



ASSOCIATION BETWEEN CHRONIC URTICARIA AND VITAMIN D- AN OBSERVATIONAL STUDY.

Dermatology

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ABSTRACT

Background: Chronic urticaria (CU) is a debilitating skin condition characterized by recurrent wheals and itching lasting more than six weeks, often without an identifiable cause. Emerging evidence suggests that vitamin D may play a role in immune modulation and mast cell regulation, implicating its deficiency in the pathogenesis of CU. **Objective:** To evaluate the association between chronic urticaria and serum vitamin D levels. **Methods:** This observational cross-sectional study included 50 patients clinically diagnosed with CU and 50 age- and sex-matched healthy controls. Serum 25-hydroxyvitamin D levels were measured using chemiluminescent immunoassay. Levels were categorized as deficient (<20 ng/mL), insufficient (20–29 ng/mL), or sufficient (≥ 30 ng/mL). Statistical analysis was performed using SPSS software. **Results:** The mean serum vitamin D level was significantly lower in CU patients (14.5 ± 5.2 ng/mL) compared to controls (24.8 ± 6.4 ng/mL) ($p < 0.001$). Vitamin D deficiency was present in 78% of CU patients versus 24% of controls ($p < 0.001$). Gender distribution was not significantly different between the groups ($p = 0.38$). **Conclusion:** A significant association exists between chronic urticaria and vitamin D deficiency. These findings support the potential role of vitamin D screening and supplementation in the management of CU. Further large-scale, interventional studies are warranted.

KEYWORDS

Chronic urticaria, vitamin D deficiency, serum 25(OH)D, immune modulation, mast cell

INTRODUCTION

Urticaria is characterized by the sudden appearance of transient wheals, angioedema, or both, due to increased vascular permeability in the superficial dermis or submucosa. Wheals typically resolve within 24 hours, whereas angioedema may persist for 2–3 days. Urticaria may be acute (<6 weeks) or chronic (≥ 6 weeks). Urticaria affects 8–22% and has a lifetime prevalence of ~1.4% and point prevalence of ~0.7% [1,2].

The central effector cell in urticaria is the mast cell, which is activated on exposure to allergens, physical stimuli, or idiopathic factors. Mast cells release mediators such as histamine, leukotrienes, prostaglandins, TNF- α , and interleukins which lead to vasodilation, increased vascular permeability, and plasma leakage, resulting in wheals and angioedema [1,3,4]. Histamine, acting on H1 receptors, is the key mediator responsible for pruritus, erythema, and edema. [1,4].

Vitamin D, a fat-soluble vitamin, exists in two forms: D2 (ergocalciferol) and D3 (cholecalciferol). D3 is synthesized in the skin upon exposure to ultraviolet B (UVB) light and can also be obtained from dietary sources such as fatty fish, liver, and egg yolk [5,6]. After hydroxylation in the liver and kidneys, vitamin D becomes its active form, 1,25-dihydroxyvitamin D, which exerts widespread effects through nuclear vitamin D receptors (VDRs) [5].

In Chronic urticaria, vitamin D is thought to reduce mast cell activation and suppress Th1 and Th17 responses while modulating Treg function and decreasing IgE production [7–9]. It also affects mast cell survival and degranulation, potentially influencing the chronicity and severity of urticaria [10,11].

MATERIALS AND METHODS

Study Design– Observational cross sectional.

Study Setting– Dermatology outpatient department, RIMS.

Study Duration– 3 months.

Study Population–

Cases ($n = 50$): Patients clinically diagnosed with chronic urticaria (duration > 6 weeks).

Controls ($n = 50$): Age- and sex-matched healthy individuals without history of Chronic urticaria or chronic inflammatory/autoimmune disease.

INCLUSION CRITERIA-

1. Patients aged 18–60 years with a diagnosis of chronic urticaria (>6 weeks)
2. Willingness to participate and give informed consent

EXCLUSION CRITERIA-

1. Patients with acute urticaria.
2. History of recent vitamin D supplementation (past 3 months)
3. Patients with known autoimmune disorders, renal or hepatic disease
4. Pregnant and lactating women

A structured proforma was used to collect demographic data (age, sex), clinical history (duration, frequency, triggers of urticaria), and laboratory investigations. The serum 25(OH) vitamin D level was measured using standard chemiluminescent immunoassay. Levels were categorized as – Deficient : < 20ng/ml

Insufficient : 20-29ng/ml

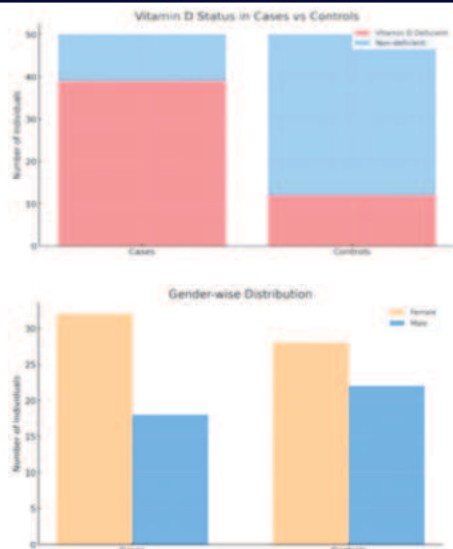
Sufficient : ≥ 30 ng/mL

Healthy individuals with no history of urticaria or chronic skin disease were recruited as controls. Vitamin D levels were assessed similarly. Data were entered in Microsoft Excel and analyzed using SPSS. Mean \pm SD of serum vitamin D levels were compared between groups. Chi-square test was used for categorical variables. A p-value < 0.05 was considered statistically significant.

RESULT

In this observational study, the mean serum vitamin D level in patients with chronic urticaria was found to be 14.5 ± 5.2 ng/mL, which was significantly lower than the mean level in healthy controls, measured at 24.8 ± 6.4 ng/mL. This difference was statistically significant, with a p-value < 0.001, indicating a strong association between lower vitamin D levels and chronic urticaria. When analyzing the prevalence of vitamin D deficiency, 78% (39 out of 50) of the chronic urticaria patients were found to be vitamin D deficient, compared to only 24% (12 out of 50) in the control group. This difference was also highly significant ($p < 0.001$), further supporting the association between vitamin D deficiency and chronic urticaria. Gender-wise distribution showed that among the chronic urticaria patients, 32 (64%) were females and 18 (36%) were males, whereas in the control group, 28 (56%) were females and 22 (44%) were males. The difference in gender distribution between the two groups was not statistically significant ($p = 0.38$), indicating that gender did not significantly influence the occurrence of chronic urticaria in this study population.

Group	Female	Male	Total
Cases	32	18	50
Controls	28	22	50
Group	Mean Vitamin D Level (ng/mL)		Standard Deviation
Cases	14.5		5.2
Controls	24.8		6.4



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DISCUSSION

The results of this study indicate a significant association between vitamin D deficiency and chronic urticaria. The majority (78%) of CU patients were vitamin D deficient compared to only 24% of the healthy controls. This statistically significant finding ($p < 0.001$) supports the hypothesis that vitamin D plays a role in the pathogenesis or persistence of CU.

While the gender distribution showed more females in the CU group, this was not statistically significant, although previous literature supports a higher prevalence of autoimmune and inflammatory conditions in females. The lower serum 25(OH)D levels observed in CU patients suggest that vitamin D deficiency may play a contributory role in the pathophysiology of the disease. The beneficial effects of vitamin D supplementation observed in several studies further support its potential as a therapeutic adjunct.

Several mechanisms may explain the role of vitamin D in CU:

- Mast cell stabilization: Vitamin D may inhibit mast cell activation and reduce histamine release, which is central to the pathogenesis of urticaria.
- Immune modulation: By promoting regulatory T cell function and suppressing pro-inflammatory cytokines such as IL-6 and TNF- α , vitamin D may help mitigate autoimmune and inflammatory responses.
- Autoimmunity link: Up to 45% of CU cases are believed to have an autoimmune basis, and vitamin D has been shown to modulate autoimmune pathways by downregulating autoantibody production.

CONCLUSION

This study demonstrates a strong association between chronic urticaria and vitamin D deficiency. Screening for vitamin D levels in CU patients should be considered, especially in those who are unresponsive to standard treatments. Vitamin D supplementation may be a potential adjunctive therapy. Larger, randomized controlled trials are needed to determine the therapeutic impact of correcting vitamin D deficiency in chronic urticaria.

LIMITATIONS

- Small sample size
- Lack of follow-up to assess improvement post-vitamin D supplementation
- Gender imbalance in control group

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