Research Article

PREVALENCE OF SERUM 25-HYDROXY VITAMIN D DEFICIENCY AND ITS INFLUENCE ON OUTCOME IN CRITICALLY ILL PATIENTS

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A R T I C L E I N F O

A B S T R A C T

Limited studies are available on vitamin D deficiency and its outcome in critically ill Indian population. We aimed to evaluate the prevalence of vitamin D deficiency and outcome like prolonged hospital stay and mortality.
Methods: In this observational study, thirty patients were included. Demographic profile and clinical parameters were noted. Blood samples (2ml) were collected for vitamin D estimation on admission. Patients were categorized into Deficient (Group D <30ng /ml) and Sufficient (Group S >30 ng /ml) groups. Patients were followed up for a period of 2 weeks or till discharge. Outcome noted were total hospital days and mortality.
Results: Vitamin D deficiency was present in 86.6% critically ill patients. A Negative correlation (Pearson Correlation - 0.01) was noted between vitamin D deficiency and total hospital days. Statistically no significant association was found between vitamin D deficiency and total hospital days (p =0.95). Mortality was found to be higher (66.7%) in vitamin D deficient patients than in vitamin D sufficient patients (33.3%).
Conclusion: Statistically significant association was not seen between vitamin D deficiency and adverse outcome like total hospital days and mortality. An inverse relation was noted between vitamin D deficiency and total hospital days.

INTRODUCTION

Most of the people from India live in areas where sunlight is abundant throughout the year and was thought that vitamin D deficiency was not common in India. Low vitamin D level may be associated with adverse outcome like infection, sepsis, total intensive care unit stay, increased morbidity and mortality[1,2,3,4,5.] Vitamin D is a unique micronutrient synthesized endogenously in the skin which functions as a hormone. The low baseline serum vitamin D level may worsen the immune and metabolic dysfunctions in the critically ill.

Data revealed the role of vitamin D in immune response to pathogen and in systemic inflammatory pathways of sepsis. Furthermore infection and sepsis may lead to organ failures, increased morbidity and mortality. [6,7,8,9] Vitamin D modifies expression of gene in cells and functions by binding to the specific vitamin D receptors.[10,11]

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These receptors are present in all types of immune cells and clinical studies have shown that vitamin D may reduce the risk of developing infection by regulating the immune function[12,13.]

We conducted this study to evaluate the prevalence of vitamin D deficiency and its adverse outcome in critically ill Indian population.

METHODS

Institutional Ethical clearance was obtained before conducting the study. A written Informed consent was taken. In this pilot study thirty patients who required admission to intensive care unit (medical and surgical) of tertiary care centre from India were included from October 2015 to March 2016. Patients with age above 18 years were included and pregnant patients, lactating women, patients with mal absorption syndrome, chronic liver disease, chronic kidney disease, patients on drugs which interfere with Vitamin D metabolism (Phenytoin, Carbamazepin, corticosteroids) and patients on vitamin D supplementations were excluded from the study.
Blood samples were collected (2 ml) in plain test tubes after vein puncture and transferred it to the ISO certified laboratory

for serum 25(OH) D estimation by CLIA (Chemi Luminescent Immunoassay) using the Immunoassay system (Beckman Coulter Access 2 Immunoassay System, Inc. USA).

Demographic profile, clinical and biochemical parameters were taken at the time of enrolment and the patients were followed up for a period of 2 weeks or till discharge. The outcomes noted were total hospital days and hospital mortality.

Statistical Analysis

SPSS software version 18 was used for data analysis. The results were expressed as mean ± standard deviation. Categorical variables were analysed by chi square test. Continuous variables were analysed by t-test and Pearson's correlation. The significance level was set at P value of < 0.05 and value < 0.05 was considered statistically significant (SS) and > 0.05was considered as not significant (NS).

RESULTS

The age group ranged from 23 years to 69 years. There were 16 (53.3%) females and 14 (46.7%) males in the study group. Vitamin D deficiency was present in 26 (86.6%) critically ill patients,

Table 1 Association between Vitamin D Level and Mortality

	Mortality		
	Non survivor	Survivor	Total
	1(33.3%)	3 (11.1%)	4
Group D	2 (66.7%)	24 (88.9)	26
Total	3 (100%)	27(100%)	30

P = 0.283 statistically not significant

Outcome

Vitamin D level and total hospital days

A negative correlation (Pearson Correlation - 0.01) was found between vitamin D deficiency and total hospital days. But statistically no significant association was found between vitamin D deficiency and total hospital days (p =0.95).

Vitamin D level and mortality

Total of three mortality occurred during hospital stay and among these two patients (66.7%) belonged to vitamin D deficient group and one (33.3%) belonged to vitamin D sufficient group. Statistically significant association was not found between vitamin D deficiency and mortality (p=0.283).

DISCUSSION

Vitamin D deficiency was found to be high in general population around the world and in India 50% -90% were vitamin D deficient among all the age groups [3,4] The present study showed a prevalence of 86.6% vitamin D deficiency (<30ng/ml, Group D) in critically ill population.

Most of the critical illnesses are adversely affected by vitamin D deficiency. It was noted that vitamin D deficiency can be associated with increased mortality in general population. In contrast to a retrospective study done by Takuhiro *et al* we could not find an association between vitamin D deficiency and hospital mortality[14]. But mortality was higher in vitamin D deficient group (66.7%) compared to sufficient group (33.3%).

Ginde *et al* found that in 81critically ill patients all 4 patients who died during index hospitalisation had a base line serum 25(OH) D level <30 ng /ml[15]. In our study 2 patients (66.7%) who died during hospitalisation had a base line vitamin D level <30ng/ml and 1 patient (33.3%) had a base line value < 31.06 ng /ml.

A negative correlation or inverse relation was found between vitamin D level and total hospital days. So by increasing the baseline serum vitamin D level to sufficient levels (>30 ng/ml) total days of stay in hospital can be reduced. Mathews *et al* noted an inverse relation between vitamin D deficiency and total ICU stay. In addition to this they also noted an inverse relation between vitamin D deficiency, cost of therapy and mortality.[16]

Limitations of this study

Since it was a pilot study only 30 patients were included and the analysis was exploratory in nature. We need larger studies to know the role of vitamin D in critical illness and the effect of vitamin D replacement therapy on outcome.

CONCLUSION

This study highlights the high prevalence of vitamin D deficiency in critically ill Indian population. A negative correlation was found between vitamin D level and total hospital days. There is a need for considering vitamin D deficiency and vitamin D supplementation in all critically ill patients. We could not found a statistically significant association between vitamin D deficiency, total hospital stay and mortality.

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