib Medical University. The total duration of data collection of the study was 18 months and the calculative value of sample size was 38. The data collection sheet was designed by the researcher and approved by the faculty members which contained all necessary information required for the study. It was used to collect the necessary information. Voluntary written informed consent was taken from the patients and/or the legal guardian after completely explaining to them about the purpose of the study. Detailed history of illness was taken and general and neurological examinations were carried out both in indoor and outdoor facility. PLID in MRI and plain X-ray of lumbosacral spine in A/P view was noted. For measurement of Serum Vitamin-D, a written requisition slip was given to the patient. Patient was sent to Biochemistry lab or Neuclear Medicine Lab for sample collection. With aseptic precaution blood sample was collected. Data were processed and analyzed using computer software SPSS (Statistical Package for Social Sciences) version 22. Appropriate statistical test for data analysis was done. Statistical association were done using Chi-square test. Statistical significance was set at p- value <0.05.

**Results:**

**Table-I**

*Distribution of the study subjects according to age (N=38)*

| Age (years) | Frequency (n) | Percentage (%) |
|---|---|---|
| 31 - 40 | 19 | 50.0 |
| 41 - 50 | 14 | 36.8 |
| >51 | 5 | 13.2 |
| Mean ± SD | 42.84 ± 10.14 | |
| Min-max | 31.00 - 78.00 | |

The age distribution of 38 patients is shown in table II. The age range of patients was 31 to 78 years. The Mean ± SD of age was 42.84 ± 10.14. Most of the patients (50%) were within the 31 to 40 years range, 36.5% of patients were within 41 to 50 years of age and only 13.2% of people were above 50 years old. Overall, 33 (86.8%) patients were within the 31 to 50 years range.

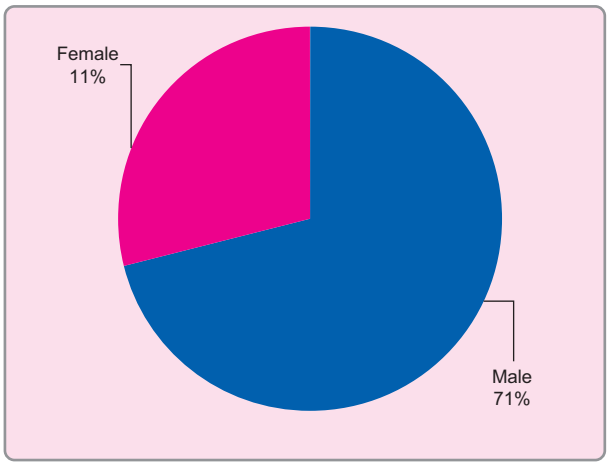


**Figure 2:** *Pie chart of the gender distribution of the study subjects*

In this study out of 38 patients, 27 (71%) patients were male and 11 (29%) patients were female. The male female ratio was 2.45:1.

In this study, out of 38 patients, 15 (39.5%) patients were service holder, 11(28.9%) patients were housewife, 10 (26.3%) patients were businessman and 02 (5.3%) patients were retired.

In this study out of 38 patients, 19 (50%) patients were smoker and 19 (50%) patients were non-smoker.

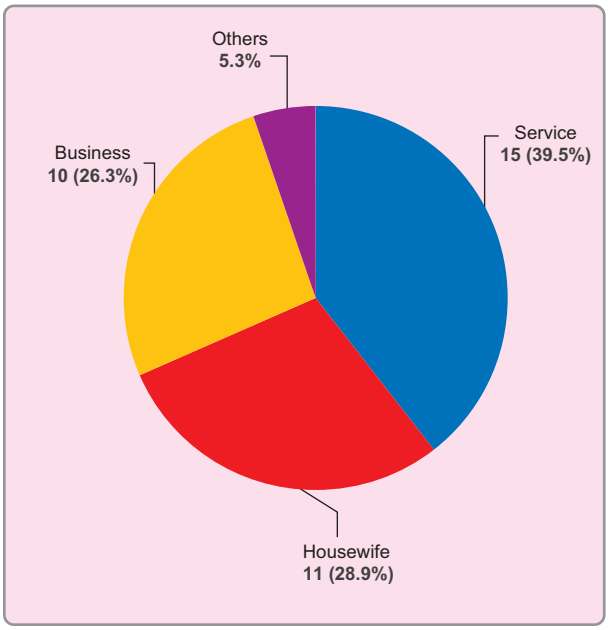


**Figure 3:** *Pie chart of Occupation distribution of the study subjects*

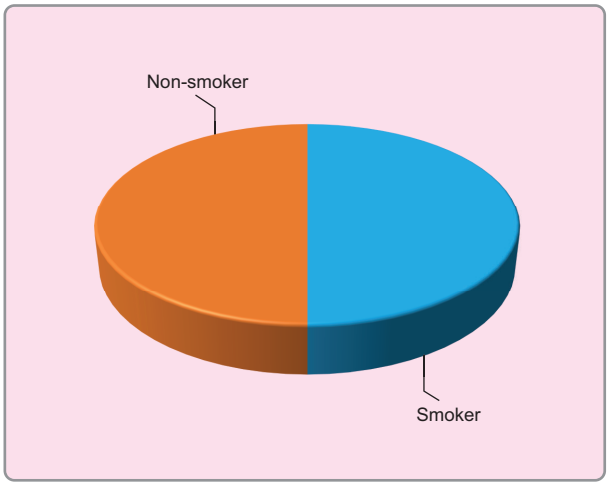


**Figure 4:** *Pie chart of distribution of no of smoker among patients (N=38)*

**Table-II**

*Pre-operative vitamin D status among the study subjects (N=38)*

| Vitamin D (ng/ml) | Frequency (n) | Percentage (%) |
|---|---|---|
| Sufficient (≥30) | 21 | 55 |
| Insufficient (< 30) | 17 | 45 |
| Mean ± SD | 28.48 ± 7.59 | |
| Min - max | 14.70 - 39.70 | |

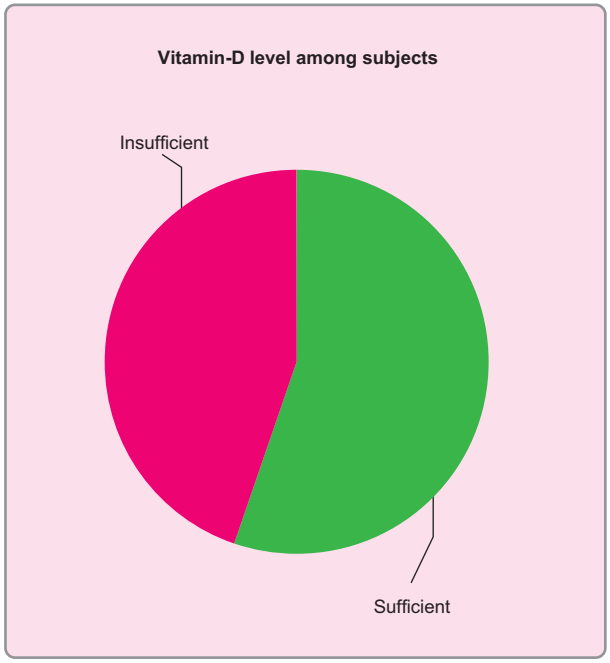


**Figure 5:** *Pie chart of distribution of the study subjects according to Vit-D level*

In this study out of 38 patients, 21 (55%) patients had normal Vitamin-D level and 17 (45%) patients had hypovitaminosis-D. Lowest level was 14.70 ng/ml and highest level was 39.70 ng/ml. Mean ± SD was 28.48 ±7.59.

**Table-III**

*Comparison of serum Vitamin-D level in different age groups (N=38)*

| | Age (years) | | | p-value |
|---|---|---|---|---|
| | 31-40 | 41-50 | >50 | |
| Vit-D (ng/ml) | 30.39±6.48 | 28.83±8.32 | 20.14±3.77 | 0.022 |

ANOVA test was done

In this study, the Mean- ± SD of serum Vitamin-D levels in 31-40, 41-50 and more than 50 year age group were 30.39 ± 6.48, 20.14 ± 3.77 and 20.14 ± 3.77 respectively. The highest mean was observed in 31-40 year age group and lowest mean observed in more than 50 years age group. ANOVA test was done to see level of significance. P value was < .05. That means it was statically significant. The more than 50 year's group had more chance of suffering low Vitamin-D level.

**Table-IV**

*Baseline characteristics of the study subjects according to Vitamin-D groups (N=38)*

| | Vitamin D | | p-value |
|---|---|---|---|
| | < 30 ng/ml | ≥30 ng/ml | |
| Age | 47.71 ± 12.61 | 38.90 ± 5.17 | [a]0.006 |
| Gender | | | |
| Male | 10 (58.8) | 17 (81.0) | [b]0.167 |
| Female | 7 (41.2) | 4 (19.0) | |
| Smoker | | | |
| Yes | 5 (29.4) | 14 (66.7) | [b]0.022 |
| No | 12 (70.6) | 7 (33.3) | |
| Occupation | | | |
| Service | 3 (17.6) | 12 (57.1) | [b]0.048 |
| Housewife | 7 (41.2) | 4 (19.0) | |
| Business | 5 (29.4) | 5 (23.8) | |
| Others | 2 (11.8) | 0 (0.0) | |
| VAS score | | | |
| Moderate pain | 4 (23.5) | 5 (23.8) | [b]0.984 |
| Severe pain | 13 (76.5) | 16 (76.2) | |

[a]Unpaired t test and [b]Chi-Square test was done

Table V demonstrates that, we divided the total 38 patients in two group according to their serum Vitamin-D level. One group is having insufficient amount of Vit-D and other group have normal Vitamin-D level. The Mean±SD of age in insufficient group is 47.71 ± 12.61 and in sufficient or normal group is 38.90 ± 5.17. Among 38 patients, insufficient group has 17 patients. In between them 10 patients are male and 07 patients are female. Sufficient or normal Vit-D group has 21 patients. In between them 17 patients are male and 04 patients are female. In insufficient group there are 05 smoker and 12 non-smoker and in normal Vit-D group there are 14 smoker and 07 non-smoker. According to occupation there are 03 service holder, 07 housewife, 05 businessman and 02 other professionals in insufficient group and 12 service holder, 04 housewife and 05 businessman in normal vit-D group. Pre-operative VAS score shows 04 patients were suffering from moderate pain and 13 patients were suffering from severe pain in vitamin-D insufficient group and 05 patients were suffering from moderate pain and 16 patients were suffering from severe pain in vitamin-D sufficient group. Unpaired t-test and chi-square test was done to see level of significance. Significant p-value was set at <0.05. Table-V demonstrates that, there was statistically significant association between insufficient Vitamin-D level and increased age. P-value was <0.05, which was statistically significant.

**Table-V**

*Distribution of patients according to relevant history, examination & co-morbidities (N=38)*

| | Frequency (n) | Percentage (%) |
|---|---|---|
| Low back pain with radiation of pain to lower limb | 38 | 100 |
| Bowel/bladder incontinence | 0 | 0 |
| Antalgic gait | 26 | 68.4% |
| Restriction of SLR (<60°) on symptomatic side | 34 | 89.45% |
| Clinically detected Scoliosis | 03 | 7.89% |
| Diabetes mellitus | 08 | 21% |
| Hypertension | 09 | 23.6 |

Table VI demonstrates that, among 38 patients, all 38 (100%) patients had low back pain with radiation of pain to lower limb, antalgic gait 26 patients (68.4%), showed significant restriction (<60°) of straight leg raising (SLR) test 34 (89.45%) patie1nt. Scoliosis was clinically detected in 03 patients (7.89%), Diabetes mellitus and hypertension were present in 21% and 23.6% patients respectively. No patient was presented with incontinence of bowel or bladder.

**Table-VI**

*Pre and post-operative VAS score and their changes (N=38)*

| VAS score | Mean ± SD | Min - max |
|---|---|---|
| Pre-operative | 8.01 ± 0.86 | 6.00 - 9.00 |
| Post-operative | 2.22 ± 1.01 | 0.00 - 3.80 |
| Change in VAS score | 5.79 ± 1.00 | 3.60 - 8.00 |

The mean ± SD of Pre-operative VAS score in patient having PLID was 8.01 ± 0.86. The highest value was 9.00 and lowest value was 6.00. The mean ± SD of post-operative VAS score in patients following PLID surgery was 2.22 ± 1.01. The highest value was 3.80 and lowest value was 0. The mean ± SD of change in VAS score was 5.79 ± 1.00. The highest change value was 8.00 and lowest change value was 3.60.

**Table-VII**

*Pre and post-operative ODI score and their changes (N=38)*

| ODI score | Mean ± SD | Min - max |
|---|---|---|
| Pre-operative | 67.74 ± 17.87 | 30.00 - 94.00 |
| Post-operative | 17.79 ± 9.18 | 2.00 - 40.00 |
| Change in ODI score | 49.95 ± 14.35 | 20.00 - 80.00 |

The mean ± SD of Pre-operative ODI score in patient having PLID was 67.74 ± 17.87. The highest value was 94.00 and lowest value was 30.00. The mean ± SD of post-operative ODI score in patients following PLID surgery was 17.79 ± 9.18. The highest value was 40.00 and lowest value was 2.00. The mean ± SD of change in ODI score was 49.95 ± 14.35. The highest change value was 80.00 and lowest change value was 20.00.

Table IX demonstrates there were no differences in preoperative VAS and ODI scores ($p > 0.05$) between the 2 groups. All patients experienced alleviation of symptoms after the surgery. VAS (2.84 ± 0.64 vs 1.72 ± 0.97; $p < 0.001$) and ODI (22.47 ± 8.85 vs 14.00 ± 7.72; $p = 0.003$) scores showed significantly better outcomes compared to insufficient group. There was statistically significant association between pre-operative Vitamin-D level and VAS and OID post-operatively. Both P-values were <0.05, which were statistically significant.

Table X demonstrates that, among 38 patients, 08 (21.05%) patients had DM. Among them, there were 06 DM patients were in insufficient group and 02 patients in normal Vitamin-D group. Among our total 38 patients, 09 (23.68%) patients had HTN. Among them, there were 04 hypertensive patients were in insufficient group and 05 patients in normal Vitamin-D group. Fisher's Exact test was done to see the level of significance. Significant p-value was set at <0.05. Table X demonstrates that, both p values were more than 0.05. So, it has no statistical significance.

Table X shows multiple logistic regression analysis to find out predictive association of age, sex, smoking/tobacco consumption and diabetes for development of vitamin-D deficiency. There was no significant independent relationship of variables except for Age to develop vitamin-D deficiency. Odds of development of vitamin-D deficiency is 0.874 times higher with increased age with a 95% confidence interval of 0.777 – 0.982, which was statistically significant (p-value 0.024).

**Table-VIII**

*Comparison of clinical outcomes between the vitamin D groups (N=38)*

| | Vitamin D | | p-value |
|---|---|---|---|
| | < 30 ng/ml | ≥30 ng/ml | |
| VAS score | | | |
| Pre-operative | 8.14 ± 0.82 | 7.91 ± 0.89 | 0.428 |
| Post-operative | 2.84 ± 0.64 | 1.72 ± 0.97 | <0.001 |
| ODI score | | | |
| Pre-operative | 68.00 ± 18.18 | 67.52 ± 18.07 | 0.935 |
| Post-operative | 22.47 ± 8.85 | 14.00 ± 7.72 | 0.003 |

Unpaired t test was done

Unpaired t test was done to see the level of significance. Significant p-value was set at <0.05.

**Table-IX**

*Co-morbidities of the study subjects according to Vitamin D groups (N=38)*

| | Vitamin D | | p-value |
|---|---|---|---|
| | < 30 ng/ml | ≥30 ng/ml | |
| DM | 6 (35.3) | 2 (9.5) | 0.053 |
| HTN | 4 (23.5) | 5 (23.8) | 0.984 |

Fisher's Exact test was done

**Table-X**

*Result from multivariate logistic regression analysis for potential risk factors of vitamin D deficiency*

| | B | S.E. | p-value | OR | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| Age | -.135 | .060 | .024 | .874 | .777 | .982 |
| Gender (male) | .889 | 1.186 | .454 | 2.432 | .238 | 24.866 |
| Smoking (yes) | 1.516 | 1.154 | .189 | 4.555 | .475 | 43.691 |
| DM | -.783 | 1.100 | .476 | .457 | .053 | 3.943 |

OR=Odds ratio, CI=Confidence interval

Chi-square test was done to measure the level of significance.

**Discussion:**

The present study has been undertaken to observe the association of pre-operative vitamin-D level and short-term clinical outcome regarding pain & disability in patients following PLID surgery. This association has been studied earlier by only one study. We wanted to evaluate the same at our context. In this study, we found significant association (p-value 0.001) between pre-operative vitamin-D level and short-term clinical outcome regarding pain & disability in patients following PLID surgery. Subjects with insufficient Vitamin-D level leads to decrease alleviation of symptoms following PLID surgery, which was statistically significant. Hypovitaminosis-D is a common prevailing problem that might lead to non-specific musculoskeletal pain, LBP, intervertebral disc degeneration, spinal instability, osteomalacia and osteoporosis subsequently causing disability, losing of job, decreasing income; leading to significant financial burden of the society. PLID is a part of degenerative spine disease (DSD). Many factors including age, sex, BMI, smoking habit, DM, steroid use, surgeon etc. have influence in post- operative outcome following PLID surgery. In this cross-sectional study, we investigated the association of pre-operative Vitamin-D level and short term clinical outcome regarding pain and disability following PLID surgery. Preoperative Vitamin-D was measured and patient's clinical condition was assessed by interviewing questionnaires i.e VAS & ODI. Then after one month postoperatively patient's clinical condition was assessed with same questionnaire.

In our study, the mean ± SD of age of patients was 42.84 ± 10.14 years, with lowest and highest ages of patients were 31 and 78 years respectively. We found majority of the

patients (50%) were within their 4th & 5th decades of life. While 13.2% patients were distributed at >50 years age group. These results are similar with the findings of Xu H.W. et al. 2019, where highest prevalence of PLID was among 30 to 50 years of age group[21]. This finding was probably due to the fact that, middle aged people are mostly occupationally active. After 6th decade as a part of degenerative spine disease, Intervertebral disc gets atrophied & shrinked, so the prevalence of patients with PLID reduces.

Here, out of 38 patients, 27 (71%) patients were male and 11 (29%) patients were female. The male female ratio was 2.45:1. In another study with PLID patients at the context of Bangladesh, showed male female ratio 3.17:1. Whereas studies that are conducted at developed countries have found almost equal distribution of PLID between sexes. This observation may be due to the fact that, men at Bangladesh perspective are dominant earning member, undertakes more physically demanding jobs and thus making them vulnerable to mechanical stress than women,

who are mostly engaged to household works and do not directly contribute to family income. Moreover, male bed number at Department of Neurosurgery, BSMMU are 1.6 times greater than female, which might have led to more opportunity for the men to get admitted for surgery.

With respect to history and examination, we found, all of the patients had LBP, radiation of pain to lower limb. 64% patient had antalgic gait. No patients had history of bowel/bladder incontinence. Restriction of SLR (<60°) was present in most patients (89.45%) while clinically detected scoliosis was present in 7.89% of patients. Among co morbidities, diabetes mellitus (DM) and hypertension were present in 215% and 23.6% of patients respectively.

In this study out of 38 patients, 21 (55%) patients had normal Vitamin-D level and 17 (45%) patients had hypovitaminosis-D. Lowest level was 14.70 ng/ml and highest level was 39.70 ng/ml. Mean ± SD is 28.48 ± 7.59. This distribution of patients according to vitamin-D level was almost similar to the previous studies[21].

There have been several studies to evaluate relationship between Vitamin-D level and chronic low back pain. There were only two studies were done to see the association between pre-operative vitamin-D level and post-operative outcome following spinal surgery. Most of the study subjects were patient having lumber disc herniation, lumber spinal canal stenosis and lumber spinal instability. They evaluated post-operative clinical outcome following various surgeries i.e. F&D, Laminectomy, Interlaminar decompression & PLIF[21]. To the best of our knowledge this is the only study to show association between pre-operative vitamin-D level and post-operative clinical outcomes regarding pain and disability following PLID surgery (F&D) .

In the present study, 17 (45%) patients had insufficient levels of vitamin D. Numerous authors have reported similar findings, including Ravindra et al. In their study, 25(OH)D level was 25.9 ± 12.4 ng/mL in the patients undergoing surgery for spinal degenerative disease. Although the prevalence of hypovitaminosis D was also high in the general population. According to a survey, there is 41.6% prevalence of vitamin D deficiency in the general U.S. population[22]. A higher incidence of vitamin D deficiency was present in patients with lumbar degenerative diseases. These results indicated that patients with lumbar degenerative diseases may need supplement with adequate vitamin D more than general population.

Multiple logistic regression analysis was done to find out predictive association of age, sex, smoking/ tobacco consumption and diabetes for development of vitamin-D deficiency. There was no significant independent relationship of variables except for Age to develop vitamin-D deficiency. Odds of development of vitamin-D deficiency is 0.874 times higher with increased age with a 95% confidence interval of 0.777 – 0.982, which was statistically significant (p-value 0.024).

**Conclusion:**

In this study evaluate the association of Pre-operative Vitamin-D level and post-operative clinical outcome regarding pain & disability, it can be concluded that lower vitamin-D levels were associated with decreased alleviation of symptoms and worse quality of life at 01 months after PLID surgery. Therefore, preoperative vitamin-D testing and supplementation may be a measure to improve life quality before PLID surgery

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