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Vitamin D Level and Risk of Community Acquired Pneumonia in adults-an experience at tertiary care hospital

Sheenam Gazala[1], Mohammad Akbar Shah[2], Bathsheeba Andrabi[3], Basharat Kassana[4], Yasir Bashir[5], Nusrat Bashir[6]

[1] Senior Resident Emergency Medicine. [2] Assistant Professor Critical Care Medicine
[3] Senior Resident Critical Care Medicine
[1, 2, 3] SKIMS Srinagar
[4] Consultant J&K Health Services [5]. Assistant Professor, Medicine GMC, Baramulla
[6] Assistant Professor, Pathology GMC Srinagar
J&K, India..

***Corresponding Author:**

Dr.Nusrat bashir
Assistant professor,department of pathology,
GMC,Srinagar,J&K,India.
190010

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ABSTRACT

Aims and objectives:
(a)To compare the levels of vitamin D between patients of Community acquired pneumonia and healthy controls.
(b) Association of Vitamin D deficiency with pneumonia.
Materials and methods: It was a prospective case control study.
Results and conclusions: Patients with pneumonia had a statistically significant low Vitamin D levels.

Keywords: Vitamin D, Pneumonia, Community.

INTRODUCTION

Till a few decades ago, vitamin D was thought of only in relation to bone health and calcium homeostasis. It stands at the frontline of current scientific endeavors, being a topic of greatest interest to medical researchers all over the globe. A growing body of evidence, implicating hypovitaminosis D as a risk factor for many diseases Vitamin D is important for the normal activity of skeletal and non-skeletal tissues, immune cells and immunity, bone calcification, and brain processes (1). Management of widespread vitamin D deficiency may fetch profound future health benefits. Vitamin D is involved in the regulation of1000 human genes. Vitamin D metabolites play an important role in the bodys immunity by induction of phagocyte migration, modulation of the Th1–Th2-cellbalance, and the differentiation of T regulatory cells. (2) (3). It is shown that vitamin D deficiency (<20 ng/mL) is a prevalent condition and may be a key contributor to both acute and chronic infectious diseases including sepsis, pneumonia, urinary tract infections, and surgical site infections. Most cells, suchas B and T lymphocytes, monocytes, and dendritic cells, have specific vitamin D receptors (VDRs). Vitamin D demonstrates its immunomodulatory effects on these cell lines through its effects on the VDR. Deficiency is associated with reduced innate immunity and an increased risk for infections. Vitamin D deficiency

can positively affect a wide variety of microbial infections such as Gram-positive and Gram-negative bacteria, fungi, mycobacteria, and viruses. (4).

Pneumonia is a common lung disease which is responsible for significant morbidity and mortality worldwide [5, 6]. Community-acquired pneumonia (CAP)

is the main type of pneumonia which can also result in high risk of mortality in

Critically ill patients [7-9]. Risk stratification is crucial for the treatment of pneumonia, because it identifies patients with high risk of mortality for whom

Intensive care can be used [10, 11]. Therefore, to improve the accuracy of risk stratification, there is need to find more appropriate factors for predicting the risk of mortality among pneumonia patients. Such findings will provide much help in developing some effective risk stratification tools for evaluating the prognosis of pneumonia patients [12, 13]. Currently, some blood biomarkers, such as

C-reactive protein, procalcitonin and proadrenomedullin are thought to be associated with the survival of pneumonia patients [14-16]. Vitamin D plays important roles in regulating calcium homeostasis and immune response [17- 19].

Results from previous studies suggest that vitamin D has a protective effect against respiratory tract infections [20, 21]. It has been suggested that vitamin D may exert immunomodulatory effects in patients with pneumonia [22, 23]. Low vitamin D status or vitamin D deficiency is common in the elderly and in critically- ill patients, as well as in patients with pneumonia [24-26]. Some studies reported that low vitamin D status was a risk factor for adverse outcomes among pneumonia patients, but results from some other studies were in disagreement with these reports [27-33]. T Given the importance of pneumonia and because vitamin D deficiency is one of the possible factors involved in susceptibility to pneumonia, further studies on the possible role of vitamin D deficiency in the prevalence or severity of the disease can be useful

Materials and methods:

The study was conducted in emergency and critical care department of our hospital for a time period of 1 year from march 2015 to march 2016 in patients with clinical history of pneumonia.

Study design: IT was a prospective case control study.

Cases: Patients who fulfilled the inclusion criteria

Inclusion criterion:

Age: greater or equal than 20 years.

Presence of new infiltrates on chest radiography.

Presence of one of the following criteria:

1. Productive Cough

2. Fever > = 38.3 degree centigrade.

3. Chest sign on auscultation.

Exclusion criterion:

Patient with active TB

Immunosuppressed patients.

Controls: Patients more than 20 years attending the hospital for complaints Other than respiratory symptoms. These patients were taken in study after taking proper consent.

A total of 80 patients were taken.40 cases and 40 controls after meeting inclusion criteria.

Methodology:

1- History taking including socio-economic level, residence, and history of upper respiratory tract infection

2- Clinical examination including body temperature, respiratory rate, cyanosis and local chest examination.

3- Routine laboratory investigations including complete blood count (CBC),

C-reactive protein (CRP) (positive above 6 mg/L) and erythrocyte sedimentation rate (ESR).

4- Chest X ray.

5- Measurement of serum Vitamin-D (25OHD): Two ml of venous blood Specimens was collected from a peripheral vein and serum separated by centrifugation and then stored at -20° C and protected from direct exposure to sunlight until the analysis. The timing of blood sample collection within the disease course varied from patient to patient. However, given that

Volume 2, Issue 2; March-April 2019; Page No. 100-105

vitamin D has a half-life of between 4 and 8 weeks, the small inconsistency in timing would not be expected to affect the average vitamin D level. Samples were assayed at the end of the enrollment period using a commercially available 25-hydroxy vitamin D3 RIA kit(25-Hydroxyvitamin D 125 RIA Kit; DiaSorin Diagnostics) according to the instructions provided by the manufacturer. All the determinations were performed in the Department of Immunology, Sher-e-Kashmir Institute of Medical Sciences, Soura, Srinagar.

Results:

There were 62.5% males and 37.5% females in the case group and 67.5% males and 32.5% females in the control group. The P value of 0.639 is statistically insignificant.

Hundred percent of cases were found to have deficient 25 hydroxy vitamin D levels whereas 52.5% controls were found to have deficient 25 hydroxy vitamin D levels.The P- value of <0.001 was found to be significant.

The mean serum levels of25-hydroxy vitamin D levels of cases was found to be 5.14 ± 2.793 ng/ml and of controls it was 15.84 ± 8.519 ng/ml with a significant P-value of <0.001.

The mean serum vitamin D levels among males in case group was 4.81 ± 2.989 ng/ml and in control group was 16.74 ± 8.186 ng/ml. The P- value of <0.001 was found to be significant.

The mean serum vitamin D levels among females in case group was5.69 ± 2.430 ng/ml and in control group was 13.98 ± 9.223 ng/ml with a significantP-value of <0.001.

Table 1a-(case group)

Total patients(Percentage)	Males(percentage)	Females(percentage)
40(100)	25(62.5)	15(37.5)

Table 1b-(control group)

Total controls (Percentage)	Males(percentage)	Females(percentage
40(100)	27(67.5)	13(32.5)

P Value (0.639)-Insignificant

Table 2(vitamin D sufficiency)

Case group(40)		Control group(40)	
Vitamin-D Sufficent	Vitamin-D In-Sufficent	Vitamin-D Sufficent	Vitamin-D In-Sufficent
0(0%)	40(100%)	19(47.5%)	21(52.5%)
5.14 ± 2.793 ng/ml(Mean value)		15.84 ± 8.519 ng/ml(Mean value)	

P Value (<0001.)-significant.

Table 3 (Mean vitamin D levels)

Case group		Control group	
Males	Females	Males	Females
4.81 ± 2.989 ng/ml	5.69 ±2.430 ng/ml	16.74 ± 8.186 ng/ml	13.98 ± 9.223 ng/ml

P Value (<0001.)-significant

Volume 2, Issue 2; March-April 2019; Page No. 100-105

Discussion: The purpose of this case-control study was to investigate the relationship between vitamin D levels and severity of CAP in a total of 80 subjects (40 cases and 40 controls). The overall prevalence of vitamin D deficiency in the case group was greater than in the control group; however, patients with CAP had a higher rate of severe vitamin D deficiency in comparison with healthy participants. Furthermore, CAP patients with severe vitamin D deficiency had more severe disease (higher CURB-65 score). Although not statistically significant, patients with severe deficiency had a higher rate of ICU admission and a longer duration of hospital stay.

In a study conducted by Mojgan Mamani[34] et al In total, 81.2% of the study population had vitamin D levels <30 ng/dL. The risk of pneumonia among subjects with deficient vitamin D levels was 3.69 (95% CI: 1.46, 9.31) times of those with sufficient vitamin D level (*P*=0.006). Prevalence of severe deficiency of vitamin D in scores three and four of CURB-65 (59.38%), was far more than scores one and two (31.71%). Also, results indicated patients with severe deficiency had a higher risk for ICU admission, 30-day mortality, and longer hospitalization stay, but these were not statistically significant. Similar results were found in our study as well. he results of our study showed that there was a significant association between severe vitamin D deficiency and CAP. Individuals with severe deficiency were 4.16 times more susceptible in acquiring CAP when compared to the people with higher levels of vitamin D. Our result is consistent with the recent studies conducted in other countries,[35-38] although this relationship was observed for different levels of vitamin D in other studies.

Conclusion: Patients with pneumonia had a statistically significant low Vitamin D levels

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Volume 2, Issue 2; March-April 2019; Page No. 100-105

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Volume 2, Issue 2; March-April 2019; Page No. 100-105

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Volume 2, Issue 2; March-April 2019; Page No. 100-105