

## Study of Vitamin D Levels in Laboratory Personnel in the Medical College of Northern Telangana

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Conflict of interest: Nil

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### Abstract:

**Background:** Vitamin D plays a crucial role in maintaining overall health and well-being. Vitamin D studies have shown its deficiency to be a major health problem affecting an estimated one billion individuals globally.

**Aim and Objectives:** To know about Vitamin D levels in laboratory personnel in the medical college of Northern Telangana.

**Materials and Methods:** This was cross-sectional study, conducted on 100 laboratory personnel (70 MLT students and 30 Lab technicians) from Prathima Institute of Medical Sciences, Karimnagar. Study has been conducted in Department of Biochemistry, for the duration of 1 year from April 2022 to March 2023. Participants were included after getting their informed consent and ethical approval from the Institutional ethical committee of our Institute, and following inclusion and exclusion criteria.

**Results:** Out of all study participants we have observed 10% of the study participants had deficiency of vitamin-D, 41% had insufficient levels of vitamin D and 49% had sufficient vitamin-D levels.

**Conclusion:** Prevalence of vitamin D deficiency was very less, also deficiency was strongly associated with sun exposure, diet and addiction like smoking or drinking.

**Keywords:** Vitamin D, laboratory personnel, sun exposure, MLT : medical lab technician students.

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### Introduction

Vitamin D is a fat-soluble vitamin that plays a crucial role in maintaining overall health and well-being. It is unique compared to other vitamins because our body can produce it when the skin is exposed to sunlight. Additionally, it can be obtained through certain foods and supplements. Vitamin D helps the body absorb calcium and phosphorous from the diet, which is essential for maintaining healthy bones and teeth. It also plays a role in supporting the immune system, regulating cell growth and promoting normal muscle function. When skin is exposed to sunlight, it synthesizes vitamin D.

However, the ability to produce vitamin D depends on various factors such as geographical location, time of year, time of day, cloud cover, pollution, and skin pigmentation. It is generally recommended to have about 10 to 30 minutes of sun exposure to face, arms or legs a few times a week to maintain adequate vitamin D levels. It can also be obtained from certain foods. Natural food sources of vitamin D included fatty fish like salmon, mackerel and sardines, as well

as fish liver oil. Small amount of vitamin D can be found in beef liver, cheese, egg yolk and fortified foods like milk, orange juice and breakfast cereals

The recommended daily intake of vitamin D varies depending on age, sex and stage of life. In general, the recommended dietary allowance (RDA) for adults is 600-800 IU per day. But now a days vitamin D deficiency is a common health concern, especially in areas with limited sunlight exposure or in people who have a poor diet. Symptoms of vitamin D deficiency can include fatigue, muscle weakness, bone pain, frequent infections, and low mood. Severe deficiency can lead to condition like rickets in children or osteomalacia in adults, which are characterized by weakened bones. Generally, vitamin D status is assessed by serum 25-hydroxyvitamin D (25(OH)D) levels, with approximately 85%-90% of 25(OH)D circulating in association with vitamin D-binding protein [1]. Vitamin D studies have shown its deficiency to be a major health problem affecting an estimated one billion individuals globally, being prevalent not only

in countries with cold climates but also in sunny regions such as India [2,3]. Dark skin complexion, limited sun exposure, using umbrellas and hats, using sunscreen, staying in the shade, and wearing full-body covering clothes are common in India, which contribute to vitamin D deficiency [4]. Indian studies have shown a very high prevalence of vitamin D deficiency in patients with Type 2 diabetes mellitus (30%-85%) [5,6].

A recent systematic review of 71 studies from across the globe showed that occupation is a major factor contributing to sub-optimal vitamin D levels, and indoor workers are at a greater risk compared to outdoor workers; more than three-fourths (78%) of indoor workers were found to be vitamin D deficient compared to less than half (48%) of outdoor workers [7]. Indoor workers spend a significant amount of time working indoors without sunshine exposure. Furthermore, due to the conventional working time of indoor workers, they are exposed to sunlight mostly during mornings and evenings, when the intensity of UV-B exposure is relatively low. Sunlight deprivation among indoor workers puts them at high risk of developing vitamin D deficiency and its associated health risks.

Laboratory personnel, particularly those who spend a significant amount of time indoors or work night shift, may be at an increased risk of vitamin D deficiency due to limited sunlight exposure. Vitamin D is synthesized in the skin when it is exposed to ultraviolet B (UVB) rays from sunlight. However, laboratory personnel often work in control environments with minimal exposure to natural sunlight. Thus present study we have undertaken to know about Vitamin D levels in laboratory personnel in the medical college of Northern Telangana.

## Material and Methods

Vitamin D Levels	Status
< 20 ng/ml	Deficient
20 - 30 ng/ml	Insufficient
> 30 ng/ml	Sufficient

## Statistical Method

Collected data were entered in Microsoft excel 2016 for further statistical analysis.

Quantitative data were expressed in terms of mean and standard deviation and categorical data were expressed in terms of frequency and proportion.

Chi-square test was used to know about association between categorical variable. P-value<0.05 considered statistically significant at 5% level of significance.

This was cross-sectional study, conducted on 100 laboratory personnel (70 MLT students and 30 Lab technicians) from Prathima Institute of medical sciences Karimnagar. Study has conducted in the department of Biochemistry, for the duration of 1 year from April 2022 to March 2023. Participants were included after getting their consent and ethical approval from Institutional ethical committee of our Institute, and following inclusion and exclusion criteria given below.

## Inclusion Criteria:

1. 18 to 40 Years of age.
2. Willing to participate in the study.
3. Working at least 5 hours inside the central laboratory of medical college.
4. Mixed Diet, Sedentary lifestyle.

## Exclusion Criteria

1. Not willing to participate in the study.
2. Those who were on Vitamin D supplements.
3. Those who were pregnant (Female) during study.

## Method

Self-administered questionnaires were used to collect data of participants, Socio-demographic characteristics and lifestyle factors were collected, Venous blood samples were collected from participants in a fasting state (at least eight hours) by trained phlebotomist.

Vitamin D levels are measured by ELICA (Electrochemiluminescence Immunoassay), based on the principle of change in electrochemiluminescence signal before and after immune reaction. Measured level of vitamin D is defined as below.

## Results and Observation

In the study we have observed that majority of the study participants were females compared to males having ratio of 1 : 1.56 (Male : Female) almost 92% of the population were from the age group of 18 to 30 years, 23% of the study participants had addiction of Alcohol, smoking and others. And only 43% of the study participants were doing physical exercise shown in table 1.

Out of all study participants we have observed 10% of the study participants had deficiency of vitamin-D, 41% had insufficient level of vitamin D and 49% had sufficient vitamin-D levels shown in table 2.

**Table 1: Socio-demographic profile distribution among study population**

Parameters	Frequency	Percent
Gender		
Male	39	39
Female	61	61
Age		
< 20 Years	53	53
21 - 30 Years	39	39
31 - 40 Years	8	8
Addiction		
Yes	23	23
No	77	77
Physical Exercise		
Yes	43	43
No	57	57

**Table 2: Distribution of vitamin-D level among study participants**

Vitamin D	Frequency	Percent	Mean	SD
< 20 ng/ml (Deficient)	10	10	15.211	3.09352
20 - 30 ng/ml (Insufficient)	41	41	25.1122	2.78362
> 30 ng/ml(Sufficient)	49	49	37.3608	4.90906
Total	100	100	30.1239	8.62978

In the study we have observed that there was no association between gender and deficiency of vitamin D levels, but we have observed addiction, sunlight exposure and diet had statistically significant association with deficient vitamin D level and there was no statistical association between physical exercise and deficient vitamin D level shown in table 3.

**Discussion:** Vitamin D deficiency has assumed alarming prevalence globally, which has elicited significant research interest to elucidate its potential causes in order to advance appropriate interventional strategies [2,8]. Several studies from India and

abroad have shown widely prevalent vitamin D deficiency in patients with T2DM [9,5, 6]. There were many studies which also indicates a high prevalence of vitamin D deficiency in various population within India, but these studies do not specifically focus on indoor working personnel.

Given the lack of studies, it is reasonable to assume that indoor workers in India may face similar challenges in maintaining adequate vitamin D levels due to limited sunlight exposure. Thus we have undertaken present study to know about Vitamin D levels among laboratory personnel in medical college of Northern Telangana.

**Table 3: Distribution of vitamin-D level among study participants**

Parameter	Vitamin D Deficiency		Total	Chi-square	P-value
	Present	Absent			
Gender					
Male	6	33	39	2.059	0.151
Female	4	57	61		
Addiction					
Yes	7	16	23	13.85**	0.00019
No	3	74	77		
Sunlight exposure					
< 1 Hour	1	50	51	7.47**	0.006
>1 Hours	9	40	49		
Diet					
Non-vegetarian	3	76	79	16.08**	0.000061
Vegetarian	7	14	21		
Physical Exercise					
Yes	5	38	43	0.22	0.637
No	5	52	57		

\*\*P-value<0.01, statistically highly significant, at 5% level of significance.

In the present study we have included 100 laboratory personnel (70 MLT students and 30 Lab technicians) in the age group of 18-40 year. We have observed majority of the study participants had age between 18 -30 years (92%). Study conducted by Mehul Kaliya et al,[10] observed that, almost three fourth of the participants belonged to the age group of 21 – 30 years followed by 31 – 40 years. Also in our study we have found that majority of the study participants were females compared to males in the ratio of 1:1.56(male : Female). Similar to our study female personnel were more compared to male personnel in the study conducted by Mehul Kaliya et al, but another study conducted by U Divakar et al [11] to examine the prevalence of vitamin D deficiency and its associated work-related factors among indoor workers in Singapore they found, 76.5% of the study participants were males, which contradicts our study concern to gender. One more study conducted by Sinkar et al [12] also observed more female participants compared to male participants.

In the present study we found that, prevalence of vitamin D deficiency level was 10%, which was lower compared to other studies. According to the study conducted by Mehul Kaliya et al observed that, the prevalence of Vitamin D deficiency is 78.39%, which was seven times more than present study. Another study by Sowah D et al.[7] showed that vitamin D level was low among indoor workers with a mean value of 40.6 nmol/L whereas outdoor workers had a mean value of 66.7 nmol/l, which was statistically significant with a value of  $p < 0.0001$ .

In present study all deficient vitamin D levels had mean vitamin-D levels of 15.211 ng/ml with standard deviation of 3.09ng/ml and those who were insufficient and sufficient level had vitamin-D levels of more than 20ng/ml. Another study by U Divakar et al observed that, prevalence of vitamin D deficiency was 32.9%. In our study mean vitamin D level difference was not statistically significant between males and females, but it was slightly less among females as compared to males which was supported by U Divakar et al., according to this study, females tend to have lower vitamin D levels than males, owing to the frequent use of sunscreen and higher body fat percentage [13]. There have been a few studies conducted in workplace settings on vitamin D status in Southeast Asia.

In the present study we found that there was statistically significant association between vitamin D deficiency level and addiction, sunlight exposure and diet. (P-value  $< 0.05$ ), study conducted by Mehul Kaliya et al shows a significantly lower prevalence of vitamin D in those who have daily exposure to sunlight and those who consume dairy products daily. Other study by Al-ElqAH[14] reported that there were no significant association between gender vitamin D level deficiency. As per Zehra Edis et

al, there are so many factors that affect vitamin D levels. One can narrate it as Sunlight Exposure which again depends on geographical distribution, seasonal variations, and types of solar radiation. Now a days our food is deficient in Vitamin D because of increased intake of processed foods.

Previous studies have shown a positive correlation between work hours and vitamin D status [15, 16]. Those who work for long hours indoors are likely to have low sunlight exposure, and thus are more prone to vitamin D deficiency. However, in our study, work hours was not significantly associated with vitamin D deficiency. This could be partly because of the small sample size with limited power to detect a significant difference. Self-reported nature of the work hours data may also have played a role.

Although there is adequate sunshine in India high temperatures during daytime and sultry humid climate are deterrents to sun exposure because Sun-protection behaviour such as wearing hats, sunscreen use, staying in the shade, wearing long sleeves or using an umbrella are common in this region.[17] Vitamin D stores are depleted if the diet has high fiber in particular, phosphate and phytates, which is usually common in Indian food habit[18,19]

Our study has some limitations. It was cross-sectional analysis, a causal relationship between work-related factors and vitamin D deficiency could not be established. Other is the study's sample size which is small, resulting in wide confidence intervals, and some covariates possibly losing significance due to reduced statistical power.

## Conclusion

From overall observation and discussion in our study we concluded that, prevalence of vitamin D deficiency level was very less, also deficiency was strongly associated with sun exposure, diet and addiction like smoking or drinking.

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