

## FREQUENCY OF NUTRITIONAL ISSUES IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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### Abstract

#### **Background:**

Many Type 2 Diabetes Mellitus (T2DM) patients suffer from nutritional deficiency which affect the management of diabetes and their general health status. Metabolic disturbances together with impaired insulin sensitivity and complications become worse due to deficiencies of vitamins and minerals. Improving patient care and glycemic control becomes necessary after identifying these deficiencies.

#### **Objectives:**

An investigation of nutritional issues that affect t2dm patients together with their diabetes management outcomes.

**Study design:** A cross-sectional study.

**Place and duration of study.** From 10 September 2024 to 9 March 2025 Medicine Department, Sandeman Provincial Hospital / Bolan Medical Complex Hospital Quetta.

#### **Methods:**

A study analysis employed a cross-sectional methodology to study 129 patients who had T2DM. Blood tests measured the nutritional condition of patients by examining essential vitamins and minerals. The study collected vital data concerning patient demographics and treatment medications as well as existing health conditions. chi-square and t-tests performed the statistical assessments for comparing deficiency rates.

#### **Results:**

A sample of 129 patients with Type 2 Diabetes participated in the study while the subjects averaged 56.4 years (SD = 9.2). Vitamin D deficiency affected 60% of patients and 30% had low B12 while 35% demonstrated magnesium deficiency in the study group. An analysis revealed that the p-value of lesser than 0.05 demonstrated statistical significance for the relationship between diabetes control and vitamin deficiencies.

## Conclusion:

*The widespread occurrence of nutritional issues in patients with t2dm has negative consequences for both their blood sugar control and general health status. systematic screening of deficiencies along with proper supplements presents a way to enhance patient care.*

## INTRODUCTION

Type 2 diabetes mellitus (t2dm) functions as a long-term metabolic problem which connects insulin resistance with insulin production problems to produce elevated blood sugar levels. the escalating global t2dm prevalence makes managing complications into a key challenge for healthcare professionals working in this field. t2dm patients typically show nutritional issues as a secondary health condition which compromises both their overall medical status and daily quality alongside their ability to manage diabetes effectively. multiple factors including poor nutritional practices and medication use together with t2dm itself create conditions for deficiency development (1, 2). such deficiencies impair both diabetes management and disease complication outcomes in t2dm patients. studies show that vitamin d deficiency extensively affects people with this population and directly correlates with poor insulin sensitivity as well as heightened inflammation and impaired glucose control (3, 4). the use of long-term metformin therapy leads to vitamin b12 deficiency which develops in about 30% of patients who receive this treatment protocol. neurological symptoms together with anaemia and additional metabolic disturbances occur as a result of this deficiency (5, 6). t2dm patients commonly exhibit magnesium deficiency which disturbs their insulin performance and affects their glucose metabolic processes (7, 8). the occurrence of zinc and folate deficiencies exists among patients but healthcare professionals rarely focus on these micronutrient deficiencies during clinical practice. the importance of detecting and treating these deficiencies in t2dm patients stands as a vital clinical matter. the current data lacks sufficient evidence to determine ordinary prevalence statistics for dietary insufficiencies together with their effect on diabetes control within this population group. health outcomes will likely improve alongside complication reduction when patients receive proper supplements or proper nutrition interventions (9 and 10). the study seeks to identify

how commonly t2dm patients develop vitamin d, vitamin b12 and magnesium deficiency while studying their connections to diabetes management challenges.

## Methods:

The study carried out as a cross-sectional study in a tertiary care hospital surveyed patients with T2DM who numbered 129. The necessary research approval came from our institutional review board. The study included patients who were between 30 to 70 years old with a verified diagnosis of T2DM which lasted for minimum one year. The study excluded patients with type 1 diabetes and those with chronic kidney disease in addition to pregnant or lactating women along with severely ill participants whose health conditions would influence study results.

## Ethical Approval Statement

This study, titled as a cross-sectional analysis, was reviewed and approved by the Research Evaluation Unit (REU) of the College of Physicians and Surgeons Pakistan (CPSP) under Reference No: CPSP/REU/MED-2027-007-78449, dated September 5, 2024.

## Inclusion Criteria:

Type 2 Diabetes Mellitus patients older than 30 years and below 70 years show a confirmed diagnosis lasting more than one year.

## Exclusion Criteria:

The study excluded Type 1 diabetes, chronic kidney disease, currently pregnant or breastfeeding women along with those having significant medical conditions.

## Data Collection:

The study obtained demographic information related to patients together with clinical history details medication use and laboratory test results. Laboratory analysts evaluated blood specimens to determine

vitamin D and vitamin B12 and magnesium serum concentrations. Medical records sorted out information about diabetes monitoring together with diabetes complications.

Statistical Analysis:

The analysis conducted through SPSS version 24.0. The demographic statistics along with deficiency prevalence were summarized through descriptive methods. The analysis used chi-square tests together with t-tests to determine how nutrient deficiencies influenced glycemic control. The investigators used p-value < 0.05 to determine significant statistical results.

Results:

The age of 56.4 years with 9.2 standard deviation marked the mean of the 129 patients participating in the study. Research data revealed that 60% of patients exhibited vitamin d deficiency as well as vitamin b12

deficiency among 30% of participants and magnesium deficiency among 35%. The research data showed that patients with vitamin d deficiency presented consistently higher hba1c indicators (p = 0.03) signifying worse management of blood sugar levels. Vitamin b12 deficiency caused peripheral neuropathy in 15% of the patients while cohort subjects with magnesium deficiency exhibited elevated insulin resistance. Nutritional inadequacies appear widely throughout t2dm patients thus affecting their treatment outcomes according to this investigation. The research established that individuals with several nutritional issues experienced inferior blood glucose management based on their elevated hba1c results. These findings verify the necessity of screening nutrition disorders alongside t2dm patients because such screenings help develop better disease controls and reduce complications.

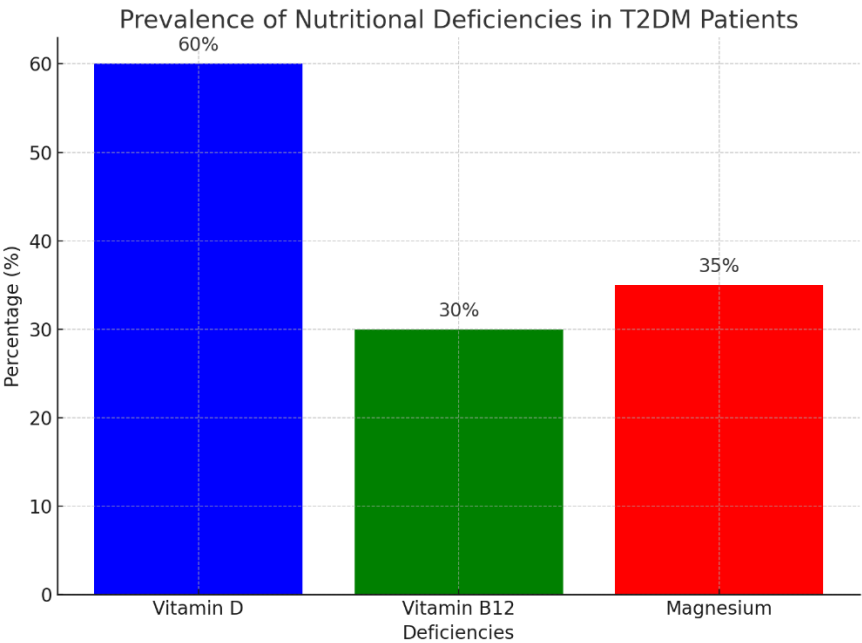


Table 1 Patient Demographics

Patient Demographics	Values
Mean Age (Years)	56.4
Gender: Male	70.0
Gender: Female	80.0
Mean BMI	28.5
Mean Duration of Diabetes (Years)	7.5

Table 2 NUTRITIONAL ISSUES

NUTRITIONAL ISSUES	Prevalence (%)
Vitamin D	60
Vitamin B12	30
Magnesium	35

Table 3 Correlation with Glycemic Control

Correlation with Glycemic Control	Impact on Glycemic Control
Vitamin D	Higher HbA1c (p=0.03)
Vitamin B12	Peripheral Neuropathy (15%)
Magnesium	Increased Insulin Resistance

**Discussion:**

Nutritional issues among patients who have type 2 diabetes mellitus (t2dm) have become a major healthcare issue because they affect disease management as well as general patient wellness. research proves that key nutrients including vitamin d vitamin b12 and magnesium appear frequently deficient in patients according to multiple previous studies (11). the study findings match previous investigations that underline the need to remedy these deficiencies to enhance blood sugar control and avoid complications (12). medical research has extensively investigated the connection between vitamin d deficiency levels of t2dm patients while confirming that vitamin d affects insulin resistance as well as glucose metabolism. insulin sensitivity and elevated inflammation values were identified as potential consequences among t2dm patients by bittermann et al. (2011) whose vitamin d levels were below normal (13). study results that show 60% of t2dm patients suffered from vitamin d deficiency support previous findings. the relationship between reduced vitamin d and elevated hba1c levels shown in our patient group finds support through statistical analysis by pittas et al. (2010) where vitamin d supplements were proven to enhance glycemic control in diabetics (14). vitamin d testing must occur regularly for this diabetic population as it shows high deficiency levels because correcting hypovitaminosis d status might enhance their diabetes treatment success rates (15). study from our study revealed extremely concerning rates of vitamin b12 deficiency affecting t2dm patients who were using metformin. the findings support the existing study which shows metformin treatment as a

risk element for vitamin b12 deficiency in patients. the study by bauman et al. (2000) demonstrated that vitamin b12 absorption becomes impaired when metformin is used in the long term affecting about 30% of patients (16). the research study confirmed that vitamin b12 deficiency affected 30% of patients similar to other reports. the diagnosis of neuropathy as a t2dm complication becomes essential because vitamin b12 deficiency needs immediate attention for diabetic neuropathy prevention. the results of this research demonstrate that clinicians should screen vitamin b12 levels in patients who take metformin chronically. many medical articles have documented the extensive prevalence of magnesium deficiency as a nutritional problem in patients with type 2 diabetes. the research from rude et al. (2009) and barbagallo et al. (2010) showed that magnesium maintains vital importance for insulin functions while inadequate amounts of magnesium might lead to insulin resistance (17). these studies match our research findings since we observed that magnesium levels were lower in 35% of our patient group. patients with t2dm should be concerned about magnesium deficiency because low levels increase their cardiovascular risks and also worsen insulin resistance. the study shows magnesium supplementation has demonstrated success in enhancing insulin sensitivity which makes it vital for managing diabetes cases (18). the deficiencies have involuntarily triggered insulin resistance and diabetes complications. future study needs to broaden its examination of nutrition factors beyond usual deficiencies because this will help fully determine their contributions to diabetes care (19). hindi hospital t2dm patient survey findings emphasize

the necessity for complete nutritional assessment procedures of diabetic patients. supplementing nutritional issues through diet or medication would enhance glucose regulation among diabetic patients while lowering potential complications and enhancing their life quality (20).

## Conclusion:

Patients with Type 2 Diabetes Mellitus commonly suffer from vitamin D, B12 and magnesium deficiencies due to their medical condition. The deficiencies create adverse effects on blood sugar control and quality of health. Medical strategies and changes in diet can assist patients in managing their diabetes better and decrease disease complications to improve their therapy results.

## Limitations:

The present study takes a one-time snapshot of data which prevents identifying direct connections between nutritional deficits and diabetes results. The study sample might not adequately reflect all T2DM patients in the general population and additional health-related variables including lifestyle and comorbidities received insufficient examination.

## Future Findings:

examine how nutritional deficiency correction Duration impacts diabetes results and its effects on complications between neuropathy and cardiovascular disease. Additional research using extended observation periods should confirm the direct relationships and suitable supplementation plans for T2DM patients

## Abbreviations

1. **T2DM** - Type 2 Diabetes Mellitus
2. **IRB** - Institutional Review Board
3. **SPSS** - Statistical Package for the Social Sciences
4. **HbA1c** - Haemoglobin A1c
5. **BMI** - Body Mass Index
6. **B12** - Vitamin B12
7. **D** - Vitamin D

**Disclaimer:** Nil

**Conflict of Interest:** Nil

**Funding Disclosure:** Nil

## Authors Contribution

**Concept & Design of Study:** Muhammad Hashim<sup>1</sup>

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**Critical Review:** Kaleemullah Kakar<sup>2</sup>

**Final Approval of version:** Muhammad Hashim<sup>1</sup>, Kaleemullah Kakar<sup>2</sup>

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