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AN EXAMINATION OF THE RELATIONSHIP BETWEEN VITAMIN B AND D INTAKE AND DEPRESSIVE SYMPTOMS AMONG SAUDI ADULTS

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Abstract

Background: Although prior research has suggested a role for vitamins B and D in supporting mental well-being, evidence regarding their relationship with depression in general populations remains inconclusive. This study aimed to evaluate the association between self-reported intake of vitamins B and D, depressive symptoms, beliefs about mental health benefits, and consultation behaviors among Saudi adults.

Methods: A cross-sectional survey was conducted among 618 adults in Saudi Arabia. The questionnaire assessed supplement use, depression symptoms, and consultation frequency with healthcare professionals. Data were analyzed using descriptive statistics, ordinal logistic regression, and predictive probability models.

Results: No statistically significant association was found between the frequency of vitamin B or D intake and reported depression severity. While 85% of participants believed in the mental health benefits of these vitamins, 40% had never consulted a healthcare provider before using supplements. Participants who reported frequent consultation exhibited lower probabilities of severe depression symptoms, whereas those who rarely or never consulted showed higher severity levels.

Conclusion: These findings indicate that self-directed vitamin supplementation may not substantially reduce depressive symptoms in the absence of professional guidance. Encouraging consultation with healthcare providers and integrating mental health awareness into nutritional education may enhance supplement use effectiveness. Future studies should incorporate objective nutrient assessments and standardized clinical tools to clarify these associations.

Keywords: depression, vitamin B, vitamin D, consultation behavior, supplementation, Saudi Arabia, mental health

INTRODUCTION

Micronutrients play a vital role in maintaining neurological function and emotional stability. Among these, B-complex vitamins—particularly B6 (pyridoxine), B9 (folate), and B12 (cobalamin)—are essential for neurotransmitter synthesis, homocysteine metabolism, and the formation of the myelin sheath (Mikkelsen et al., 2016). Likewise, vitamin D, though traditionally associated with bone health, acts as a neurosteroid that influences brain development, synaptic plasticity, and inflammatory regulation through its interaction with vitamin D receptors (Eyles et al., 2005; Groves et al., 2014).

Depression is a common psychiatric condition, characterized by persistent low mood, anhedonia, fatigue, and cognitive impairment, affecting more than 280 million individuals globally (World Health Organization [WHO], 2021). In Saudi Arabia, the burden of depressive symptoms appears to be rising, particularly among young adults and women—a trend possibly driven by sedentary lifestyles, nutritional shifts, and psychosocial stressors (Alharbi et al., 2022).

Emerging literature supports the link between micronutrient deficiencies and mental health disorders. For instance, low levels of folate and vitamin B12 have been consistently associated with increased risk of depressive symptoms (Mikkelsen et al., 2016). Almeida et al. (2015) demonstrated that vitamin B12 deficiency in older adults was significantly correlated with depressive risk, while other studies have found that supplementation with methylfolate may enhance antidepressant response, particularly in treatment-resistant cases (Papakostas et al., 2012).

Vitamin D has also received attention in psychiatric research due to its potential role in mood regulation. Meta-analytic evidence suggests that vitamin D supplementation may improve depressive symptoms, particularly in individuals with deficient baseline levels (Spedding, 2014; Li et al., 2022). In Saudi Arabia, where vitamin D deficiency is highly prevalent—especially among women—fatigue, low mood, and general malaise have been frequently reported symptoms (Alharbi et al., 2022).

Despite accumulating clinical and biochemical evidence, population-based studies exploring self-reported vitamin intake and mental health remain scarce in Saudi Arabia. Most existing research focuses on serum-level assessments and overlooks behavioral patterns, cultural perceptions, and self-guided supplement use. This study addresses this gap by investigating the association between self-reported intake of vitamins B and D and depressive symptoms among Saudi adults, while also considering participants' beliefs and practices related to supplementation in the absence of clinical supervision.

Research Aim

This study aims to examine the association between the self-reported intake of vitamins B and D and depressive symptoms among Saudi adults. It also investigates individuals' beliefs about the mental health benefits of these vitamins and their consultation behavior with healthcare professionals prior to supplementation.

Hypotheses

H1: Individuals who frequently consume vitamin B and/or D supplements are less likely to report severe depressive symptoms.

H2: Stronger belief in the mental health benefits of vitamins B and D is associated with a higher likelihood of consulting a healthcare professional before taking supplements.

METHODS

Study Design

This study employed a **cross-sectional observational design** to examine the association between self-reported intake of vitamins B and D and depressive symptoms in a sample of Saudi adults. The design was chosen to capture data on exposure (vitamin intake) and outcome (depressive symptoms) simultaneously, thereby enabling the identification of potential correlations without establishing causality.

Data Sources and Participants

Data were collected via a structured, self-administered online questionnaire distributed between January 10 and April 10, 2025, through social media platforms and university mailing lists. A total of 618 responses were obtained. Inclusion criteria were: (1) age 18 years or older, (2) Saudi nationality, and (3) ability to provide informed consent. Non-Saudi participants and incomplete responses were excluded from the final analysis.

Measures and Instruments

- **Vitamin B and D Intake**: Assessed through self-reported frequency of supplement use (never, 1–2 times/week, 3–4 times/week, 5–6 times/week, or daily) and primary source of intake (food, supplements, both, or unknown).
- **Depressive Symptoms**: Evaluated using adapted items based on common clinical screening questions (e.g., frequency of low mood, anhedonia, fatigue, concentration difficulties, and sleep disturbances). Responses were recorded on a Likert scale (Never, Rarely, Sometimes, Often, Always).
- **Perceptions and Behaviors**: Additional items explored beliefs about the role of vitamins in mental health and whether participants consulted healthcare professionals before initiating supplements.

Data Analysis

Quantitative data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics (frequencies, percentages, means, standard deviations) summarized demographic variables and vitamin intake patterns. Bivariate analyses, including Chi-square tests and one-way ANOVA, were conducted to assess differences in depressive symptom scores across vitamin intake groups. A binary logistic regression model was used to identify predictors of high depressive symptom burden, controlling for age, gender, employment status, and education level. A significance threshold of $p < 0.05$ was adopted.

Reproducibility and Validity

All survey items were piloted among a subsample (n = 30) to ensure face validity and internal consistency. The final version was distributed using standardized procedures. Statistical analyses followed established guidelines to ensure replicability. Raw data and syntax are available upon reasonable request from the corresponding author.

Ethical Considerations

Ethical approval was obtained prior to the commencement of the study. Participation was voluntary, and electronic informed consent was secured from all respondents before initiating the survey. All data were collected anonymously and stored securely in accordance with applicable data protection and privacy regulations.

RESULT

A total of 618 participants were included in the analysis. As shown in Table 1, the majority were female (69.4%) and Saudi nationals (93.7%). Over half of the respondents held a bachelor's degree (55.5%), and 45% were students. Other employment categories included employed (30.7%), unemployed (13.1%), and retired individuals (11.2%).

Table 1: Sociodemographic Characteristics of the Participants (N = 618)

Variable	Category	n	%
Gender	Male	189	30.6
	Female	429	69.4
Nationality	Saudi	579	93.7
	Non-Saudi	39	6.3
Education Level	High school or less	142	23
	Diploma	60	9.7
	Bachelor's degree	343	55.5
	Postgraduate	73	11.8
Employment Status	Student	278	45
	Employed	190	30.7
	Unemployed	81	13.1
	Retired	69	11.2

Regarding supplement behaviors (Table 2), most participants reported infrequent use of vitamin B and D supplements. Only 7.6% and 6.5% used vitamin B and D daily, respectively. Consultation with healthcare professionals before

supplement use was common, with 41.3% reporting consistent consultation. A strong belief in the mental health benefits of vitamin use was also prevalent: over half (52.6%) strongly agreed with this belief.
Concerning mental health symptoms, approximately half of the participants reported sometimes feeling depressed (49.2%) and experiencing loss of interest (50.2%). Fatigue, difficulty focusing, and sleep disturbances were also common, particularly at the "sometimes" and "often" levels.

Table 2: Distribution of Vitamin Use, Consultation Behaviors, and Mental Health-Related Symptoms (N = 618)

Variable	Category	n	%
Vitamin B Intake Frequency	Never	440	71.20%
	Daily	47	7.61%
	1–2 times/week	91	14.72%
	3–4 times/week	31	5.02%
	5–6 times/week	9	1.46%
Vitamin D Intake Frequency	Never	341	55.18%
	Daily	40	6.47%
	1–2 times/week	194	31.39%
	3–4 times/week	33	5.34%
	5–6 times/week	10	1.62%
Consultation Before Supplement Use	Never consult	128	20.71%
	Sometimes consult	160	25.89%
	Always consult	255	41.26%
	Rarely	75	12.14%
Belief in Mental Health Benefit	Strongly disagree	12	1.94%
	Disagree	13	2.10%
	Neutral	66	10.68%
	Somewhat agree	202	32.69%
	Strongly agree	325	52.59%
Feeling Depressed	Never	35	5.66%
	Rarely	132	21.36%
	Sometimes	304	49.19%
	Often	115	18.61%
	Always	32	5.18%
Loss of Interest	Never	66	10.68%
	Rarely	112	18.12%
	Sometimes	310	50.16%
	Often	130	21.04%
Fatigue/Low Energy	Never	29	4.69%
	Rarely	64	10.36%
	Sometimes	251	40.61%
	Often	155	25.08%
	Always	119	19.26%
Difficulty Focusing	Never	46	7.44%

	Rarely	85	13.75%
	Sometimes	259	41.91%
	Often	143	23.14%
	Always	85	13.75%
Sleep Pattern Changes	Never	50	8.09%
	Rarely	92	14.89%
	Sometimes	219	35.44%
	Often	141	22.82%
	Always	116	18.77%

Chi-square tests were conducted to assess associations between supplement behaviors, beliefs, and depressive symptoms (Table 3). No significant association was found between frequency of vitamin B intake and depression levels ($\chi^2(16) = 13.34$, $p = .648$). However, consultation behavior before supplement use was significantly associated with belief in the mental health benefits of vitamins ($\chi^2(12) = 41.34$, $p < .001$), indicating that individuals who consistently consulted professionals were more likely to hold strong positive beliefs.

Table 3: Bivariate Associations Between Vitamin Intake, Consultation Behaviors, Beliefs, and Depression (N = 618)

Variables	Chi-square (χ^2)	df	p-value
Vitamin B intake × Depression	13.34	16	0.648
Consultation behavior × Belief in mental health benefit	41.34	12	< .001***

An ordinal logistic regression model was used to examine whether supplement intake, consultation behaviors, and beliefs predicted levels of depressive symptoms (Table 4). The model was not statistically significant ($\chi^2(4) = 0.41$, $p = .982$), with a negligible pseudo R^2 of 0.0003, indicating very limited explanatory power. None of the individual predictors showed significant associations.

Table 4: Ordinal Logistic Regression Predicting Depressive Symptoms (N = 618)

Predictor	Odds Ratio (OR)	SE	95% CI	p-value
Vitamin B intake	1.015	0.037	[0.944, 1.090]	0.692
Vitamin D intake	1.008	0.034	[0.944, 1.076]	0.815
Consultation behavior	1.006	0.079	[0.862, 1.173]	0.943
Belief in benefit	1.006	0.089	[0.845, 1.198]	0.946

Model fit: $\chi^2(4) = 0.41$, $p = .982$, Pseudo $R^2 = .0003$
Note. OR = Odds Ratio; SE = Standard Error; CI = Confidence Interval.

As illustrated in Figure 1, participants who reported always consulting a healthcare professional before taking supplements had the highest counts of mild to moderate depressive symptoms (i.e., "sometimes" and "rarely" depressed), with relatively fewer reporting severe symptoms ("always" or "often" depressed). In contrast, those who rarely consulted tended to report higher proportions of "often" or "always" depressed states, despite having fewer total participants. This visual trend suggests a potential pattern between proactive consultation and lower self-reported depressive severity.

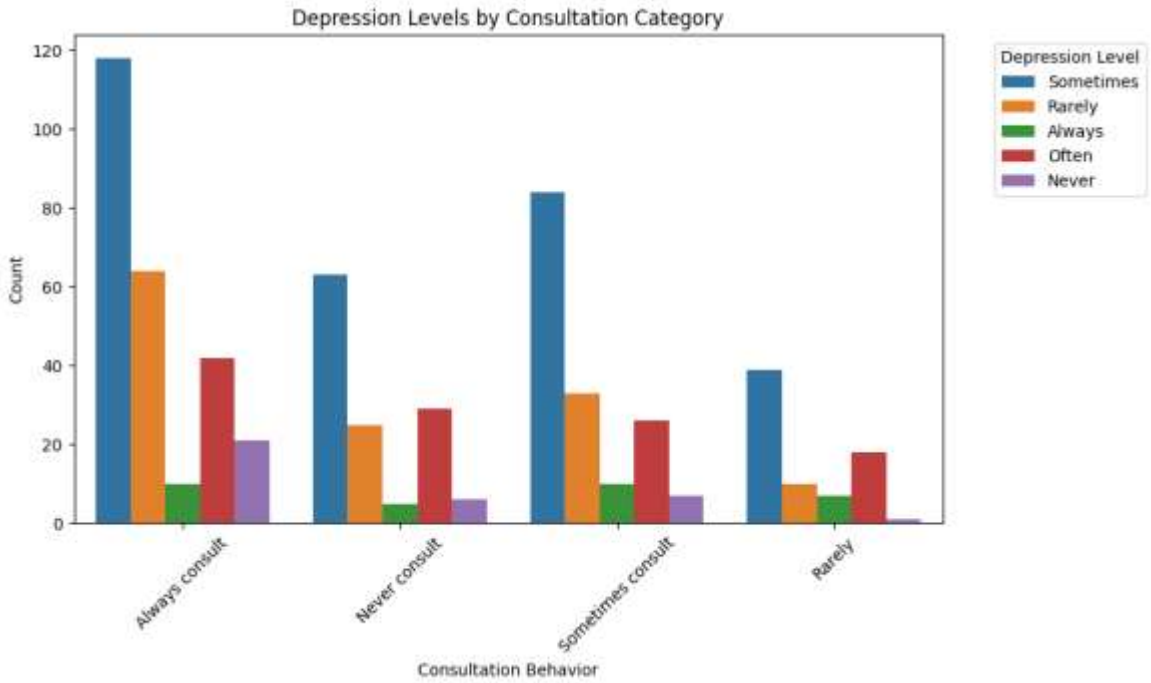

Figure 1. Distribution of Depression Levels by Consultation Behavior Before Taking Vitamins

Figure 2 displays the predicted probabilities of depression severity levels across different consultation behaviors. Participants who rarely consulted exhibited a notably higher probability of falling into the "high" and "very high" depression categories. In contrast, those who always consulted showed greater probabilities for “low” and “moderate” levels, with relatively fewer predicted in the severe range. This suggests a possible association between frequent consultation and reduced likelihood of severe depressive symptoms.

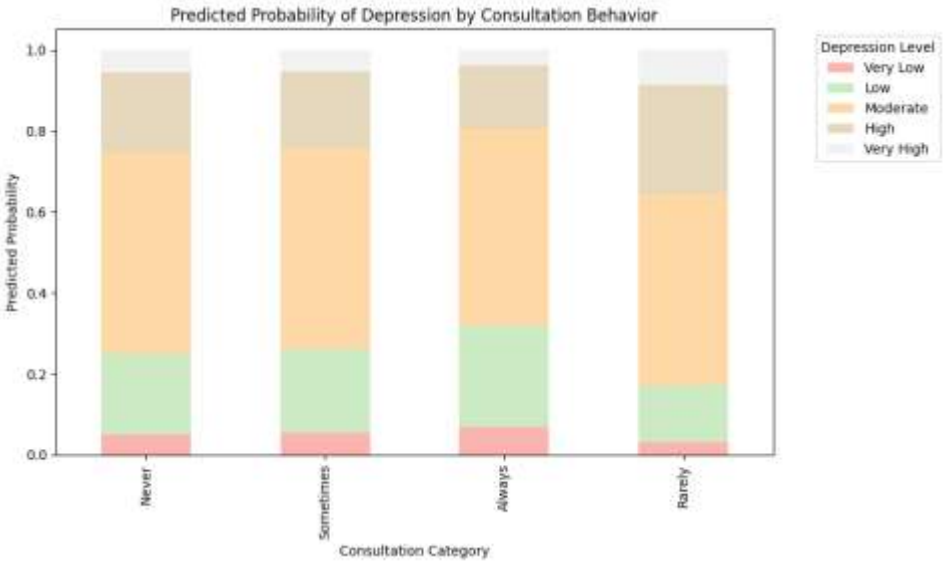

Figure 2. Predicted Probability of Depression Levels by Consultation Category Before Taking Vitamins

Figure 3 presents the ordered logistic regression coefficients estimating the effect of various predictors on depression severity. The strongest positive association was observed with the belief that vitamins are ineffective (“Belief Disagree”), followed by “Belief Strongly Agree” and “Belief Somewhat Agree.” Infrequent consultation (e.g., “Rarely

consult") and moderate vitamin B intake (3–4 times/week) were also positively associated with higher depression severity. Conversely, daily intake of vitamins and frequent consultation (e.g., "Always consult") were associated with lower depression severity, although the effect sizes were smaller.

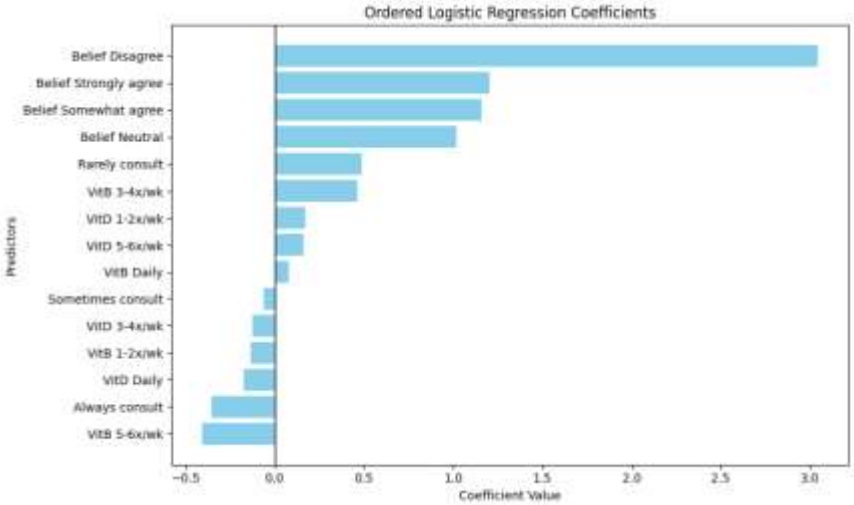

Figure 3. Ordered Logistic Regression Coefficients for Predictors of Depression Severity

Figure 4 displays the coefficient estimates and 95% confidence intervals from the ordinal logistic regression model assessing the relationship between consultation behavior and depression levels. Positive coefficients indicate higher odds of being in a more severe depression category. Compared to those who "Never consult," participants who "Always consult" or "Sometimes consult" had significantly lower odds of reporting higher depression levels, with negative coefficient estimates. The reference category for depression transition is "Never/Rarely," and stepwise thresholds (e.g., "Rarely/Sometimes") are shown along with behavioral predictors. These findings reinforce the potential protective role of consultation behavior in mitigating depression severity.

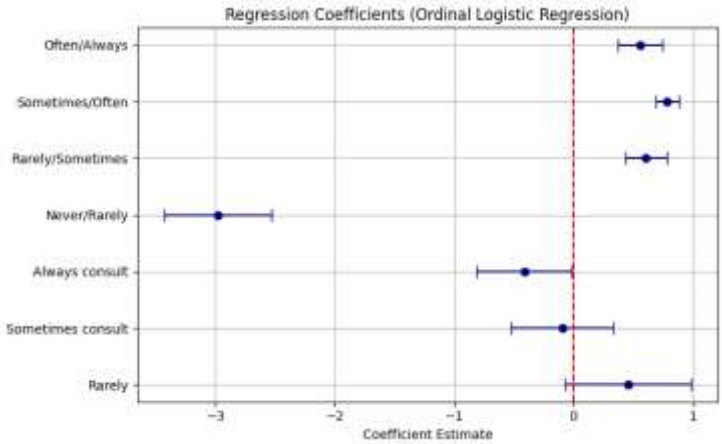

Figure 4 Ordinal Logistic Regression Coefficients with 95% Confidence Intervals for Depression Levels

DISCUSSION

This study aimed to explore the association between self-reported intake of vitamins B and D and depressive symptoms among Saudi adults. Contrary to findings in prior clinical and observational studies, no statistically significant relationship was found between frequency of vitamin intake and levels of depression. This contrasts with earlier

studies, such as those by Mikkelsen et al. (2016) and Almeida et al. (2015), which found associations between vitamin B deficiencies and increased depressive risk, particularly among older adults.

Interestingly, despite 85% of participants expressing belief in the mental health benefits of vitamin B and D supplements, over 40% had never consulted a healthcare provider before beginning supplementation. This is consistent with previous research conducted in the Saudi context, where unsupervised supplement use is common due to widespread vitamin D deficiency, especially among women (Alharbi et al., 2022). These findings raise concerns, especially considering that participants who engaged in self-medication without clinical guidance still reported symptoms of low mood, fatigue, and concentration difficulties.

While some randomized controlled trials and meta-analyses have identified a modest effect of vitamin D supplementation on depressive symptoms—particularly in individuals with clinically confirmed deficiency—such benefits appear contingent upon biological assessment. For instance, Spedding (2014) argued that studies without serum-level verification tend to produce inconclusive outcomes. Li et al. (2022) and Tolppanen et al. (2012) similarly emphasized the role of objective deficiency markers, with the latter linking adolescent vitamin D deficiency to depression in adulthood.

Comparable observations have been made for vitamin B. Long and Benton (2013) demonstrated that B vitamin supplementation may alleviate stress-related mood disturbances in healthy populations, while Lewis et al. (2017) reported that B12 and folate enhanced the effectiveness of SSRIs in treatment-resistant depression cases. These findings support the idea that micronutrient supplementation may be more effective when paired with structured clinical intervention, rather than used independently.

Additionally, insights from Alhur et al. (2024) underscore the broader context of self-medication behaviors in Saudi Arabia. Their study revealed significant knowledge gaps and unsafe practices in relation to anxiety medication use, reinforcing the importance of professional consultation in mental health-related self-care.

This study is not without limitations. The cross-sectional design restricts causal interpretation, while the reliance on self-reported data may introduce recall and reporting biases. The absence of validated diagnostic tools for depression and lack of biochemical assessments to verify vitamin deficiency further limit the generalizability of findings. Nevertheless, the results provide critical insights into public perceptions and behaviors regarding supplement use and its perceived mental health benefits.

Future research should adopt longitudinal approaches, incorporate biochemical markers, and use validated screening tools to better understand the interplay between micronutrient status and psychological well-being. A more integrated strategy involving nutritional counseling and mental health care is essential to address both perceived and actual deficiencies among at-risk populations.

CONCLUSION

This study explored the association between self-reported intake of vitamins B and D and depressive symptoms among Saudi adults, while also examining beliefs and consultation behaviors related to supplementation. The findings revealed no statistically significant association between vitamin intake frequency and depression levels, diverging from prior clinical evidence suggesting a protective effect of B and D vitamins on mood disorders. Despite a strong belief in the mental health benefits of these supplements, a substantial proportion of participants reported using them without professional consultation.

The results highlight the complexity of addressing depressive symptoms through micronutrient supplementation alone, especially when not clinically guided or tailored to individual needs. Public health initiatives should emphasize the importance of medical consultation prior to supplement use, particularly given the potential risks of unsupervised intake and the multifactorial nature of depression.

Future research should employ longitudinal methods, include biochemical validation of nutrient levels, and use standardized mental health assessment tools to more accurately determine the role of vitamins in psychological well-being. Ultimately, a more integrated approach that combines nutritional, psychological, and clinical support may be necessary to improve mental health outcomes in the Saudi population.

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