

## Evaluation Of Safety And Efficacy Of Vitamin D Supplementation Inerectile Dysfunction Patients With Vitamin D Deficiency

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### Abstract

**Aim:** To evaluate the safety and efficacy of Vitamin D supplementation in erectile dysfunction patients with Vitamin D deficiency.

**Material and Method:** This study was carried out in Department of Urology, S.M.S. Medical College and attached Hospitals between March 2018 to April 2019 among patients in the age group 20-60 years presenting with ED and having severe Vitamin D deficiency. Patients were randomized into three groups. First group was treated with Tadalafil 10mg once a day while the second group had Tadalafil 10mg once a day plus Vitamin D 60,000 IU once a week, and third group was given Vitamin D 60,000 IU once a week only. Efficacy of drugs was evaluated at base line and after 12 weeks on the basis of International Index of Erectile Function Questionnaire scoring.

**Results:** After 12 weeks of treatment IIEF-5 scoring was nearly same as that of the base line with no significant difference in group C patients. On the other hand, IIEF-5 scoring was significantly improved in group A and B patients ( $P < 0.001$ ). On comparing group A and B patients there was significant improvement in group B compared to group A ( $P < 0.05$ ). In comparison to group C, group A and group B patients had more side effects ( $P < 0.05$ ), but of mild intensity and prescribed medications were well tolerated. Group A and B patients had no significant difference in side effects.

**Conclusion:** This study showed that the use of Tadalafil in combination with Vitamin D in Vit D deficient ED patients act better than Tadalafil or Vit. D alone.

**Keyword:** ED, Vitamin D, Tadalafil, IIEF

### Introduction

Erectile dysfunction is inability to achieve and/or maintain penile erection for satisfactory sexual intercourse. When a man is sexually aroused, neural nitric oxide synthase (nNOS) is activated, that causes release of NO, which is further augmented by the release of endothelial nitric oxide synthase (eNOS)<sup>[1]</sup>. Finally NO leads to increase cGMP levels which results in smooth muscle relaxation and vasodilatation that maintains penile erection<sup>[2]</sup>. Detumescence is a result of cessation NO release and breakdown of cGMP by phosphodiesterase. Phosphodiesterase inhibitors Sildenafil and Tadalafil were FDA approved in 1998 and 2003 respectively for successful treatment of ED patients.

McCullum et al.<sup>[3]</sup> Discovered vitamin D in 1922 that cures Rickets. Previously its importance was assumed for bones only but now it has been considered for other organs also including penis. Vitamin D receptor is a steroid receptor, present in almost all the cells and helps in cell differentiation and function<sup>[4,5]</sup>. Vitamin D attached to its receptors, moves to the nucleus where it triggers up the genes and results in transcription of nearby genes also<sup>[6]</sup>.

Vitamin D deficiency is strongly associated with atherosclerotic cardiovascular diseases like peripheral vascular disease, hypertension, metabolic syndrome, coronary artery disease<sup>[7]</sup>. As penile erection is maintained due to normal penile vasculature, ED is used as a marker of systemic vascular disorder<sup>[8,9]</sup>. Normal levels of vitamin D range between 30-80 ng/ml. The Endocrine society defines vitamin D deficiency as Vitamin D <30 ng/ml and severe deficiency if <20ng/ml<sup>[10]</sup>. Patients with severe vitamin D deficiency have increased risk of ED particularly arteriogenic ED and risk decreases if level is >35ng/ml<sup>[11,12]</sup>.

It has been proven that vitamin D act as anti-inflammatory agent and decrease factors IL-1, IL-6, TNF-A, IL-8<sup>[13,14]</sup> involved in inflammation. Oxidative stress of endothelial cells decrease with Vitamin D supplementation and its deficiency also contributes to ED. Molinari et al.<sup>[15]</sup> demonstrated that Vitamin D induces NO production in cultured human umbilical vein endothelial cells through eNOS stimulation. NO is an important factor for maintaining penile erection through vascular dilatation and thus preventing ED. Canguven O et al. recently demonstrated that Vit D treatment improves sexual hormones, metabolic parameters and erectile function in middle-aged Vit-D deficient man<sup>[16]</sup>. Rafiq R, et al. demonstrated that serum Vitamin D status was positively associated with total and bioavailable testosterone levels<sup>[17]</sup>. Pilz et al.<sup>[18]</sup> investigated the effect of Vitamin D supplementation on androgens in men and they observed significant increase in total testosterone, bioactive and free testosterone levels in vitamin D supplemented groups<sup>[18]</sup>.

Although there are many studies showing association between Vitamin D, atherosclerotic disease and ED, till date there is no prospective study evaluating Vitamin D supplementation in patients with ED. Therefore, this study was undertaken to evaluate the effect of Vitamin D supplementation in ED patients with severe Vitamin D deficiency.

## Materials and method

This study was carried out in Department of Urology, S.M.S. Medical College and attached Hospitals between March 2018 to April 2019 after getting approval of the Institutional ethics review board. Patients in the age group 20-60 years presenting with ED and having severe Vitamin D deficiency were enrolled. Patients taking vitamin D, antiandrogens, antipsychotics, antidepressants, antihypertensive, having history of diabetes, prior penile surgery and penile trauma were excluded. Detailed history, physical examination, blood investigations like random blood sugar, complete blood count, serum testosterone, lipid profile, serum Vit D level and International Index of Erectile Function Questionnaire scoring were done.

After taking informed consent from each one, patients were randomized into three groups. First group was treated with Tadalafil 10mg once a day while the second group had Tadalafil 10mg once a day plus Vitamin D 60,000 IU once a week, and third group was given Vitamin D 60,000 IU once a week only. Drugs were given for a specific period of 12 weeks. Efficacy of drugs was evaluated at base line and after 12 weeks on the basis of International Index of Erectile Function Questionnaire scoring.

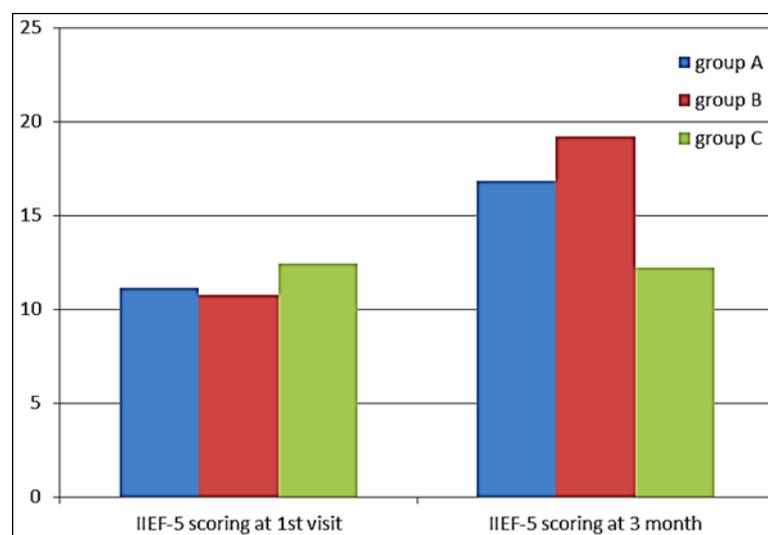
**Statistical analysis:** Data was collected and analyzed by Paired t-test and Anova test. Software used was SPSS version 24.

## Results

The study included 75 patients and three groups were compared regarding improvement of IIEF-5 scoring and toxicity of drugs, used in the study. After 12 weeks of treatment IIEF-5 scoring was nearly same as that of the base line with no significant difference in group C patients. On the other hand, IIEF-5 scoring was significantly improved in group A and B patients ( $P < 0.001$ ). On comparing group A and B patients there was significant improvement in group B compared to group A ( $P < 0.05$ ) as shown in table 1, graph 1.

**Table 1:** Comparison of IIEF score among the study groups

Variables	Group A	Group B	Group C	One-Way ANOVA	Post-Hoc test significant pairs
Age	37.44±10.85	39.08±9.78	37.96±9.66	F=0.171 P>0.05	A Vs B P>0.05 A Vs C P>0.05 B Vs C P>0.05
IIEF-5 scoring at 1 <sup>st</sup> visit	11.12±1.76	10.76±2.4	12.41±2.12	F=4.14P<0.05 (P=0.020)	A Vs B P=0.055 A Vs C P=0.549 B Vs C P=0.008
IIEF-5 scoring at 3 month	16.84±3.6	19.2±3.98	12.21±1.41	F=29.73P<0.001 (P=0.000)	A Vs B P=0.012 A Vs C P=0.000 B Vs C P=0.000
Paired test	t=9.79 P=0.000	t=10.78 P=0.000	t=0.643 P=0.527		



**Graph 1:** IIEF score among the study groups

In all three groups the administered drugs were well tolerated by the patients with no serious side effects and no patient discontinued the prescribed medications. In group A, 6 patients complained of dyspepsia, 4 patients had mild headache, 6 patients had backache and myalgia, and 4 patients had nasal congestion and facial flushing. In group B, 5 patients complained of dyspepsia, 6 patients had mild headache, 4 patients had backache and myalgia and 4 patients had nasal congestion and facial flushing. In group C, 4 patients complained of nausea and dyspepsia. In comparison to group C, group A and group B patients had more side effects

( $P < 0.05$ ), but of mild intensity and prescribed medications were well tolerated. Group A and B patients had no significant difference in side effects ( $P > 0.05$ ).

**Table 2:** Side effects among the study groups

Group	Dyspepsia	Headache	Backache & Myalgia	Nasal Congestion	Total
A	6	4	6	4	20
B	5	6	4	4	19
C	4	0	0	0	4
Total	15	10	10	8	43

## Discussion

In our study 25 (OH) vitamin D measurements was conducted by chemo luminescence assay. A total of 110 ED patients were examined of which 75 patients had severe vitamin D deficiency (68%) and they were enrolled in the study.

Sexual function assessment was done by IIEF-5 (Rosen et al, 1999)<sup>[19]</sup> scoring system which had 5 items: 5, 15, 4, 2 and 7 from IIEF-15 scoring system. IIEF-5 instruments classified ED severity into 5 categories: severe (5 to 7), moderate (8 to 11), mild to moderate (12 to 16), mild (17 to 21) and no ED (22 to 25).

## IIEF-5 scoring system

Over the past 6 months					
1. How do you rate your confidence that you could get and keep an erection?	Very low 1	Low 2	Moderate 3	High 4	Very high 5
2. When you had erections with sexual stimulation, how often were your erections enough for penetration?	Almost never 1	Few times (much less than half the times) 2	Sometimes (about half the times) 3	Most times (more than half the times) 4	Almost always 5
3. During sexual intercourse, how often were you able to maintain your erection after you had penetrated you partner?	Almost never 1	Few times (much less than half the times) 2	Sometimes (about half the times) 3	Most times (more than half the times) 4	Almost always 5
4. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse?	Extremely difficult 1	Very difficult 2	Difficult 3	Slightly difficult 4	Not difficult 5
5. When you attempted sexual intercourse, how often was it satisfactory for you?	Almost never 1	Few times (much less than half the times) 2	Sometimes (about half the times) 3	Most times (more than half the times) 4	Almost always 5

Several studies were conducted in the past which showed mixed result of vitamin D in relation to sexual function. Kidir et al.<sup>[20]</sup> in 2015 suggested that sexual dysfunction in dialysis patients is related to low level of vitamin D. Bellastella and colleagues<sup>[21]</sup> showed no correlation between severity of ED and vitamin D.

Study conducted by Canguven et al.<sup>[16]</sup> suggested improved erectile function score after vitamin D supplementation in vitamin D deficient patients but in contrary Blumberg & colleagues<sup>[22]</sup> did not find any improvement in sexual function after 4 months of vitamin D supplementation in vitamin D deficient patients on hemodialysis. In our study there is significant improvement in sexual function in patients taking vitamin D along with Tadalafil in comparison to Tadalafil alone in vitamin D deficient patients, but there is no improvement in patient taking only vitamin D. In group B patients, after 3 month we continued vitamin D 400IU once a day along with reduced dose of Tadalafil (5 mg OD) and till date there is no deterioration in erectile function, which showed consistency of effect of vitamin D. No severe side effects of the drugs were noted and there was no dropout of patients in our study.

### Conclusions

This study showed that the use of Tadalafil in combination with Vitamin D in Vit D deficient ED patients act better than Tadalafil or Vit. D alone. The combined therapy was well tolerated with no major side effects. However, more studies are needed to identify the best duration of this treatment and larger study of patients before the final conclusion can be made.

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