

# The Evaluation of Vitamin D Deficiency in Patients with Nasal Polyposis

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## Abstract

**Background:** Despite performing surgical treatment, chronic rhinosinusitis coexisting with polyposis has recurrent episodes. Considering the strong association between nasal polyposis and asthma, the role of Vitamin D deficiency has been demonstrated in most of the asthma attacks.

**Aim:** To investigate the serum level of 25-hydroxy vitamin D in chronic rhinosinusitis among the patients with and without nasal polyposis.

**Methods:** A retrospective review from 36 cases was conducted. Patients were selected from a computerized rhinoplasty database of operative cases. The database was used to extract a subset population that had received the dome cut procedure and had follow-up data for 6 months or more after surgery. Patient satisfaction, physician evaluation, physical examination, blinded comparison of preoperative and postoperative photographs, and revision surgery necessitation were also analyzed in this review of results and complications.

**Results:** We found severe vitamin D deficiency in 47.4% of the polyposis patients, while this rate decreased to 13.3% in the control group ( $p=0.004$ ). Based on the age group classification, there was no statistically significant difference in terms of the vitamin D deficiency between the polyposis patients and control group ( $p=0.66$ ).

**Conclusion:** Vitamin D deficiency can be associated with the prevalence of nasal polyposis in the patients affected by chronic rhinosinusitis. Further studies can prove the essential role of vitamin D in pathogenesis of nasal polyposis.

**Conflicts of Interest:** The Authors declare no conflicts of interest.

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## Introduction

There is no distinct etiology for nasal polyposis. Although the medical and surgical treatment methods are available, the frequent recurrence is a common event. Reported relapse prevalence rate in nasal polyposis is around 60%, which needs the revision surgery in 47% of the cases (1). The coexistence of asthma and aspirin intolerance in nasal polyposis (samter

triad) increased the recurrence rate up to 36% to 96% (2, 3).

In addition to the essential role of vitamin D in calcium hemostasis and deposition of calcium in bones, it is considered as an important factor for balancing the immune system.

Immune cells, lymphocytes, antigen-presenting cells, intestinal epithelial cell, and renal cells contain vitamin D receptor. Beside the

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paracrine role in innate and acquired immunity, these cells are able to synthesis the active form of vitamin D (4).

According to Laksi research, the level of vitamin D changes during the year and the lowest concentration is represented in winter, which is associated with the increased respiratory infection (5). Several studies have indicated the link between decreasing level of vitamin D and the rising rate of asthma attack (6, 7).

Considering the 29% prevalence rate of asthma in the polyposis patients (3); we analyzed the level of vitamin D in the nasal polyposis cases.

## Methods

In this cross-sectional study, 38 patients with nasal polyposis and 38 rhinoplasty patients without polyposis who were referred to otorhinolaryngology department of Loghman Hakim hospital, Shahid Beheshti University of Medical Sciences, during 2015-2016 were enrolled. Also, they had no systemic disease.

The patients with any mass or antrochoanal polyp were excluded from the study. The serum level of vitamin D in all cases was detected using immunoassay examination. The basic information including demographics, the history of asthma, and aspirin intolerance were gathered in questionnaires.

In order to determine the severity of vitamin D deficiency, vitamin D levels were classified into three categories as follows: vitamin D deficiency, vitamin D insufficiency, and sufficient vitamin D that were represented as serum vitamin D level of less than 10 nanograms per deciliter (ng/dL), 11-30 ng/dL, and higher than 30 ng/dL, respectively (8). The medical ethics committee of Shahid Beheshti University of Medical Sciences approved this study. We obtained written informed consent from the eligible patients.

Quantitative variables were presented with mean  $\pm$  standard deviation, and then analyzed using independent t test and Mann – Whitney U

test (the normality of data was not met). The chi-square test was applied for qualitative variables. Also, statistical analysis was performed using spss 18.0 (spss Inc., Chicago, IL) and statistical significance was set as p-value  $<0.05$ .

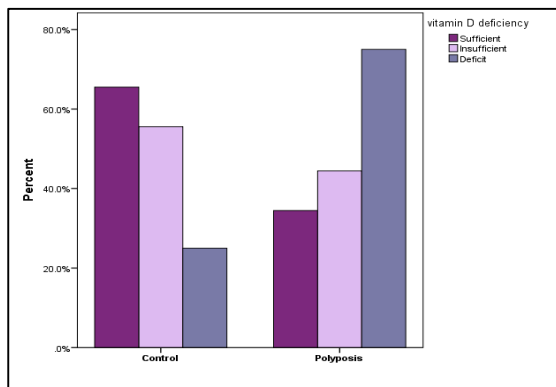
## Results

In this study, a total of 76 patients including 32 male and 44 female, were enrolled. The patients were classified into two groups as those with and without nasal polyposis. There was no significant statistically difference between both genders ( $p=0.49$ ). The mean age of the polyposis patients was  $43.47 \pm 12.24$  years old and in patients without polyposis was  $32.18 \pm 9.87$  years old, which represented a significant statistically difference ( $p<0.001$ ).

The majority of the participants' ages were ranged from 31 to 50 years old ( $n=31$ , 40.8%). The average level of vitamin D was compared between two groups, which was not significantly different (polyposis group:  $24.47 \pm 15.51$  ng/dL vs non polyposis group:  $30.03 \pm 16.4$  ng/dL,  $p=0.13$ ). Considering the classification of vitamin D levels; sever vitamin D deficiency ( $\leq 10$  ng/dL) was diagnosed in 18 polyposis patients (47.4%), and 5 cases (13.2%) from the other group, who were without polyposis. This difference was statistically significant ( $p=0.004$ ) (Figure.1).

The patients were categorized into three groups as follows: less than 30 years old ( $n=28$ , 36.8%), 30-50 years old ( $n=31$ , 40.8%), and more than 50 years old ( $n=17$ , 22.4%). Frequency percentages of vitamin D deficiency were 28.8%, 32.3%, and 29.4%, respectively, which indicated no statistically significant difference ( $p=0.66$ ).

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**Figure 1:** Comparison of vitamin D deficiency frequency between polyposis patients and control group.

The association between gender and frequency percentage of vitamin D deficiency was not indicated ( $p=0.81$ , 59.4% male vs 63.6% female). The nasal polyposis concomitant with asthma ( $n=10$ , 26.3%) was detected in 5 patients (50%) with vitamin D deficiency, 3 patients (30%) with vitamin D insufficiency, and 2 cases (20%) with sufficient vitamin D, and in comparison with the nasal polyposis patients who were without asthma, there was no significant difference ( $p=0.95$ ).

Also, 7 cases (18.4%) of polyposis patients were affected by aspirin intolerance. There was no significant statistically difference in vitamin D deficiency diagnosis between the patients with and without aspirin intolerance (85.7% vs 62.3%,  $p=0.41$ ). We found 13.1% patients with samter's triad affected by vitamin D deficiency, which was not statistically different ( $p=0.740$ ).

## Discussion

The association between vitamin D deficiency and the severity of asthma has been proved in different studies (6, 7). Considering the association between asthma and polyposis (3); we analyzed the relationship between vitamin D level and polyposis.

Accordingly, we found a significant difference in vitamin D deficiency between polyposis the patients and control group participants (47.4%

vs 13.2%,  $p=0.004$ ), while the mean level of vitamin D was not significantly different between the two groups.

Wang's study showed that, there was a significant difference between the level of vitamin D in the polyposis patients and sinusitis cases without polyposis ( $21.4 \pm 5.7$  vs  $28.6 \pm 6.2$ ) (9), which confirmed the results of our work showing that the incidence of severe vitamin D deficiency is higher in the polyposis cases compared to the patients without polyposis (45.5% vs 6.3%).

According to Dr. Heshmat's study, similar to our study, there was no significant difference in vitamin D level among various age groups. (10). In Heshmat's study, 47.2% was accounted for vitamin D deficiency in less than 50 years old patients, 45.7% for 50-60 years old, and 44.2% for the patients who were older than 60 years old. Moreover, no significant difference in vitamin D deficiency was illustrated in both genders. According to Muligan's study, in comparison with control group or CRSsNP cases, the patients who are affected by CRSwNP or AFRS represent the increased number of dendritic cells and declined level of 25 hydroxy vitamin D. As a result of the essential role of DCs in regulating Th1/Th2 skewing, they can be introduced as the mediators of the Th2 skewing, observed in CRS with polyposis (11). Vitamin D facilitates the induction of T regulatory (12), extracellular matrix edema, and tissue remodeling, and its deficiency lead to down regulation of T regulatory and TGF-B in the polyposis patients. There was no statistically significant association between vitamin D deficiency in the patients affected by asthma or samter's triad; however, as a result of inadequate subjects, the results were not valid to evaluate these variables

## Conclusion

In conclusion, vitamin D deficiency can affect the immune response to antigens. Therefore,

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additional studies are needed to evaluate the effects of corrected vitamin D deficiency on the prophylaxis of polyposis and the decreased recurrence rate.

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### Conflicts of Interest

The authors declare no conflicts of interest.

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### Ethics

This study was approved by the “Ethics Committee of Shahid Beheshti University of Medical Sciences (Tehran, Iran)”; Registration Code: IR.SBMU.RETECH.REC.1399.531.

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