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Letter to Editor

Prevalence of Vitamin B12 Deficiency in Wadi Etba Population, Southern Libya

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Dear Editor

One of the elements that is essential for many physiological processes is vitamin B12 which has an important role in red blood cell production and maintenance of nervous system. Vitamin B12 is is also crucial in DNA synthesis and repair to maintain cellular health, tissue integrity and plasticity. (1). A high prevalence of vitamin B_{12} deficiency has been reported in developing countries, which begins at a young age and continues throughout life. It is estimated that 6-40% of people over 60 years old suffer from vitamin B_{12} deficiency (2). The human body requires about 2.4 micrograms of vitamin B_{12} daily, while large amounts of vitamin B_{12} are also stored in the liver. Beneficial microbes in the gastrointestinal tract were demonstrated to use vitamin B12 to improve the body's defenses (3). However, patients with vitamin B_{12} deficiency are at risk of developing irreversible neurological complications if left undiagnosed. Factors such as pregnancy, breastfeeding, and menstruation can deplete vitamin B_{12} stores in women, especially those of childbearing age (4). Vegetarian young adults and adolescents are at a higher risk of developing vit B_{12} deficiency. Those who are exclusively breastfed by mothers and their mothers are deficient in vitamin B_{12} or children born to mothers who are deficient in vitamin B_{12} are also at risk (5).

For early diagnosing and treating vitamin B_{12} deficiency, lower and higher cutoff values were used. Deficiency and insufficiency were defined when vitamin B12 level is below the low limit (low cutoff) and a lower limit of reference range (high cutoff), respectively. By identifying at-risk groups, public health initiatives can be more effectively targeted to prevent and treat vitamin B12 deficiency and thereby improve the overall health outcome. Therefore, this study aimed to determine the prevalence of vitamin B12 deficiency in a population and identify at-risk age groups associated with a deficiency and inadequate intake in in Wadi Etba population, southern Libya.

In this study, data was collected for 240 participants (161 females, 79 males). The assessment of vitamin B12 level (Snibe MAGLUMI X3, Shenzhen New Industry Biomedical Engineering Co., China) was undertaken from March 2022 to March 2024 in Al-Abden Medical Laboratory, Wadi

Etba region, Libya. A subject with multiple records and who received vitamin B12 were not enrolled. Participants were divided into three age groups of 1-30, 31-40 and 41-82 years. Vitamin B12 level was also classified according to gender. The reference range for serum vitamin B12 level by the laboratory was defined 200-1100 pg/mL. Vitamin B_{12} status was defined as deficiency, insufficiency and a normal level according to the low and high-cutoff values. The low-cutoff value for vitamin B12 deficiency was confirmed when the vitamin B12 level was less than 200 pg/mL. A high-cutoff value of the risk of having vitamin B12 insufficiency was described when vitamin B12 level was less than 450 pg/mL and a normal level of vitamin B12 was considered when vitamin B12 level was 450-1100 pg/mL (6). Data were presented as mean±standard deviation, percentage and median. SigmaPlot software (version 14.0) was used for statistical analysis. Chi-square assessed the association between categorical variables. Analysis of variance (ANOVA) compared the mean of vitamin B12 level in relation to gender. A $p<0.05$ was considered significant.

Thirty (12%) individuals suffered from vitamin B12 deficiency, while 103 (43%) subjects were insufficient, and 107 (45%) had a normal vitamin B12 level. The insufficiency rate for females was higher in both young and elderly women, while at mid-age, the normal level of vitamin B12 was higher for females. There was a significant association between gender, age, and vitamin B12 status. Vitamin B12 deficiency at middle-age was higher in both females and males. Vitamin B12 deficiency was significantly higher in males than in females. Regarding insufficiency and a normal level of vitamin B12, no significant difference was seen between females and males. No significant difference was seen in relation to vitamin B12 level among different age groups for both males and females. Table 1 shows a comparison of vitamin B12 level among females and males in the area. The comparison of vitamin B12 level in relation to age in the region was demonstrated in Table 2. Also, comparison of vitamin B12 level in relation to both age and gender in the area was illustrated in Table 3.

The global prevalence of vitamin B12 deficiency varies significantly depending on the region, age, diet, and socioeconomic status. Our study revealed that the prevalence of vitamin B12 deficiency was at the lower global range (12%), but there is still a concern in the regions as the population consumes just animal food sources. In a previous study, vitamin B12 deficiency affected 2.5-26% of the general population (1). Another study revealed the prevalence in elderly population over 60 years old in Libya to be 4.6% due to factors such as a decreased absorption capacity (7). In our study, almost half of the population (43%) was at risk of developing deficiency. In one study, it was shown that 34% of older adults had insufficient level of vitamin B12 (8).

However, females of childbearing age were demonstrated to be at a higher risk than males for vitamin B12 insufficiency, due to factors such as pregnancy, breastfeeding, and menstruation (9). In our study, the insufficiency rate for females was higher in both young and elderly women, while at mid-age, the normal level of vitamin B12 was higher for females. So our population faced a significant risk of deficiency if not treated for vitamin B12 insufficiency. The level of vitamin B12 in our study (45%) is lower than another report revealing that 17.8% had vitamin B12 deficiency, 19.3% suffered from insufficiency, and 62.9% were normal (10).

Table 1: Comparison of vitamin B12 level among females and males in Wadi Etba population, Southern Libya.

Vitamin B12 status	Female (pg/mL)	Male (pg/mL)	*P* value
Deficient	139.6±27	169.6±32	0.041
Insufficient	328.6±68	329.3±62	0.754
Normal level	703.1±231	706.6±253	

Table 2: Comparison of vitamin B12 level in relation to age among Wadi Etba population, Southern Libya.

Vitamin B12 status	Age group (years)	All participants (pg/mL)	*P* value
Deficient	(1-30) to (31-40)	147.2±32	0.702
	(31-40) to (41-82)	146.3±29	
	(1-30) to (41-82)	152.5±37	
Insufficient	(1-30) to (31-40)	326.4±62	
	(31-40) to (41-82)	337.1±68	
	(1-30) to (41-82)	325.8±68	
Normal level	(1-30) to (31-40)	672.3±210	
	(31-40) to (41-82)	701.1±240	
	(1-30) to (41-82)	724.1±250	

Table 3: Comparison of vitamin B12 level in relation to age and gender in Wadi Etba population, Southern Libya.

Vitamin B12 status	Age group (years)	Female (pg/mL)	Male (pg/mL)	*P* value
Deficient	(1-30) to (31-40)	133.3±22	188.7±8	0.060
	(31-40) to (41-82)	141.7±26	188.5±12	
	(1-30) to (41-82)	143.3±43	158.7±35	
Insufficient	(1-30) to (31-40)	330.5±67	312.0±44	
	(31-40) to (41-82)	332.3±65	344.6±77	
	(1-30) to (41-82)	324.5±74	327.7±61	
Normal level	(1-30) to (31-40)	679.7±207	659.1±229	
	(31-40) to (41-82)	710.2±229	640.0±199	
	(1-30) to (41-82)	709.1±231	744.6±278	

In our study, there was a significant association between gender, age, and vitamin B12 status. Vitamin B12 deficiency at middle-age was higher in both females and males. Therefore, these findings indicate that different age groups exhibit varying risks of vitamin B12 deficiency, insufficiency, or have a normal level among males and females. A previous study displayed a widespread vitamin B12 deficiency among elderly, but no specific age group was at risk for screening (8). Our study showed vitamin B12 deficiency was significantly higher in males than in females. In contrast, a previous study indicated that serum vitamin B12 level was higher in women than in men (4). It seems that gender significantly influences the manifestation of vitamin B12 deficiency that can be due to biological factors, dietary patterns, and health conditions. Therefore, it is crucial for public health strategies to include gender-specific dietary recommendations and supplementation programs such as vitamin B12. Regarding insufficiency and a normal level of vitamin B12 in our study, no significant difference was seen between females and males suggesting presence of similar risk factors for insufficiency and a normal level of vitamin B12 for both genders. Our study revealed no significant difference in relation to vitamin B12 level among different age groups for both males and females. In a previous study, vitamin B12 level was shown not to be significantly affected by gender and age (9) revealing that the variables do not have a significant interaction to affect the status of vitamin B12.

In conclusion, the population in this area was demonstrated to be at risk of developing vitamin B12 deficiency due to inadequate food intake, specifically among middle-aged females. So it is crucial to improve the vitamin B12 level through public health interventions, especially by raising awareness about vitamin B12 sources.

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Authors' Contribution

A.M.N developed the research question, designed the study and analysis plan, wrote the initial draft, and created the figures. A.M.A collected data, provided materials and equipment, organized the research data, and edited the manuscript.

Conflicts of Interest

There is no conflict of interest.

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