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Prevalence of Vitamin D Deficiency Among Patients Attending Oral Surgery Clinics: A Clinical Evaluation

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ABSTRACT

Background: Vitamin D plays a critical role in bone metabolism, immune regulation, and oral tissue health. Deficiency has been linked to impaired bone healing, increased susceptibility to infection, and reduced success of oral surgical procedures. Despite abundant sunlight in Libya, hypovitaminosis D remains widely reported. This study aimed to evaluate the prevalence and distribution of vitamin D deficiency among patients attending the Oral Surgery Clinic in Surman. **Methods**: A descriptive cross-sectional study was conducted from March to November 2022, including 62 patients aged 14 years and above. Serum 25-hydroxyvitamin D [25(OH)D] levels were measured and categorized as deficient (<20 ng/mL), insufficient (20–30 ng/mL), or normal (>30 ng/mL). Data were analyzed using SPSS version 21, with descriptive statistics, independent t-test, Chi-square test, and one-way ANOVA applied where appropriate. **Results**: The study population comprised 62.90% females and 37.10% males, with a mean age of 38.80 ± 17.57 years. The mean serum vitamin D level was 22.85 ± 9.72 ng/mL, indicating an overall tendency toward insufficiency. Vitamin D deficiency (<20 ng/mL) was observed in 35.5% of patients, insufficiency (20–30 ng/mL) in 45.2%, while only 19.4% had normal levels. No statistically significant differences were found between males and females regarding vitamin D levels (p = 0.072), nor across age groups (p = 0.715). **Conclusion**: Vitamin D deficiency and insufficiency are highly prevalent among patients attending oral surgery clinics in Surman, regardless of age or gender. Given vitamin D's essential role in bone healing and surgical outcomes, routine screening and appropriate management may enhance postoperative recovery and improve oral surgical care. Further studies are recommended to assess the clinical impact of correcting vitamin D deficiency prior to oral surgical interventions.

1. INTRODUCTION

Vitamin D is an essential fat-soluble prohormone involved in calcium–phosphate homeostasis, skeletal mineralization, immune regulation, and overall systemic health. Endogenous synthesis through cutaneous exposure to ultraviolet B (UVB) radiation constitutes the primary source of vitamin D, while dietary intake contributes only a minor proportion of total body stores (approximately ten to twenty percent) (Bashutski, et.al., 2011 ; Bikle, 2020 ; Diachkova, et.al., 2021).

Following hepatic and renal hydroxylation, serum 25-hydroxyvitamin D [25(OH)D] becomes the established biomarker for assessing vitamin D status because of its stability and long half-life (Dietrich, et.al., 2004). Global epidemiological studies consistently indicate that vitamin D deficiency (VDD) is widespread, affecting nearly one billion individuals, with particularly high prevalence reported in Middle Eastern and Mediterranean populations despite abundant sunlight (Hilger, et.al., 2014 ; Holick, 2003 ; Mithal, et.al., 2009). Multiple determinants—including limited sun exposure, darker skin pigmentation, cultural clothing practices, obesity, aging, and malabsorption disorders—further contribute to regional variability in 25(OH)D concentrations (Mithal, et.al., 2009 ; Mogire, et.al., 2020). In clinical dentistry, vitamin D has gained increasing relevance due to its emerging association with oral and maxillofacial conditions. Adequate vitamin D levels support alveolar bone metabolism, normal tooth mineralization, periodontal health, and mucosal immunity (Ross, 2011 ; Schroth, et.al., 2013 ; Uwitonzeet.al., 2013). Deficiency has been linked to increased susceptibility to dental caries, periodontal inflammation, impaired wound healing, and reduced osseointegration of dental implants.[12-15] In oral surgery practice, patients frequently present with chronic pain, recurrent infections, delayed postoperative healing, and bone-related pathologies—clinical patterns that may overlap with or be exacerbated by underlying hypovitaminosis D. Recent literature highlights that VDD is particularly common among individuals seeking dental or maxillofacial surgical care, underscoring a need for targeted screening in these settings (Vieth, 2001 ; Zgaga, et.a;., 2011 ; AlQuaiz, 2018). This study aims to evaluate the prevalence of vitamin D deficiency among patients attending the oral surgery clinic in Surman, Libya, and to assess variations by age and gender. Understanding the distribution of vitamin D status in this patient population will help inform clinical decision-making and emphasize the relevance of vitamin D screening as part of routine oral surgical care.

2. METHOD

2.1 Study Design

This study adopted a descriptive cross-sectional design to evaluate the prevalence and patterns of vitamin D deficiency among patients attending the Oral Surgery Clinic in Surman, Libya.

2.2 Study Setting and Population

The study was conducted at the Oral Surgery Clinic in Surman, Libya. All patients who presented to the clinic between March and November 2022 and met the eligibility criteria were included.

2.3 Inclusion and Exclusion Criteria

Inclusion criteria

- Patients aged 14 years and above.
- Individuals attending the oral surgery clinic for consultation or treatment.
- Patients who agreed to undergo vitamin D testing and provided informed consent.

2.4 Exclusion criteria

- Patients receiving vitamin D supplements or medications affecting bone metabolism.
- Individuals with known metabolic bone diseases.
- Pregnant women.

2.5 Data Collection

Serum Vitamin D Level

Venous blood samples were collected from each participant and analyzed to determine serum 25-hydroxyvitamin D [25(OH)D] concentration.

Vitamin D Status Classification

Vitamin D status was categorized according to standard clinical cutoffs:

- Deficiency: <20 ng/mL
- Insufficiency: 20–30 ng/mL
- Normal: >30 ng/mL

2.6 Ethical Considerations

Ethical approval for this descriptive study was obtained from the local health authority in Surman, Libya. Participation was voluntary, informed consent was secured from all patients, and confidentiality and anonymity were strictly maintained throughout the research.

2.7 Statistical Analysis

Data were analyzed using SPSS version 21 (IBM Corp., USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the data. Independent samples t-test, Chi-square test, and one-way ANOVA were applied as appropriate, and a p-value ≤ 0.05 was considered statistically significant.

3. ETHIC APPROVAL

Within the ethical and professional framework governing the practice, all surgical and prosthetic procedures for this case were carried out at the Ajiad Centre for Dental Medicine and Implantology in Surman, Libya. This complete course of treatment was undertaken only following the successful acquisition of the patient's formal written informed consent.

4. RESULT

The study sample consisted of 62 patients who attended the Oral Surgery Clinic in Surman, Libya. The gender distribution showed a predominance of females, who represented 62.90% of the participants, while males accounted for 37.10% (Table 1, Figure 1). This distribution reflects a higher utilization of oral surgery services by female patients during the study period.

Table 1. Gender Distribution of Patients Attending Oral Surgery Clinics

Gender	Frequency	Percentage
Male	23	37.10%
Female	39	62.90%

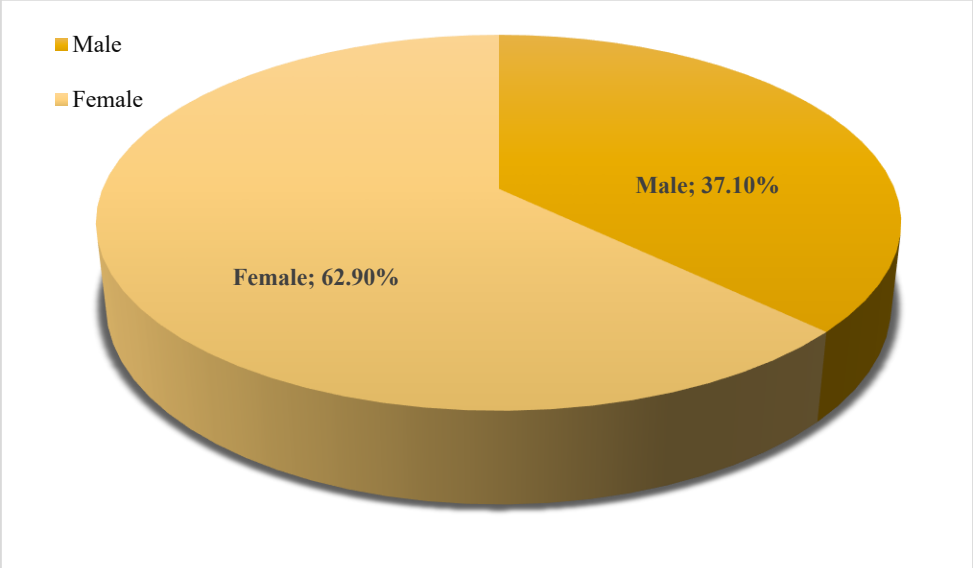

Figure 1. Gender Distribution of Patients Attending Oral Surgery Clinics

The age of participants demonstrated a wide range, extending from 14 to 75 years, with a mean age of 38.80 ± 17.57 years, indicating a heterogeneous population across adolescence, adulthood, and older age groups. Serum vitamin D levels similarly varied substantially, ranging from 3.5 to 60 ng/mL, with a mean concentration of 22.85 ± 9.72 ng/mL, suggesting an overall tendency toward suboptimal vitamin D status in this clinical cohort (Table 2, Figure 2).

Table 2. Descriptive Statistics of Age and Serum Vitamin D Levels Among Study Participants

	Max	Min	Mean	SD
Age	75	14	38.80	17.57
Vit. D	60	3.5	22.85	9.72

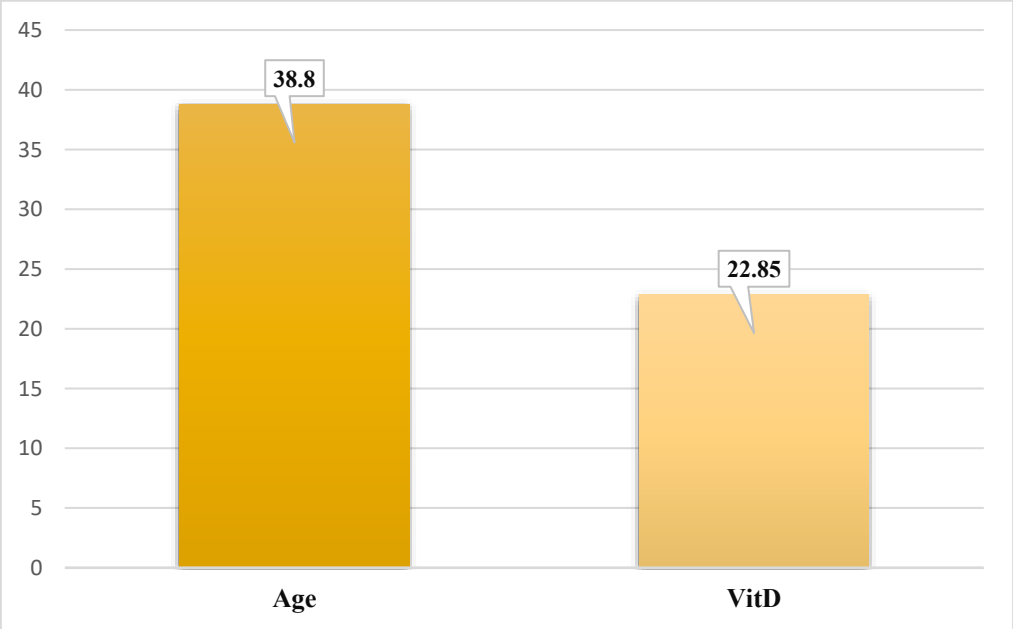

Figure 2. Age and Serum Vitamin D Level Distribution Among Patients

When comparing demographic and biochemical characteristics by gender, no statistically significant differences were observed. Male patients had a mean age of 41.13 ± 16.80 years, while females had a mean of 37.44 ± 18.08 years ($p = 0.428$). Although males exhibited a higher mean vitamin D level (25.74 ± 8.13 ng/mL) than females (21.15 ± 10.27 ng/mL), this difference did not reach statistical significance ($p = 0.072$) (Table 3, Figure 3). These findings indicate that gender was not a determining factor for vitamin D concentration within this sample.

Table 3. Comparison of Age and Vitamin D Levels Between Male and Female Patients

	Male				Female				P- value
	Max	Min	Mean	SD	Max	Min	Mean	SD	
Age	75.00	16.00	41.13	16.80	73.00	14.00	37.44	18.08	0.428
Vit. D	44.5	4.47	25.74	8.13	60	3.5	21.15	10.27	0.072

Comparison of the various parameters among the groups by Independent Samples Test.

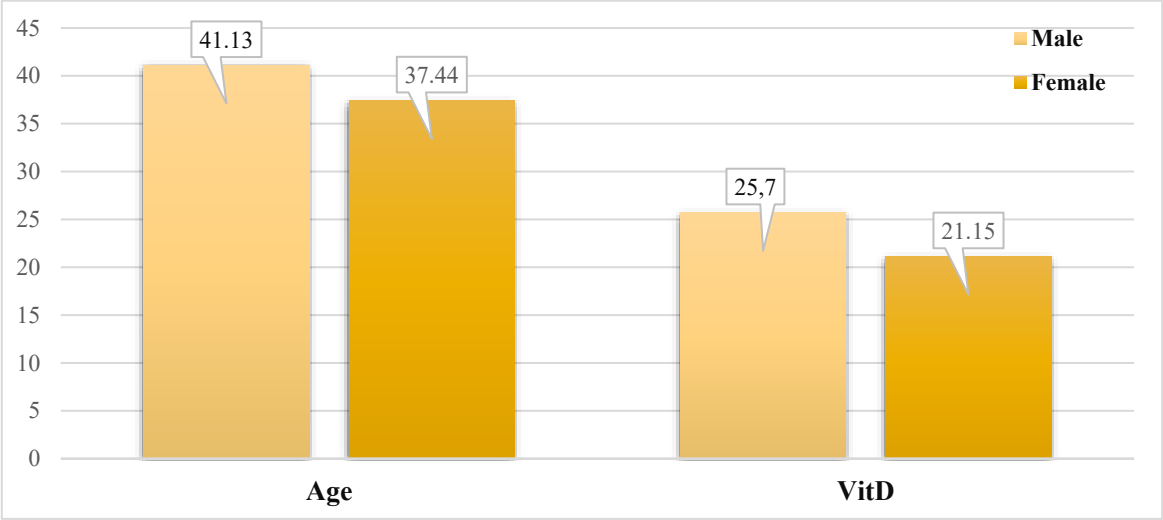

Figure 3. Comparison of Age and Serum Vitamin D Level Between Male and Female Patients

Assessment of vitamin D status categories revealed notable patterns. Vitamin D deficiency (<20 ng/mL) was identified in 35.5% of the patients, while 45.2% exhibited insufficient levels (20–30 ng/mL). Only 19.4% of participants achieved normal levels (>30 ng/mL). These distributions demonstrate that the majority of patients, regardless of presenting complaint, had vitamin D levels below the clinically accepted normal threshold (Table 4, Figure 4).

Table 4. Distribution of Vitamin D Status Categories Among Patients

Level	Frequency	Percentage
<20	22	35.5
20 - 30	28	45.2
>30 (Normal Level)	12	19.4
Total	62	100

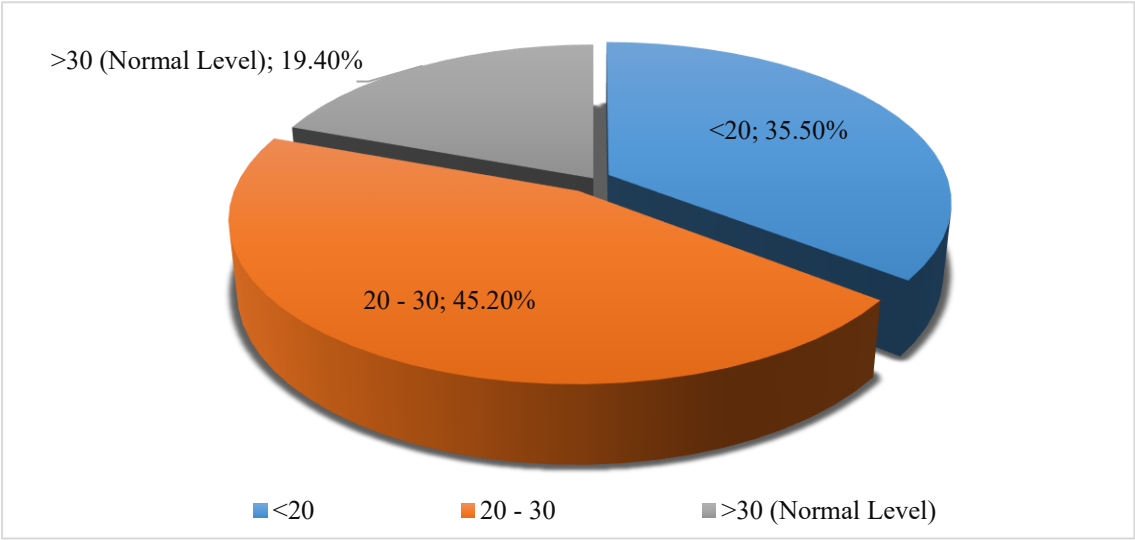

Figure 4. Distribution of Vitamin D Status Categories (<20, 20–30, >30 ng/mL)

Further examination of vitamin D status by gender showed that deficiency was more common among females (43.6%) compared with males (21.7%). However, this difference did not reach statistical significance (p = 0.115). Similarly, the proportions of insufficient and normal vitamin D levels did not differ significantly between male and female groups (Table 5, Figure 5). These findings suggest that although females appeared more affected by deficiency, the difference may not be attributable to gender alone.

Table 5. Vitamin D Status by Gender

Level	Male		Female		P- value
	Frequency	percentage	Frequency	percentage	
<20	5	21.70%	17	43.60%	0.115
20 - 30	11	47.80%	17	43.60%	
>30 (Normal Level)	7	30.40%	5	12.80%	

Comparison of the various parameters among the groups by Chi-Square Tests.

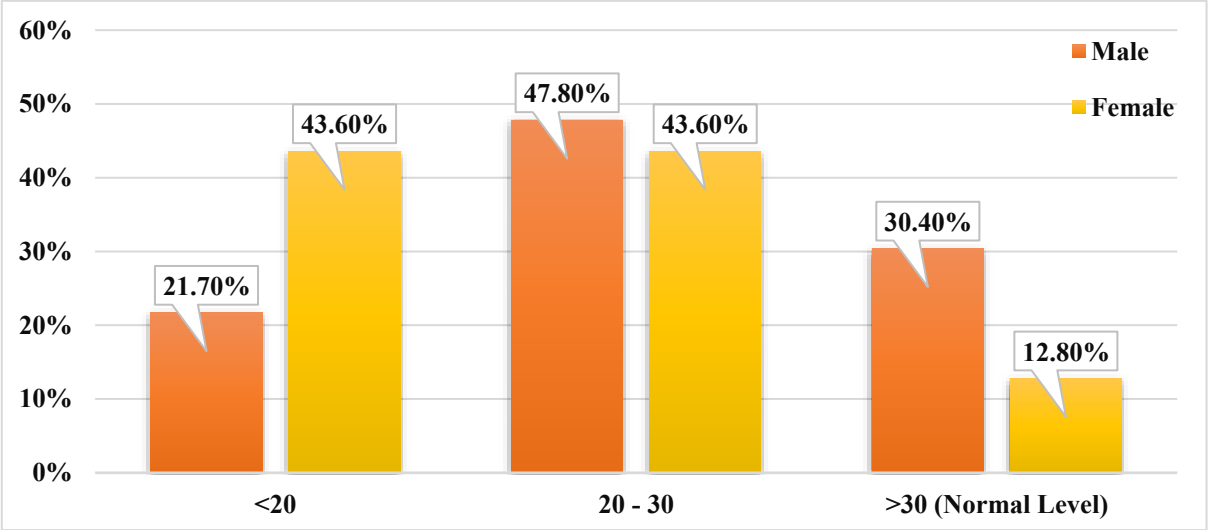

Figure 5. Comparison of Vitamin D Levels Between Male and Female Patients

Analysis of age across vitamin D categories demonstrated no statistically significant variations (p = 0.715). Patients with deficiency had a mean age of 40.00 ± 20.04 years, those with insufficiency had a mean of 37.86 ± 20.36 years, and those with normal levels had a mean age of 43.42 ± 17.54 years (Table 6, Figure 6). These results indicate that vitamin D status in this population was generally independent of age, with similar age distributions across all categories.

Table 6. Comparison of Age Across Vitamin D Status Categories

Level	Age				
	Max	Min	Mean	SD	P- value
<20	70.00	14.00	38.41	16.53	0.588
20 - 30	75.00	15.00	37.14	18.63	
>30 (Normal Level)	72	16	43.42	17.54	

Comparison of the various parameters among the groups by ANOVA.

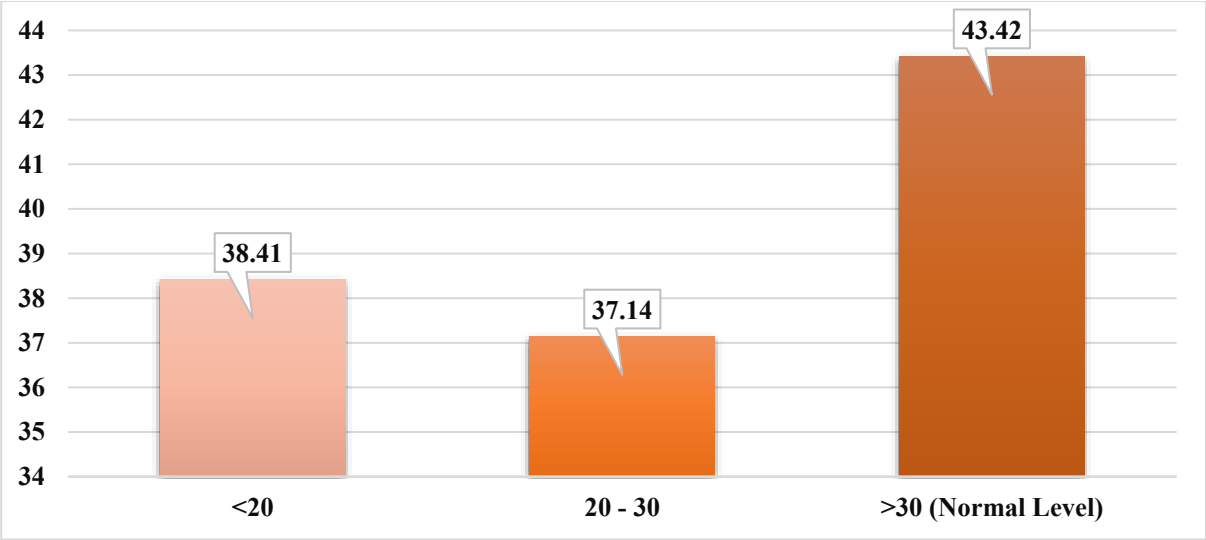

Figure 6. Mean Age Across Vitamin D Status Categories (<20, 20–30, >30 ng/mL)

5. Discussion

This clinical evaluation showed that most patients attending the oral surgery clinic in Surman had suboptimal serum vitamin D levels, despite living in a region with abundant sunlight. The mean 25(OH)D concentration of 22.85 ng/mL, together with the finding that more than 80% of participants were either deficient or insufficient, places this cohort within the global pattern of widespread hypovitaminosis D reported in epidemiological studies from many regions, including the Middle East and North Africa.[2-7] This reinforces the concept that geographic latitude and sunlight availability alone are not sufficient to guarantee adequate vitamin D status.

The study population was predominantly female, with women representing 62.9% of those attending the oral surgery clinic. This pattern may reflect differential health-seeking behavior, where women tend to utilize healthcare services more frequently and are more likely to present for dental and maxillofacial complaints.[1,2] Similar female predominance has been reported in outpatient and dental clinic populations in several settings and may be influenced by greater health awareness, cosmetic concerns, and sociocultural expectations.

Despite this higher representation of women, no statistically significant difference in serum vitamin D levels was detected between males and females, although males had a slightly higher mean value (25.74 vs 21.15 ng/mL). This is comparable to several population-based reports showing that, once lifestyle factors such as clothing, outdoor activity, and diet are taken into account, sex alone is not always an independent determinant of vitamin D status (Bikle, 2020 ; Hilgeret.al., 2014 ; Mithal, et.al., 2018). In many Middle Eastern and Mediterranean communities, female sex has been associated with a higher risk of deficiency because of more conservative clothing and reduced sun exposure,[5,7,8] but the lack of statistical significance in the present sample suggests that both men and women in this setting are broadly exposed to similar environmental and behavioral risk factors (indoor living, limited intentional sun exposure, and low dietary intake).

The distribution of vitamin D status categories is particularly noteworthy. Only 19.4% of patients achieved levels above 30 ng/mL, whereas 35.5% were frankly deficient (<20 ng/mL) and a further 45.2% were insufficient (20–30 ng/mL). These figures are comparable with multicenter and meta-analytic data from Africa and the Middle East, where deficiency and insufficiency frequently affect more than half of the adult population (Hilger, et.al., 2014 ; Lips, 2010 ; Palacios & Gonzalez, 2014). Given that the current study enrolled patients seeking oral surgical care rather than healthy volunteers, this high prevalence may also indicate that individuals requiring invasive dental procedures constitute an at-risk group in whom coexisting systemic deficiencies, including vitamin D, are common.

No significant association was observed between age and vitamin D status, either when age was considered as a continuous variable or when compared across deficiency, insufficiency, and normal categories. Although many studies describe an age-related decline in 25(OH)D concentrations—attributed to reduced cutaneous synthesis, comorbidities, and lower dietary intake in older adults (Dietrich, et.al., 2004 ; Holick, 2003 ; AlQuaiz, et.al., 2013), other reports highlight that lifestyle patterns such as sun avoidance, indoor occupations, and reduced outdoor activity can lead to similar or even higher deficiency rates in younger and middle-aged adults (Holick, 2003 ; Lips, 2010).

The relatively homogeneous distribution of vitamin D levels across age groups in this study suggests that behavioral and environmental factors are likely affecting all age strata in Surman in a similar manner.

From an oral surgery perspective, the high burden of hypovitaminosis D in this cohort has important clinical implications. Vitamin D is essential for calcium–phosphate homeostasis, bone remodeling, and immune modulation; inadequate levels may negatively affect alveolar bone density, osseous healing after extractions, and the success of procedures such as implant placement, bone grafting, and periodontal surgery (Ross, 2011 ; Zgaga, 2011). Experimental and clinical studies have demonstrated that sufficient vitamin D status can enhance bone formation, support implant osseointegration, and improve soft-tissue healing, whereas deficiency may be associated with delayed recovery, increased postoperative pain, and greater susceptibility to infection (Schroth, et.al., 2013 ; Uwitonze, et.al., 2018 ; Vieth, 2001). Although this study did not directly evaluate surgical outcomes, the biochemical profile of the patients indicates that many are not in an optimal metabolic condition for bone and wound healing.

Several contextual factors may underlie the observed high prevalence of low vitamin D levels in Surman. These likely include limited intentional sun exposure due to hot climate, indoor working patterns, cultural clothing practices, and low dietary intake of vitamin D–rich foods or supplements, as highlighted in regional and global literature (Diachkova, et.al., 2021 ; Hilger, et.al., 2014 ; Palacios & Gonzalez,) 2014).

The absence of statistically significant sex- and age-related differences does not diminish the clinical relevance of these findings; instead, it emphasizes that vitamin D insufficiency is a generalized problem in this patient group, rather than confined to a particular demographic subset. This has practical implications for oral and maxillofacial surgeons (AlQuaiz, et. al., 2018).

6. Conclusion

This study revealed a considerable prevalence of vitamin D deficiency and insufficiency among patients attending the oral surgery clinic in Surman, with most individuals exhibiting serum 25(OH)D levels below the clinically accepted normal range. The lack of significant differences in vitamin D status between males and females, as well as across age groups, indicates that deficiency is a widespread issue affecting the entire clinic population rather than being concentrated in specific demographic categories. These findings align with regional and global evidence showing that hypovitaminosis D remains common even in sun-rich areas, likely due to lifestyle, environmental, and behavioral factors.

Given the essential role of vitamin D in bone healing, osseointegration, and immune function, the high prevalence observed in this cohort holds important implications for oral and maxillofacial practice. Suboptimal vitamin D levels may adversely influence postoperative outcomes and bone-related procedures, making routine assessment of vitamin D status beneficial, particularly for patients undergoing invasive interventions such as extractions, implant placement, and bone grafting. Further multicenter studies are recommended to explore the impact of vitamin D optimization on surgical outcomes and to support the integration of vitamin D screening into preoperative protocols in oral surgery settings.

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