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Research Article

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Awareness of the Importance and Deficiency of Vitamin B12 among Saudi Population

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ABSTRACT

Background: A deficiency in vitamin B12 could result in particular consequences which need consideration. This research aims to measure the awareness level with regard to the importance and deficiency of vitamin B12 among Saudi population. Methods: A population-based cross-sectional study was conducted in December 2019 among Saudi women and men who aged over 18 years. A sample of 489 subjects participated. The data was collected through an electronic questionnaire that had been distributed through social media. Data were analyzed using SPSS version 20. Results: Among all participants, 22.1% have never heard about vitamin B12. Among the studied population, 56.6% identified the importance of vitamin B12 intake to the body, 49.7% knew food sources for vitamin B12, and 48.5% knew signs and symptoms of vitamin B12 deficiency. In comparison, only 30.7% knew the complications of vitamin B12 deficiency. Most participants (65.4%) did not know how to prevent vitamin B12 deficiency, and almost all 94.5% required more information regarding vitamin B12 deficiency. Conclusion: There is a crucial need to raise the awareness of vitamin B12 among the population of Saudi Arabia. There are many suggestive activities to spread the awareness of vitamin B12 including spreading knowledge in campaigns at schools, areas where most people gather as in malls, and social media.

Key words: *vitamin B12, awareness, Saudi Arabia, deficiency.*

INTRODUCTION

Natural dietary sources that contain vitamin B12 are animal foods such as milk, egg, fish, shellfish, sheep meat, and chicken. The vegan source as edible cyanobacteria or blue-green algae has predominately inactive vitamin in human supplements, which is called pseudo-vitamin B12. [1]

The secretion of vitamin B12 occurs in the bile; while, ileal receptors are responsible for reabsorption process which occurs through the enterohepatic circulation, that requires intrinsic factor (IF). Therefore, in patients with pernicious anemia with the loss of synthesis of intrinsic factor, the development of vitamin B12 deficiency is likely to be more rapid. [2]

In vegetarians and older people, vitamin B12 deficiency has a very high rate, especially in developing countries. [3] The lack of meat consumption results in high level of homocysteine which is reflected in vitamin B12 deficiency; while, malabsorption is the main cause in elderly. [1, 4] Other causes may include pernicious anemia and post gastric surgery. [5]

A deficiency of vitamin B12 could result in either short-term or long-term consequences; these include development of haematologic, neurologic, psychiatric, and other chronic illnesses. [6]

Women of childbearing age are importantly in needs for an adequate vitamin B12. [3] Also, the infant who has breastfed from a vitamin B12–deficient mother has a high risk for the development of growth failure, and anemia, and other severe developmental abnormalities. [4]

Vitamin B12 deficiency results in an elevation in specific functional markers, called methylmalonic acid and homocysteine. These biomarkers may also raise when vitamin B12 status is insufficient or sub-optimal. This sub-optimal status may increase the risk for the development of neurodegenerative disease and neural tube defects in the fetus of pregnant women. [6]

The recommended adequate intake of vitamin B12 is 4.0 μg/d for adults which is according to the European Food Safety Authority, and during pregnancy and lactation, the vitamin B12 requirements are higher. [7]

There was a study which was done in Riyadh, Saudi Arabia which proved that vitamin B12 deficiency is common, and recommended that the general population is in need of an awareness program to identify the risk factors of vitamin B12 deficiency, and to prevent it through guidelines. [8]

This research aimed to measure the awareness level of importance and deficiency of vitamin B12 among the Saudi population.

SUBJECT AND METHODS

This is a cross-sectional study that was conducted in Saudi Arabia from December, 2019 to February, 2020.

This study was conducted after obtaining Institutional Review Boarded (IBR) approval from the Ethics Committee of King Fahad Medical City Research Center, with IBR number: 19–657E. Also, a permission was obtained from the sampled population.

The sample size was estimated using Raosoft, [9] an online sample size calculator. With a total Saudi population of 34522543 people, [10] the minimum recommended sample size was 385 participants with a 5% margin of error. Inclusion criteria were female and male people aged over 18 years old who live in Saudi Arabia. Exclusion criterion was people with age less than 18 years old.

Data was collected through an electronic questionnaire which has been distributed among the Saudi population through social media. The questionnaire was subdivided into two broad sections. The first section included the data about the personal characteristics (i.e., age, gender, educational level, and employments status) and the second section included 10 questions about participants' awareness and knowledge about vitamin B12 (i.e., importance, food sources, symptoms, signs and complications due to vitamin B12 deficiency, and the need for awareness about vitamin B12 deficiency).

The data was analyzed using SPSS 20.0. Statistical analysis was done using descriptive statistics, such as chi-square for interpretation of the categorical variables. The statistical significance was set at $P<0.05$. The relationships between different gender groups, age range and the level of awareness were analyzed.

RESULT

A total of 489 subjects participated in this questionnaire during the study period. Among all participants, 125 (25.6%) of them were male; whereas, 364 (74.4%) were female. The majority of the participants were Saudi 471 (96.3), and non-Saudis were just 18 (3.9%). Most participants hada university education or above 357 (73.0%). 222 (45%) of participants were employed; while, 267 (54.6) were unemployed.

The sociodemographic data of the participants are shown in ***Table (1).*** Information regarding the knowledge of hemoglobin and various aspects of vitamin B12 deficiency was collected. It was apparent that almost half of the population was aware of the normal range of hemoglobin; whereas, almost two-thirds of the population had gone for hemoglobin level estimation. 22.1% have never heard about vitamin B12; while, only 20.7% had gone for vitamin B12 estimation. Among the studied population, 56.6% identified the importance of vitamin B12 intake to the body, 49.7% knew food sources for vitamin B12, and 48.5% knew signs and symptoms of vitamin B12 deficiency. In comparison, only 30.7% knew the complications of vitamin B12 deficiency. Most participants (65.4%) did not know how to prevent vitamin B12 deficiency, and almost all 94.5% needed more information regarding vitamin B12 deficiency.

Table 1: The personal characteristics of the participants

Demographic Characteristics	Count (n=498)	Relative Frequency (%)
Age		
18-25 years	193	39.5
26-35 years	132	27.0
36-45 years	85	17.4
45 years and above	79	16.2
Gender		
Male	125	25.6
Female	364	74.4
Nationality		
Saudi	471	96.3
Non-Saudi	18	3.7
Education level		
Elementary	3	0.6
Intermediate	9	1.8
Secondary	120	24.5
Higher education and above	357	73.0
Occupation		
Worker	222	45.4
Non-Worker	267	54.6

Table (2) shows the proportions of the participants' awareness and knowledge regarding hemoglobin and vitamin B12 deficiency.

Table 2: Proportions of participants' awareness and knowledge regarding hemoglobin and vitamin B12 (n=489)

Item:	Answer	Results
Have you ever gone for your hemoglobin level estimation?	Yes	310 (63.4%)
	No	179 (36.6)
Do you know the normal range of hemoglobin concentration?	Yes	272 (55.6%)
	No	217 (44.4%)
Have you ever gone for your vitamin B12 estimation	Yes	101 (20.7%)
	No	388 (79.3%)
Having ever heard about vitamin B12?	Yes	381 (77.9%)
	No	108 (22.1)
Do you know the importance of vitamin B12 intake to the body?	Yes	277 (56.6%)
	No	212 (43.4%)
Do you know the symptoms and signs of vitamin B12 deficiency	Yes	237 (48.5%)
	No	252 (51.5%)
Do you know the food sources for vitamin B12?	Yes	243 (49.7)
	No	246 (50.3)
Do you know the complications of vitamin B12 deficiency?	Yes	150 (30.7)
	No	338 (69.1)
Do you know how to prevent vitamin B12 deficiency?	Yes	169 (34.6)
	No	320 (65.4)
Do you want more information on vitamin B12 deficiency?	Yes	462 (94.5)
	No	27 (5.5)

Table (3) shows the sociodemographic characteristics among participants who heard about vitamin B 12. The participants who have heard about vitamin B12 differed significantly according to their gender ($p<0.001$), with the highest proportion among females. The participants who have heard about vitamin B12 differed significantly according to their educational level ($p<0.001$), with the highest proportion among those who have university degrees or above and secondary school degree (60.7% and 15.7%, respectively). However, the participants did not differ significantly according to their age or nationality or occupation status.

Table 3: The sociodemographic characteristics among the participants' who have heard about vitamin B12

Personal characteristic:	Frequency		P-value
	Yes	No	
Age			
18-25 years	150 (30.7%)	43 (8.8%)	
26-35 years	105 (21.5%)	27 (5.5%)	0.905
36-45 years	64 (13.1%)	21 (4.3%)	
45 years and above	62 (12.7%)	17 (3.5%)	
Gender			
Male	79 (16.2)	46 (9.4)	< 0.001
Female	302 (61.8)	62 (12.7)	
Nationality			
Saudi	367 (75.1%)	104 (21.3%)	0.989
Non-Saudi	14 (2.9%)	4 (0.8%)	
Education level			
Elementary	1 (0.2)	2 (0.4)	
Intermediate	6 (1.2)	3 (0.6)	< 0.001
Secondary	77 (15.7)	43 (8.8)	
Higher education and above	297 (60.7)	60 (12.3)	
Occupation			
Worker	171 (35.0%)	51 (10.4%)	0.666
Non-Worker	210 (42.9%)	57 (11.7)	

DISCUSSION

Vitamin B12, which is also known as Cobalamin, is absorbed in the intestine, and it is essential for the metabolisms of the body, formation of the red blood cells, and central nervous system maintenance. Early recognition of vitamin B 12 deficiency is crucial to avoid neurological impairment. An extensive search revealed only a few published works about the awareness of vitamin B12 deficiency worldwide or in our community. As a result, this study was conducted to assess the awareness and knowledge of vitamin B12.

This study is appreciated as the first paper targeting the Saudi population with regard to measuring the knowledge and attitude toward vitamin B12 deficiency. In this study, 489 voluntaries participated. Indeed, female participants represented 74.4%; while, 25.6% represented the male participants. That could explain that the survey was mostly focused on females due to its convenience. Over and above, most participants had a university education or above 73.0%. While another study by ***Awwadh et al.*** that was done among the population in Abha, found that 66.8% of the participants were male, and 33.2% of the participants were female. Also, 66.9% of the participants had university education. [11]

In this study, it was shown that 63.4% of the participants had gone for their hemoglobin level estimation, and 55.6% of the participants knew the normal range of hemoglobin concentration. Also, only 20.7% of the participants had gone for vitamin B12 estimation. In comparison to a study by ***Shah et al.,*** which had been conducted among blood donors at a rural tertiary hospital in India, it was found that 46.5% of the participants had gone for their hemoglobin level estimation, and only 32.7% of the participants knew the normal range of hemoglobin concentration. Besides, 17.2% of the participants had gone for their vitamin B12 estimation. [12] Based on the results from the previous studies, it is clear that there was not enough awareness regarding vitamin B12 importance .

In this study, most of the participants had high educational status; however, 77.9% of the participants had heard about vitamin B12. Regarding the importance of vitamin B12 intake to the body, only 56.6% of the participants had identified its importance, and 49.7% of the participants knew the food sources for vitamin B12. According to

the study by ***Awwadh et al.***, 55.4% of the participants had heard about vitamin B12, and 46.3% of the participants had identified the importance of vitamin B12 intake to the body. Additionally, 28% of the participants knew the food sources for vitamin B12. [11] Indeed, the participants in the present study showed a higher percentage of the population with a higher knowledge regarding vitamin B12. Indeed, the present study was distributed among all Saudi population, and not only a specific city in Saudi Arabia.

In the present study, 48.5% of the participants knew symptoms and signs of vitamin B 12 deficiency, and 30 .7% of the participants knew the complications of vitamin B 12 deficiency. Also, 34.6% of the participants knew how to prevent vitamin B12 deficiency, and a considerable number (94.5%) wanted to get more information about vitamin B12 deficiency. In comparison to a study by ***Shah et al.,*** among blood donors at rural tertiary hospital in India, 35.4% of the participants knew the symptoms of vitamin B12 deficiency, 24.1% of the participants knew how to prevent vitamin B12 deficiency, and 82.7% of the participants wanted to get more information about iron and vitamin B12 deficiency. [12]

According to these findings, it is recommended to raise the awareness of vitamin B12 among the population.

CONCLUSION

Vitamin B12 is an essential vitamin required to facilitate the metabolism process and function in the body. Additionally, vitamin B12 deficiency causes many health problems, such as anemia. This research was aimed to analyze the different factors affecting the awareness of the population. As shown in the results section regarding the points of differences, there is an important need to raise the awareness of vitamin B12 among the population of Saudi Arabia. There are many suggestive activities to spread the awareness of vitamin B12 which can be done through spreading knowledge in campaigns at schools, areas where most people gather as in malls, and social media. There is a need for family physician to be involved in the awareness process of vitamin B12 deficiency and routinely monitor vitamin B12 levels particularly among the elderly patients and patients with chronic diseases including long-term takers of metformin.

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