



Assessment of the Deficiency of Vitamin D among the Tuberculosis Patients at People Medical College Hospital Nawabshah, Pakistan

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Authors' contributions

This work was carried out in collaboration among all authors. Author SAS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors BMT, AAJ, FS, AAZ, LK and AA managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Objective: The objective of this study is to assess deficiency of Vitamin D among the Tuberculosis Patients at People's Medical College Hospital (PMCH) Nawabshah, Pakistan.

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Methodology: This was a case-control study in which 184 new diagnosed tuberculosis patients aged between 30 to 50 years were selected and 200 were taken as control. The study was conducted from June 2020 to May 2021. Well-structured questionnaire was administered to both case and control groups. Body mass index (BMI) was recorded as (kg/m²). Blood samples were collected for the presence of Vitamin D3 levels. Statistical Software for Social Sciences (SPSS) version 23 was used to analyze the data.

Results: The mean age and standard deviation (SD) of the patients was 45.11 ± 7.99 years and gender distribution was females 94/184 (51%) and males 90/184 (49%) in patients. There was Vitamin D deficiency in 79/184 (39%) patients.

Conclusion: Vitamin D deficiency was common among tuberculosis patients in contrast to control group. The female patients with low Body Mass Index (BMI) (kg/m²) were having the more deficiency of Vitamin D. Vitamin D supplementation has vital role in tuberculosis treatment and prevention.

Keywords: Chemiluminescence assay; roche diagnosis elesys; tuberculosis; vitamin D deficiency.

1. INTRODUCTION

Tuberculosis disease (TB) is one of the major causes for death worldwide and is because of Mycobacterium tuberculosis (Mtb) infection. Albeit this bacterium can influence various organs, the respiratory framework stays the most conspicuously influenced. TB is an infectious disease, and air droplets in as the fundamental method of transmission [1]. In excess of 10,000 TB patients accepting straightforwardly noticed treatment system in Iran every year. Dietary supplementation has been utilized as an instrument to improve the resistant framework [2, 3]. In spite of the fact that nutrient D is best perceived as a controller of calcium and bone homeostasis, it has assorted extra cell capacities, influencing separation, multiplication, actuation, and demise. In people, nutrient D essentially results from bright B-actuated cleavage of 7-dehydrocholesterol in skin [4]. Nutrient D has a fundamental job in the body's characteristic guard component towards contamination since it advances the part of macrophages and monocytes which is significant in pathogenesis. In disease brought about by Mtb, calcidiol, the major flowing metabolite of nutrient D, upholds the acceptance of inborn antimicrobial insusceptible reaction by causing Mtb development limitation. Calcidiol is utilized by CYP27B1 enzyme into its dynamic structure, calcitriol [5]. A few investigations show the effects of calcidiol levels, vitamin D receptor VDR polymorphisms, also, nutrient D supplementation on the securing of TB and on the results of TB diseases [6, 7]. Addition hazard of TB was accounted for among individuals with lower serum nutrient D levels. Nutrient D supplementation appears to have a positive result on TB results [8-10]. The capacity of

calcitriol to limit the development of destructive Mycobacterium tuberculosis in human macrophages was first announced by Crowle et al [11]. In that review, calcitriol 4 µg/mL (5 logs higher than in blood) expanded the intracellular multiplying season of destructive M tuberculosis from 1 to 3 days, in spite of the fact that it didn't create clear bactericidal movement. A few components have since been proposed, including creation of nitric oxide (NO) and advancement of phagolysosome combination [12]. Likewise high focuses are needed to hinder M tuberculosis development in blended mononuclear cell societies, which additionally need unmistakable bactericidal action [13]. Nutrient D has been known as an assistant specialist in forestalling different contaminations [14, 15]. We will in general decide the enhancements in clinical result in patients accepting cholecalciferol as supplement go with hostile to tuberculosis treatment.

The objective of this study is to assess deficiency of Vitamin D among the Tuberculosis Patients at PMCH Nawabshah, Pakistan.

2. METHODOLOGY

This was a case-control study in which 184 new diagnosed tuberculosis patients aged between 30 to 50 years were selected and 200 were taken as control. The study was conducted from June 2020 to May 2021 at Department of Medicine, PMCH Nawabshah, Pakistan. Sample size was calculated by Rao-Soft calculator at margin error 5% and confidence interval 95%. Cases who were newly diagnosed and not taken any treatment yet were diagnosed by acid fast bacilli identification in sputum smears, mycobacterium tuberculosis isolation on culture or chronic

caseating granulomatous inflammation representation in the specimens of tissue. To find out the drug presence, testing for drug susceptibility was done. Control group was randomly selected who matched the age and sex. Well-structured questionnaire was administered to both case and control groups regarding the physical activity, anthropometry, smoking status, job status and dietary pattern. BMI was recorded as (kg/m^2). Blood samples were collected for the presence of Vitamin D3 levels. By centrifugation the serum was separated and levels of Vitamin D3 were measured by using the chemiluminescence assay by using the Roche diagnosis Elesys. Levels of Vitamin D3 less than 25 ng/ml was considered as deficient of Vitamin D3.

Statistical Software for Social Sciences (SPSS) (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.) was used to analyze the data. Chi-square and independent t-test test was applied to observe the results. The representation of results was done as standard deviation (\pm SD), mean, frequency and percentage. P-Value < 0.05 was considered significant.

3. RESULTS

Table 1 show the age and gender distribution in the case-control groups as well as Vitamin D3 deficiency.

Table 2 show the clinical characteristics like BMI, Vitamin D3, Pulmonary and extra pulmonary tuberculosis, sensitivity and multidrug resistance of tuberculosis patients.

4. DISCUSSION

A few natural investigations to identify impacts of Vit D on insusceptible arrangement of the body show that Vit D has a complete part in concealment of multiplication of Mycobacterium TB and summed up incendiary reaction delivered auxiliary to it [16,17]. An alternate operational definition for nutrient D inadequacy of < 12 ng/ml according to the United States Institute of Medicine rules [18] was utilized in the Ugandan investigation thus the distinction in the pervasiveness. Studies done in the western piece of Uganda [5], Guinea Bissau [19] and Mwanza in Tanzania [20] have revealed lower commonness of nutrient D lack among TB

Table 1. Socio-demographic and clinical characteristics of the patients

Variables	Cases (n =184)	Controls (n =200)	P-value
Age (years) mean [SD]	45.11 (\pm 7.99)	49.10 (\pm 7.65)	0.568
Females n (%)	94 (51%)	95 (47.5%)	0.1076
Males n (%)	90 (49%)	105 (52.5%)	0.856
Vitamin D3 (ng/ml) mean [SD]	24.02 (\pm 5.65)	28.75 (\pm 7.72)	<0.0001
Vitamin D 3 deficiency [n (%)]	79 (39%)	54 (29%)	<0.0001

*The results are presented as number (N) and percent (%), mean and standard deviation (SD)

Table 2. Clinical characteristics of tuberculosis patients

Variables	Levels of Vitamin D		P-value
	Deficient < 25 ng/ml	Normal > 25 ng/ml	
Number of patients [n(%)]	55 (46%)	74 (40%)	< 0.001
BMI(kg/m^2) mean [SD]	19.12 (\pm 2.01)	22.43 (\pm 2.04)	< 0.001
Vitamin D3(ng/ml) mean [SD]	19.23 (\pm 2.91)	30.22 (\pm 5.01)	<0.0001
Pulmonary tuberculosis [n(%)]	78 (45%)	64 (48%)	0.001
Extra-pulmonary tuberculosis [n(%)]	32 (75%)	12 (10%)	0.001
Sensitive [n(%)]	63 (47%)	72 (51%)	< 0.01
Multidrug resistant [n(%)]	21 (88%)	3 (9%)	< 0.01

*The results are presented as number (N) and percent (%), mean and standard deviation (SD)

patients of 7%, 8.5% and 10.6% individually contrasted with our own. A lower predominance of HIV co-contamination (47.2%) in Tanzania, mirroring a superior by and large wellbeing status and the expanded utilization of fish among the investigation members in Tanzania and Guinea Bissau could clarify the lower commonness of nutrient D insufficiency announced from these two settings. In our study Vitamin D deficiency in patients was reported as 54 (29%) and mean of Vitamin D levels in patients was found as 24.02. In our findings the mean age and standard deviation (SD) of the patients was 45.11 ± 7.99 years and gender distribution was females 94/184 (51%) and males 90/184 (49%) in patients. There was Vitamin D deficiency in 79/184 (39%) patients.

5. CONCLUSION

Vitamin D deficiency was common among tuberculosis patients in contrast to normal people. The female patients with low BMI were having the more deficiency of Vitamin D. Vitamin D supplementation has vital role in tuberculosis treatment and prevention.

ETHICAL APPROVAL AND CONSENT

Informed written consent was taken and study was approved by PMCH ethical committee.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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