

## Evaluation of Relationship between Vit D Level and Rhinosinusitis: An Institutional Based Study

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### ABSTRACT

**Background:** Chronic Rhinosinusitis (CRS) places a relatively large socioeconomic burden on developed nations, yet remains a difficult disease to treat. Vitamin D3 (VD3) deficiency is reported to be associated with increased incidence of allergic airway diseases. The ability of VD3 to augment innate and adaptive immune responses has sparked interest in its immunologic role in allergy. The objective of the present study is to evaluate the relationship between serum vitamin D level and Chronic Rhinosinusitis (CRS).

**Materials & Methods:** A total of 25 patients with Chronic Rhinosinusitis were enrolled and were labelled as study group. Also, 25 healthy subjects without history of sinusitis and no endoscopic evidence of inflammatory sinus disease were enrolled as control group. Complete demographic details of all the patients were obtained. Blood samples were obtained from all the patients and were sent to laboratory for assessment of Vitamin D levels. In the laboratory, ELISA technique was used for assessment of serum Vitamin D levels. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

**Results:** Mean Vitamin D levels of the study group patients was found to be 31.8 nmol/L and that of control group were found to be 43.2 nmol/L respectively. Vitamin D levels were significantly lower in study group as compared to control group.

**Conclusion:** Vitamin D levels are significantly altered in Chronic Rhinosinusitis patients. However; their role in pathogenesis of the disease need further exploration.

**Key words:** Vitamin D, Rhinosinusitis.


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### INTRODUCTION

Chronic rhinosinusitis (CRS) is one of the most common diseases affecting people all over the world due to inflammation of the mucosal lining of the nose and paranasal sinuses. There is no specific long-term treatment for CRS, but different drugs and modalities are used to control the disease and decrease the attacks. Recent guidelines defined CRS on the basis symptoms, endoscopic examination, and radiological finding.<sup>1-3</sup> Pathological explanations of CRS are still unclear but most of the theories refer CRS to the interaction between host (human body) and the surrounding environment interaction. CRS can be presented in two forms or phenotypes: chronic rhinosinusitis without nasal polyps (CRSsNP) and chronic rhinosinusitis with nasal polyps (CRSwNP).<sup>4</sup>

Vitamin D3 (VD3) status is traditionally linked with rickets in children and osteomalacia in adults. Vitamin D3 (VD3) levels have

been recently found to be responsible for a number of immunological, anti-inflammatory and anti-infectious roles. Some studies reported that some forms of allergic fungal rhinosinusitis (AFRS), occurs more commonly in patients who are more susceptible to VD3 deficiency.<sup>5</sup> It is a major fighter of inflammation, plays a critical role in prevention and treatment of asthma, and plays a major role in cases of chronic sinusitis and sinus infection.<sup>6</sup> Hence; the present study was planned for evaluating the relationship between Vitamin D levels and Rhinosinusitis.

### MATERIALS & METHODS

The present study was conducted with the aim of evaluating the relationship between Vitamin D levels and Rhinosinusitis. Ethical approval was obtained from institutional ethical committee and

written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 25 patients with Chronic Rhinosinusitis (CRS) were enrolled and were labelled as study group. Also, 25 healthy subjects without history of sinusitis and no endoscopic evidence of inflammatory sinus disease were enrolled as control group. Complete demographic details of all the patients were obtained. Blood samples were obtained from all the

patients and were sent to laboratory for assessment of Vitamin D levels.

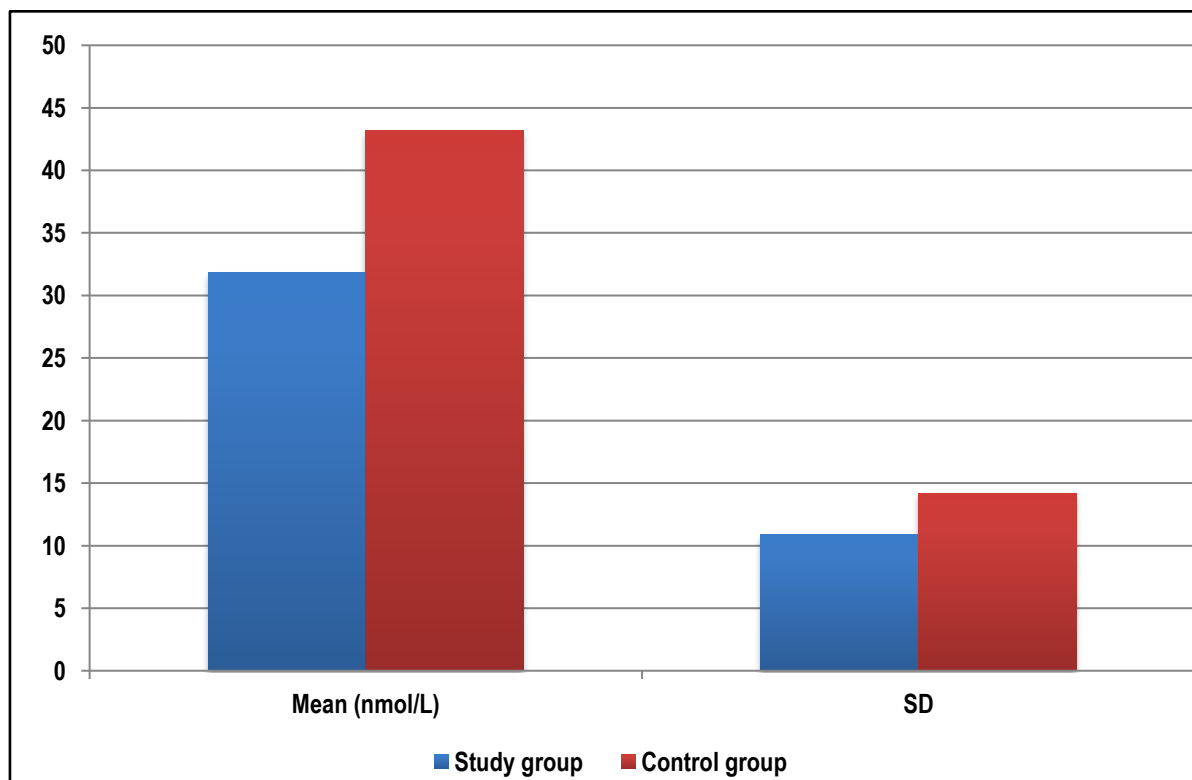
In the laboratory, ELISA technique was used for assessment of serum Vitamin D levels. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi- square test and student t-test was used for assessment of level of significance.

**Table 1: Comparison of demographic data**

Parameter		Study group	Control group
Age group (years)	Less than 35	8	7
	35 to 50	13	15
	More than 50	4	3
Mean age (years)		34.3	35.1
Gender	Males	15	13
	Females	10	12

**Table 2: Comparison of Vitamin D levels**

Vitamin D levels	Study group	Control group
Mean (nmol/L)	31.8	43.2
SD	10.9	14.2
t-value		-15.815
p-value		0.001



**Graph 1: Comparison of Vitamin D levels**

## RESULTS

A total of 25 patients with Chronic Rhinosinusitis (CRS) and 25 healthy subjects with no history of Rhinosinusitis were included. Mean age of the patients of the study group and the control group were found to be 34.3 years and 35.1 years respectively. There were 15 males and 10 females in study group, while there were 13 males and 12 females in control group. There was no statistically significant difference between the groups in terms of age and gender, hence the groups are age and gender matched and comparable. In the present study, mean Vitamin D levels of the study group patients was found to be 31.8 nmol/L and that of control group were found to be 43.2 nmol/L respectively. Vitamin D levels were significantly lower in study group as compared to control group.

## DISCUSSION

The Pathological explanations of CRS are still unclear but most of the theories refer CRS to the interaction between host (human body) and the surrounding environment interaction. mucosal inflammation leads to ciliary dysfunction and ostial obstruction, this creates a stagnant pool of secretions within the sinonasal cavities that is ideal for viral, bacterial, and/or fungal growth. Recent evidence suggests that vitamin D promotes anti-inflammatory effects in human sinonasal epithelial cells, and it is also a potent regulator of the innate and adaptive immune systems.<sup>7-9</sup> Hence; the present study was planned for evaluating the relationship between Vitamin D levels and Rhinosinusitis.

Stokes PJ et al conducted a systematic review of the relationship among serum vitamin D levels, CRS phenotype, and disease severity by using outcome assessments. A systematic search was performed by using the PubMed, MEDLINE, and EMBASE databases. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were followed. Studies that measured serum vitamin D levels and correlated the measurements to any subtype of CRS (with or without nasal polyps) were included for qualitative analysis. Seven articles were included (four prospective and three retrospective studies), with a total of 539 patients. There were significantly lower vitamin D levels in the polypoid phenotypes of CRS compared with controls. Low vitamin D levels were often associated with an increased degree of inflammation. The available evidence indicated that there is a significant relationship between low vitamin D levels and polypoid CRS phenotypes.<sup>10</sup>

Previous reports have shown that T cells, B cells, dendritic cells (DCs), monocytes, and macrophages are all influenced by the regulation of  $1,25(\text{OH})_2\text{D}_3$ .  $1,25(\text{OH})_2\text{D}_3$  inhibits T-cell proliferation; facilitates induction of Foxp3<sup>+</sup> T regulatory (Treg) cells; suppresses the differentiation, maintenance, bioactivity, and transcription of Th17 cells; and induces the switch from Th1 to Th2 by decreasing the Th1 response via regulation of antigen presenting cells and enhancing Th2 cell development. Additionally,  $1,25(\text{OH})_2\text{D}_3$  inhibits the proliferation and induces apoptosis of activated B cells, and it inhibits plasma cell differentiation and immunoglobulin secretion, including IgE secretion. The effect of  $1,25(\text{OH})_2\text{D}_3$  on DCs is more complicated.  $1,25(\text{OH})_2\text{D}_3$  interferes with the differentiation of DCs from human monocytes, and DCs differentiated in the presence of  $1,25(\text{OH})_2\text{D}_3$  showed inhibited immunostimulatory capacity. Thus,  $1,25(\text{OH})_2\text{D}_3$  leads to the development of DCs with tolerogenic

properties, as immature DCs promote T-cell tolerance; whereas, mature DCs activate naïve T cells.<sup>11-15</sup>

In the present study, mean Vitamin D levels of the study group patients was found to be 431.8 nmol/L and that of control group were found to be 43.2 nmol/L respectively. Significant results were obtained while comparing the mean Vitamin D levels among the patients of the study group and the control group. Restimulia L et al assessed the relationship between vitamin D with allergic rhinitis (AR) and total nasal symptom scores (TNSS). A group of 30 subjects were recruited using consecutive sampling. Levels of serum vitamin D were measured using electrochemiluminescence immunoassay (ECLIA) method while the total nasal symptom scores were obtained by accumulating all the nasal symptoms. Data of serum vitamin D levels and TNSS were analysed statistically with the Pearson correlation test. It was found that the mean of serum  $25(\text{OH})$  vitamin D levels (9.13 ng/mL) of the AR group was significantly lower than the non-AR group (26.22 ng/mL) ( $P = 0.000$ ). The vitamin D cut-off points which correlated to AR were about 12.83 ng/mL. A Pearson correlation test found a strong, negative correlation between vitamin D levels and TNSS. There was a strong, negative correlation between serum vitamin D levels with AR and TNSS. The cut-off points of serum vitamin D levels correlated to AR were approximately 12.83 ng/mL.<sup>11</sup>

## CONCLUSION

From the above results, the authors concluded that vitamin D levels are significantly altered in Chronic Rhinosinusitis patients. However; their role in pathogenesis of the disease need further exploration. Hence; further studies are recommended.

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