EDITORIAL

REEVALUATING THE ROLE OF SERUM VITAMIN D LEVELS IN A RESOURCE-LIMITED COUNTRY – THE CASE OF PAKISTAN

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This article may be cited as: Shafi M. Reevaluating The Role Of Serum Vitamin D Levels In A Resource-Limited Country – The Case Of Pakistan. J Med Sci 2025 April - June;33(2):59-60

Vitamin D deficiency has emerged as a global public health issue with wide-ranging implications on musculoskeletal, immunological, and even psychological health. While much of the global discourse has focused on the epidemiology of vitamin D deficiency in temperate regions and its implications on bone metabolism, emerging evidence suggests a paradoxical and widespread deficiency in sun-rich developing countries, including Pakistan. Despite abundant sunlight, Pakistan continues to report alarmingly low serum vitamin D levels across all age groups and socioeconomic strata.

Several population-based and hospital-based studies have reported a prevalence rate of vitamin D deficiency ranging from 60% to over 90% in various cohorts of the Pakistani population, including healthy individuals, pregnant women, children, and hospitalized patients. The etiology appears multifactorial; cultural clothing practices, limited outdoor exposure, urban indoor lifestyles, and poor nutritional intake are commonly cited. However, emerging hypotheses suggest a deeper biological underpinning: altered vitamin D metabolism due to high-affinity vitamin D binding receptors and variability in genetic polymorphisms associated with the vitamin D receptor (VDR) in South Asian populations, including Pakistan, could be playing a crucial role in this epidemic.[1, 2]

The normal physiological range of serum vitamin D levels (25-hydroxyvitamin D) has not been locally validated in Pakistan. Most diagnostic cutoffs are based on international consensus from Western populations, which may not be entirely applicable to the South Asian genetic and environmental milieu. This lack of region-specific reference ranges raises concerns about overdiagnosis, underdiagnosis, and misclassification of deficiency and insufficiency, which can affect both clinical management and public health policymaking.[3] Furthermore, vitamin D plays an immunomodulatory role beyond its skeletal functions, especially in regulating inflammatory responses, autoimmune diseases, and infectious conditions — a vital consideration in resource-limited healthcare systems with high burdens of tuberculosis, hepatitis, and respiratory infections.[4, 5]

Given the limited resources and constrained healthcare budgets in countries like Pakistan, the integration of cost-effective screening, supplementation strategies, and fortification policies is urgently needed. However, such interventions must be guided by high-quality, locally relevant data. Despite the high prevalence, there is still no nationally representative data on vitamin D levels in the general Pakistani population. Most studies are limited in scope, geographical coverage, and population diversity.[6]

There is also a pressing need to investigate population-level determinants of vitamin D deficiency, including genetic predispositions, dietary patterns, and sun exposure behavior. Clinical trials exploring optimal dose-response relationships for supplementation and outcome-based endpoints are lacking. In this regard, Pakistan should prioritize establishing a national task force or registry to conduct cross-sectional surveillance and standardize vitamin D diagnostics in collaboration with universities, public health authorities, and international partners.

In conclusion, Pakistan presents a unique case in global vitamin D research — a paradox of high sunlight but high deficiency. A deeper understanding of the biological, cultural, and systemic factors contributing to this epidemic is essential. Local research initiatives must be promoted to revise reference ranges, inform screening guidelines, and develop affordable preventive interventions. Until then, a cautious but proactive public health approach should be adopted, particularly targeting vulnerable groups such as women of reproductive age, children, and the elderly.

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