

Vitamin D and Pelvic Floor Disorders

Vitamin D is a fat-soluble vitamin whose active metabolite (1,25-hydroxyvitamin D [1,25(OH)₂D]) plays a vital role in calcium homeostasis and thus is important for overall health of all individuals. Vitamin D insufficiency affects up to 80% of reproductive age women.^[1] Factors that affect Vitamin D status include ethnicity (African-Americans individuals and with darker skin),^[2,3] intake of Vitamin D supplementation, obesity, seasonality (lower levels are found after winter months), and regional location (lower levels found in areas of higher latitudes and lesser sunlight).^[2] Insufficient Vitamin D status has received increased attention and has been shown to be associated with various extraskeletal medical conditions including cardiovascular disease, diabetes, asthma, and preeclampsia.^[4-6] However, the most notable effect of insufficient Vitamin D has been on musculoskeletal health. Observational and randomized studies have confirmed that lower levels of serum 25-(OH)D are associated with decreased postural stability and increased risk of falls.^[7,8] In addition, human and animal *in vitro* studies consistently demonstrate a relationship between Vitamin D and muscle growth and function,^[2,3] though the exact mechanism is yet to be clearly elucidated. Level I studies exploring the role of Vitamin D in skeletal muscle strength and functional efficiency are inconclusive. Despite discrepant conclusions, there is significant plausibility behind the hypothesis that Vitamin D has an important role in skeletal muscle function and efficiency.

The female pelvic floor is a complex component of the body whose global function is reliant on delicate relationships between musculoskeletal connections to pelvic bones that support the abdominal cavity and pelvic viscera. Disorders of the pelvic floor include urinary incontinence (UI), fecal incontinence (FI), pelvic organ prolapse, and other storage and emptying problems of the lower urinary and gastrointestinal tracts. Pelvic floor muscle weakness is clinically observed in women with pelvic floor disorder (PFD) symptoms and thus may be impacted by insufficient serum Vitamin D. The Vitamin D receptor has also been identified in the detrusor wall, thus its insufficient level may impact bladder function also.

In vitro skeletal muscle cell, culture studies have demonstrated that Vitamin D may affect muscle strength by influencing cell proliferation and differentiation and muscle fiber size. It also protects against muscle degradation by preventing fatty degeneration, insulin resistance, and arachidonic acid mobilization. Hence, Vitamin D may play a role in the efficiency of muscle function that is distinct from the role of calcium in muscle contractility.

Prospective cohort or randomized studies investigating the relationship between Vitamin D nutritional status and PFD symptoms are lacking. However, Jen-Tzer Gau reported few case studies of resolution of UI with Vitamin D supplementation. Thus, more follow-up studies and randomised control trials are needed for confirmation and documentation.

Sudhaa Sharma, Neelam Aggarwal¹

Department of Obstetrics and Gynaecology, GMC, Jammu, Jammu and Kashmir, ¹Department of Obstetrics and Gynaecology, PGIMER, Chandigarh, India
E-mail: sudhaagynaec@gmail.com

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