

Association Between Vitamin D Deficiency and Recurrent Tonsillitis

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ABSTRACT

Background: Tonsillitis is defined as an inflammation of the tonsils characterized by signs of tonsillar erythema and exudates and recurrent tonsillitis is at least 7 episodes of acute tonsillitis in a year, or a minimum of 5 episodes in a year for 2 consecutive years, or at least 3 episodes in a year for 3 consecutive years. There are many research that have hypothesized the association of low level of Vitamin D and recurrent attacks of acute tonsillitis.

Methods: A single centre prospective, cross sectional analytical study was conducted from 2021 June to 2022 March in Department of ENT and Head and Neck surgery in Kathmandu Medical College Teaching Hospital. The study participants were recruited from ENT Head and Neck OPD and the data on number of episodes of recurrent attacks of tonsillitis and serum level of Vitamin D were collected.

Results: 78.8% of patients with tonsillitis had low level of serum Vitamin D (less than 30ng/ml) and 21.2% had optimal level of serum Vitamin D (more than 30ng/ml). The incidence of recurrent tonsillitis was 40.9% in patients with low level of Vitamin D where as the incidence of recurrent tonsillitis was 18.1% in patients with optimal level of Vitamin D.

Conclusions: The low serum level of Vitamin D was found to be associated with recurrent episodes of tonsillitis.

Keywords: Recurrent tonsillitis; vitamin D.

INTRODUCTION

Tonsillitis is considered one of the major causes of outpatient visits in the United States.¹ The causes of tonsillitis can be viral or bacterial and group A beta-hemolytic Streptococcus accounts for 5% to 17% of cases.^{2,3} In addition, there are many factors such as weak immune system, environmental factors, poor nutritional status and incomplete treatment of acute tonsillitis that have been postulated as the risk factor for recurrent tonsillitis.

There has been a systematic review which has concluded that the supplementation of Vitamin D had a protective role in acute upper respiratory tract infections.⁴ Vitamin D deficiency causes an increase in Vascular Endothelial Growth Factor (VEGF) expression in the tonsillar tissue which plays a role in the pathogenesis of recurrent tonsillitis.⁵ There are few observational

studies that have explained the association of vitamin D and recurrent tonsillitis.⁶⁻⁹ The aim of this study is to determine the association between serum level of Vitamin D and recurrent episodes of tonsillitis.

METHODS

A prospective, single centre, cross sectional analytical study was conducted from 2021 June to 2022 March in ENT Head and Neck Department, Kathmandu Medical College Teaching Hospital, Kathmandu, Nepal. The study population was patients with clinical diagnosis of tonsillitis presenting to ENT Head and Neck OPD in Kathmandu Medical College Teaching Hospital. The convenience sampling method was used to conduct the study and the sample size was 66. The inclusion criteria were patients with clinical diagnosis of tonsillitis presenting to ENT OPD with age group >12 years. The exclusion criteria were patients who had undergone

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tonsil surgery, taking immunosuppressive drugs and on Vitamin D supplementation therapy. The operational definitions used for tonsillitis was “an inflammation of the tonsils, which is characterized by signs of erythema and exudate with or without abscess formation” and for recurrent tonsillitis was “at least 7 episodes in a year, or a minimum of 5 episodes in a year for 2 consecutive years, or at least 3 episodes in a year for 3 consecutive years”.⁶ The patients were informed about the study and written informed consent was taken. The data was collected on patient demographics, diagnosis, serum Vitamin D level and number of episodes of tonsillitis in past three consecutive years in a predesigned proforma. The data was entered in Microsoft Excel 2007 and analyzed using Statistical Program for Social Science software (SPSS 16.0). The ethical approval was taken from Institutional Review Committee of Kathmandu Medical College.

RESULTS

There were 66 patients of tonsillitis included in the study out of which 34 were male (51.5%) and 32 were female (48.4%) patients. The mean age of the patients was 30.9±8.8 years. Of the cases with tonsillitis, 78.8% had low level of serum Vitamin D (less than 30ng/ml) and 21.2% had optimal level of serum Vitamin D (more than 30ng/ml). (Table 1)

Table 1. Tonsillitis in patients with low serum level of Vitamin D vs optimal serum level of Vitamin D.

Serum Vitamin D level (ng/ml)	Incidence of tonsillitis, N= 66 (%)	P value
>or =30	14 (21.2%)	0.03
<30	52 (78.8%)	

In patients with low level of serum Vitamin D, none had severe deficiency and 55.76% had mild to moderate deficiency as per Mayo Medical Laboratories reference.⁷ The incidence of recurrent tonsillitis was 40.9% in patients with low level of Vitamin D where as the incidence of recurrent tonsillitis was 18.1% in patients with optimal level of Vitamin D. (Table 2)

The incidence of 7 episodes of tonsillitis in a year was 8 versus 6 , 5 episodes in two consecutive years was 13 versus 0, 3 episodes in three consecutive years was 6 versus 6 in patients with low level of Vitamin D and optimal level of Vitamin D respectively.

Table 2. Recurrent tonsillitis in patients with low serum level of Vitamin D vs optimal serum level of Vitamin D.

Recurrent tonsillitis n=66	Low serum level of Vitamin D (30 ng/ml)	Optimal serum level of Vitamin D (>30ng/ml)	P value
7 episodes in a year	8 (12.1%)	6 (9.0%)	<0.05
5 episodes in two consecutive years	13 (19.7%)	0 (0%)	insignificant
3 episodes in 3 consecutive years	6 (9.0%)	6 (9.0%)	<0.05
Total recurrent tonsillitis	27 (40.9%)	12 (18.1%)	<0.05

ng/ml= nanograms per milliliters

DISCUSSION

Recurrent tonsillitis poses a major concern in terms of repeated antibiotic usage. Recurrent tonsillitis in pediatric population affects growth and development of the children. It has been understood that the immune mechanism, environmental factors, and inappropriate treatment of the acute attack of tonsillitis play a role in the recurrent attack of tonsillitis. The incidents of upper respiratory tract infection (URTIs) such as tonsillitis are inversely related to sun exposure.⁸ During the winter season where there is deprivation of sunlight, there is inadequate synthesis of Vitamin D in the human body during that season.² The incidence of upper respiratory tract infections such as tonsillitis are inversely related to sun exposure. The histopathological role of Vitamin D deficiency in recurrent tonsillitis showed an increased angiogenesis in tonsil and increased VEGF expression of the tonsillar surface epithelium when blood serum 25OHD level <20ng/ml.⁵ There is a consistent association between low levels of 25-hydroxvitamin D and the risk of respiratory tract infection.^{9,10,11} In our study, 78.8% cases with tonsillitis had low levels of Vitamin D(<30ng/ml) and 21.2% cases with tonsillitis had optimum levels of Vitamin D(>30ng/ml) (P<0.05). Of the cases of tonsillitis with low level of Vitamin D, 55.76% had mild to moderate deficiency of Vitamin D(10-24 ng/ml) as per Mayo Medical Laboratories Reference ranges. There are studies which have linked recurrent URTIs with Vitamin

D deficiency. A systematic review by Mirza AA showed that Vitamin D deficiency was present in patients with recurrent tonsillitis.¹² 78% of children who underwent tonsillectomy in New Zealand had low Vitamin D level.¹³ In our study, recurrent tonsillitis was found in 40.9% cases with low level of serum Vitamin D where as recurrent tonsillitis was found in 18.1% with optimal level of serum Vitamin D ($P < 0.05$). Low level of Vitamin D was found in children with tonsillitis in a study done in Turkey.⁴ N Sier et al concluded that there is a linkage between Vitamin D deficiency and recurrence of group A Streptococcus tonsillitis in adult population.¹⁴ As the low level of Vitamin D is found to be associated with recurrent tonsillitis attacks, Vitamin D supplementation can be adopted to prevent the recurrent attacks of tonsillitis which carries a huge disease burden in our population. However, this study will not be able to assess the association between serum level of Vitamin D and attacks of recurrent tonsillitis at the community level.

CONCLUSIONS

The serum level of Vitamin D was found to be low (< 30 ng/ml) in majority of cases of tonsillitis and the low serum level of Vitamin D was found to be associated with recurrent episodes of tonsillitis.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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