

ORIGINAL RESEARCH

To evaluate the possible association between vitamin D deficiency and pelvic floor disorders

¹Shivani Sharma, ²Ankit Prabhakar, ³Sudhaa Sharma

¹Department of Obs & Gynae, GMC Jammu, Jammu and Kashmir, India

²Department of Radiology, GMC Srinagar, Jammu and Kashmir, India

³Professor, Department of Obs & Gynae, GMC Jammu, Jammu and Kashmir, India

Corresponding author

Ankit Prabhakar

Department of Radiology, GMC Srinagar, Jammu and Kashmir, India

Email: ankitprabhakar10@gmail.com

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ABSTRACT

Background: The present study entitled 'To evaluate the possible association between vitamin D deficiency and pelvic floor disorders' was conducted in the Department of obstetrics and gynecology over a period of one year. In the present study, 200 women were selected randomly attending OPD clinic or who were admitted in the ward. Women having pelvic floor disorder (PFD) formed Cases and those without PFD were taken as Controls. **Aim:** To evaluate possible association between Vitamin D levels and Pelvic floor disorders. **Material and methods:** 200 females above 40 years of age were selected randomly attending OPD clinic or who were admitted in the ward. Women above 40 years of age with or without PFD are included in the study while Women with pre-existing thyroid disorders, parathyroid or calcium metabolism disorders Women who took medications that interfere with calcium or vitamin D metabolism (diuretics or calcium channel blockers), Women suffering from bone renal adrenal or gastrointestinal disorders. Women with history of ATT intake or antiepileptic drugs or on hormone therapy are not included in the study. **Results:** A total of 200 women above the age of 40 years attending OPD or admitted in the ward of Obstetrics and Gynecology Department. were selected for this study. One hundred women with pelvic floor disorder (PFD) were taken as Cases, while the other one hundred without PFD were taken as Controls. Number of women with normal BMI (18.5-24.9 kg/m²) in Cases was 64%, while in Controls it was 74%, while number of underweight women (<18.5 kg/m²) in Cases was 15% compared to only 1% in Controls. **Conclusion:** Our research strongly suggests a link between Pelvic Floor Disorders (PFD) and Vitamin D deficiency. Early detection of vitamin D deficiency is crucial to initiate timely and adequate treatment, thereby preventing various health issues associated with its deficiency, including PFD.

Keywords: Pelvic floor disorders, pigmentation, muscle strength

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INTRODUCTION

Pelvic floor disorder (PFD) is a major clinical problem in women. It is a group of disorders which includes: pelvic organ prolapse (POP), urinary incontinence (UI) and fecal incontinence (FI). These can occur alone or in combination (Greer WJ *et al.*, 2008). The overall prevalence of PFD in the reproductive age women is 24%, which almost doubles as the age of the women increases, with prevalence being 36-49% after 60 years of age (Nygaard I *et al.*, 2008). The various factors contributing to PFD include multi parity, mode of delivery, instrumental delivery, obesity, collagen defects and menopause being well known risk factors (MacLennan AH *et al.* 2000). It is well known by many epidemiological studies that age is one of the

important causes for PFD. This may be due to the age-related changes in the neuromuscular function and connective tissue changes in the elderly women (Nygaard I *et al.*, 2008). In addition, estrogen increases the activity of enzyme responsible for activating Vitamin D and so declining estrogen levels during menopausal transition could lead to symptoms of Vitamin D deficiency (Buchanan JR *et al.*, 1986).

Vitamin D can be synthesized in sufficient amounts by most vertebrates on adequate exposure to sunlight (UVB rays). Half an hour exposure delivers 50,000 IU of vitamin D in the white complexioned skin. Skin synthesis of vitamin D depends mainly on factors like age, degree of skin pigmentation and amount of UVB reaching the earth's surface. Dietary intake of vitamin D makes a relatively small contribution to the overall

vitamin D status (Chen TC *et al.*, 2007). Since the half-life of 1-25(OH)₂D is only several minutes the more accurate assessment of an individual's vitamin D status is determined through measurement of 25-OHD which has half-life of about 3 weeks (Hollis BW *et al.*, 2007).

The role of vitamin D in muscle strength, neuromuscular function and postural stability has been evaluated in the past studies (Venning G, 2005). Since pelvic floor muscle is also composed of skeletal muscles, it is likely to be affected by the vitamin D levels. A few retrospective studies have shown an association between vitamin D deficiency and PFD (Badalian SS *et al.*, 2010; Parker-Autry CY *et al.*, 2012a). Elderly women are more likely to be vitamin D deficient due to the reduced activity of the skin to convert 25 hydroxycholecalciferol to active form which indicates that vitamin D deficiency could be a precipitating factor for PFD in postmenopausal women (Venning G, 2005). Vitamin D is deemed a worthy factor to consider in the pelvic floor disorder population as well as in postmenopausal women. Treatment of vitamin D insufficiency and deficiency in both premenopausal and postmenopausal women could improve pelvic muscle strength, with a possible reduction in the prevalence of pelvic floor disorders including urinary incontinence.

The overall goal of this study was to evaluate possible association between vitamin D levels and PFD.

MATERIALS AND METHODS

200 females above 40 years of age were selected randomly attending OPD clinic or who were admitted in the ward. Women having pelvic floor disorder (PFD) formed Cases and those without PFD were taken as Controls.

INCLUSION CRITERIA

- Women above 40 years of age with or without PFD.

EXCLUSION CRITERIA

Women with pre-existing thyroid disorders, parathyroid or calcium metabolism disorders. Women who took medications that interfere with calcium or vitamin D metabolism (diuretics or calcium channel blockers). Women suffering from bone renal adrenal or gastrointestinal disorders. Women with history of ATT intake or antiepileptic drugs or on hormone therapy.

STUDY DESIGN

- This study was a prospective case-control (observational) study.
- Informed consent was taken from the subjects.
- A detailed history including educational status, socio-economic background, job status and sunlight exposure was recorded. Any kind of calcium or vitamin D supplementation taken was noted.
- Obstetric history including parity, age at first delivery, mode of delivery, interval between deliveries, institutional/ home delivery was also noted.
- Other relevant details including associated medical illness, prior abdominal/vaginal surgeries were documented. The body mass index was also calculated.
- Pelvic examination was done to diagnose pelvic organ prolapse (POP).
- Urinary leak was demonstrated using the supine stress test and also in standing position.

SAMPLE COLLECTION

- Blood sample was taken from all the subjects.
- About 2 ml sample was collected in a plain test tube without any anticoagulant and was then stored in refrigerator until analysis.

STATISTICAL ANALYSIS

At the end of the study all the data was compiled and analyzed with the help of computer software MS Excel and SPSS version 21.0 of Windows. The data was reputed as proportion and mean (SD) for quantitative and qualitative variables. Univariate analysis (Crude or with 95% CI) was used to repute association between vitamin D levels and risk of PFD. Chi-square was used to evaluate statistical significance. A prevalence of <0.05 was considered significant.

RESULTS

A total of 200 women above the age of 40 years attending OPD or admitted in the ward of Obstetrics and Gynecology Department. were selected for this study. One hundred women with pelvic floor disorder (PFD) were taken as Cases, while the other one hundred without PFD were taken as Controls. Following observations were made in the study.

Table 1: Group comparison for age distribution of patients

Age (years)	No. of Patients (%)	
	Case (with PFD)	Control (without PFD)
≤45	43	52
46-55	34	34
56-65	16	10
>65	07	04
Mean age ± SD	49.71 ± 9.16	47.67 ± 7.97
p-value	0.095	

Table 2: Menopausal status

Menopausal status	No. of Patients	
	Case (with PFD)	Control (without PFD)
Postmenopausal	43	35
Premenopausal	57	65
p-value	0.251	

Table 3: Group comparison for BMI (kg/m²)

BMI (kg/m ²)	Cases (with PFD)		Controls (without PFD)	
	No.	%	No.	%
<18.5 (underweight)	15	15.00	01	1.00
18.5 – 24.9 (normal)	64	64.00	74	74.00
25.0 – 29.9 (overweight)	20	20.00	23	23.00
≥30 (obese)	01	1.00	02	2.00
Total	100	100.00	100	100.00
Mean BMI ± SD	23.83 ± 3.64		23.26 ± 3.82	
(Range) kg/m²	(16.4 – 30.3)		(18.4 – 38.7)	
Statistical inference (Unpaired t test)	t=2.65; p=0.282 not significant			

Number of women with normal BMI (18.5-24.9 kg/m²) in Cases was 64%, while in Controls it was 74%, while number of underweight women (<18.5 kg/m²) in Cases was 15% compared to only 1% in Controls. Mean BMI in both Cases and Controls was within normal range. However, the difference between the two was statistically not significant (p=0.282).

Table 4 Difficult delivery

Difficult delivery	No. of Patients	
	Case (with PFD)	Control (without PFD)
Yes	05	0
No	95	100
p-value	0.020	

History of complications during delivery were reported in 5% Cases and nil in Controls, the difference however was statistically not significant (p=0.020).

In Cases, mean vitamin D level in women with SUI was 8.74 ng/mL, while in those without SUI was 9.93 ng/mL. The difference in mean vitamin D level was observed to be statistically not significant (p=0.57).

DISCUSSION

Pelvic Floor Disorder (PFD) is a major clinical problem in women. The various factors contributing to PFD include Multi parity, Mode of delivery, Instrumental delivery, Obesity, Collagen defects and menopause being well known risk factors. (MacLennan AH et al 2000). Recent literature has suggested the role of Vitamin D Deficiency as contributory to PFD. The present study was conducted in the post graduate department of obstetrics and gynecology over a period of one year with the aim to evaluate possible association between Vitamin D levels and Pelvic floor disorders. Two hundred (200) females above 40 years of age were selected randomly attending OPD clinic or admitted in ward. Women having PFD formed cases & those without PFD formed controls. In our study of 200 women, maximum no. of women were in the age group of 40-49 years in cases with PFD (56%) and controls

without PFD (65%) with the mean age of 49.71 ± 9.16 in cases and 47.67 ± 7.97 in controls. In our study, Patients were classified into four groups based on BMI. Group 1 with BMI <18.5kg/m² (underweight), group 2 between 18.5-24.9 kg/m²(normal), group3 between 25-29.9 overweight) and group 4 >30 kg/m² (obese).

Maximum no. of patients had normal BMI (18.5-24.9) seen in 64% in cases with PFD and 74% in controls without PFD. In our study, Maximum no. of illiterate women formed cases with PFD (53%) while control without PFD group had literate women (63%). In cases with PFD, literate patients showed higher vitamin D levels (10.79 ± 5.35 ng/ml) as compared to illiterate persons (8.95 ± 4.95 ng/ml), while in case of control group, the higher vitamin D levels were recorded in illiterate patients (23.03 ± 8.57 ng/ml). The difference between the two groups was found statistically significant. A better educational level correlates with better living conditions and may indirectly improve the quality of diet. Also the more educated females are more likely to take vitamin D supplements. Vitamin D deficiency prevails in epidemic proportion all over the Indian subcontinent with a prevalence of 70-100% in the general population (Ritu G *et al.*, 2014).

Our study is consistent with study by Navaneethan et al (2015) in which vitamin D level were significantly

lower in women with PFD (77.5%). In another study by Harinarayan CV et al 2004, found, , 82% cases with PFD had insufficient vitamin D levels. It is found that vitamin D deficiency is more prevalent in women with pelvic floor disorders. Hence, it is found that vitamin D deficiency is more prevalent in women with pelvic floor disorders.

CONCLUSION

Globally, Pelvic Floor Disorders (PFD) are one of the largest unaddressed issues in women's healthcare today. It is common and undermines the quality of life(QOL) of atleast one-third of adult women of all ages. The development of PFD is multifaceted and can be influenced by multiple factors like neurological, emotional, behavioral, nutritional, and/or environmental. Treatment is associated with morbidity and may not be totally satisfactory. Prevention of PFD when possible should be the primary goal. Our findings strongly suggest association of Pelvic Floor Disorders (PFD) with Vitamin D deficiency. There is a need for early detection of vitamin D deficiency so that adequate treatment could be started at the earliest order to prevent various morbidities associated with its deficiency including PFD. In a country like India where vitamin D deficiency is common, diagnosing VDD could have a profound effect on the health of the nation.

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