

**Vitamin B12 deficiency among Newly-Arrived Syrian Refugees in Central Anatolia of
Turkey**

**Türkiye Orta Anadolu Bölgesi'ne yeni gelen Suriye'li mültecilerdeki vitamin B12
eksikliği**

**Muzaffer Keklik¹, Ugur Kalan², Serdal Korkmaz¹, Ozerhan Ozer², Pinar Ipek², Adile
Ortakoyluoglu², Ertugrul Keklik³**

1: Department of Hematology, Kayseri Education and Research Hospital, Kayseri, Turkey

2: Department of Internal Medicine, Kayseri Education and Research Hospital, Kayseri,
Turkey

3: Department of Physiology, Faculty of Medicine, Erciyes University, Kayseri, Turkey

Yazışma adresi: Dr. Muzaffer Keklik, Department of Hematology, Kayseri Education and
Research Hospital, Kayseri, Turkey

E.mail: muzafferkeklik@yahoo.com

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ABSTRACT

Purpose: Vitamin B12 (cobalamin) has the most complex chemical structure of all vitamins and it is obtained naturally only from products of animal origin in developing countries. Vitamin B12 deficiency is prevalent in countries of origin of refugees. The aim of this study was to determine the prevalence of vitamin B12 deficiency among newly-arrived Syrian refugees in Central Anatolia of Turkey.

Methods: Newly arrived 256 refugees aged ≥ 16 years were tested for vitamin B12 level and other hematological parameters.

Results: We found that 50 participants (19.5%) had vitamin B12 deficiency (≤ 150 pmol/L). Low levels of vitamin B12 were prevalent among males those over the age of 50 (44.4%) ($p=0.01$) and females those under the age of 50 (75%) ($p<0.001$).

Conclusion: The results of this study shown that, the prevalence of vitamin B12 deficiency was higher in Syrian refugees, especially in older men and younger women. To our knowledge, this is the first nationally representative study for Central Anatolia of Turkey about vitamin B12 deficiency in refugees.

Key words: refugee, vit B12 deficiency, Syrian

ÖZET

Amaç: Vitamin B12 (kobalamin) tüm vitaminler içinde en karmaşık yapıya sahip olanıdır ve gelişmekte olan ülkelerde doğal olarak sadece hayvansal ürünlerden temin edilir. Vitamin B12 eksikliği mültecilerin yer aldığı ülkelerde yaygındır. Bu çalışmada amacımız Türkiye Orta Anadolu Bölgesi'nde yeni yerleşmiş Suriye'li mültecilerde B12 eksikliği prevalansını değerlendirmektir.

Metodlar: Yeni gelen 16 yaş ve üzeri 256 mültecinin vitamin B12 düzeyleri ve diğer hematolojik parametreleri değerlendirildi.

Bulgular: Çalışma sonunda 50 katılımcıda (%19.5) vitamin B12 eksikliği tespit edildi (≤ 150 pmol/L). Düşük vitamin B12 düzeyleri 50 yaş üzerinde erkeklerde yaygın iken (%44.4) ($p=0.01$), 50 yaş altı grupta kadınlarda daha yaygındı (%75) ($p<0.001$).

Sonuç: Bu çalışmanın sonuçları, vitamin B12 eksikliği prevalansının Suriye’li mültecilerde özellikle yaşlı erkekler ile genç kadınlarda yüksek olduğunu gösterdi. Kanaatimize göre bu çalışma mültecilerdeki vitamin B12 eksikliği hakkında Türkiye Orta Anadolu Bölgesi’ni temsil eden ilk çalışma durumundadır.

Anahtar kelimeler: mülteci, Suriye’li, vitamin B12 eksikliği

INTRODUCTION

Vitamin B12 plays essential roles in folate metabolism and in the synthesis of the citric acid cycle intermediate, succinyl-CoA. Vitamin B12 deficiency results most commonly from abnormal absorption and insufficient dietary intake and this deficiency lead to the delayed DNA synthesis resulting in megaloblastic anemia and some neurologic signs [1]. It is well established that vitamin B12 deficiency is a common problem in most of the developing world [2-6]. On the other hand, a few studies has shown that cobalamin deficiency is prevalent among refugees [7-9]. In the present study, we aimed to document the vitamin B12 levels among refugees from Syrian to Central Anatolia of Turkey.

METHODS

All newly arrived refugees over the age of 16 years who attended the Internal Medicine Department in Kayseri Education and Research Hospital, Turkey, between November 2014 and November 2015 were enrolled in the study. Their countries of origin were Syria. Baseline demographic data included date of birth, gender, date of arrival in Turkey, date of test and country of birth. All participants were tested for vitamin B12, folate and full blood count. The World Health Organisation (WHO) has recommended that a level of <150 pmol/L be used as the threshold for defining vitamin B12 deficiency [10]. Anemia was defined as a

hemoglobin < 120 g/L. The study approved by the Kayseri Education and Research Committee (52332816/50- 09.02.2016)

Statistics

For statistical analysis, chi square analysis was performed on dichotomous variables. Also, where appropriate, logistic regression analysis was used and odds ratios are presented for each predictor of interest. The level of significance was set at $p < 0.05$ to comparison the groups.

RESULTS

The study population consisted of 256 persons (156 females, 100 males). The mean age of participants was 40.9 ± 15.7 years for women and 40.2 ± 15 years for men. Figure 1 shows that the age distribution of the population by gender. There were an apparent over-representation of people under 50 years of age and women. Most participants were examined shortly after they arrived in Turkey. Seventy-four percent had arrived in Turkey within the previous month, with only 4% having a duration of stay recorded of more than four months. Participants' mean B12 level was 213.97 ± 153.39 pmol/L; 50 participants (19.5%) were deficient and 206 (80.5%) had normal levels of B12. Figure 2 shows that the age distribution of the low vitamin B12 group by gender. Low levels of vitamin B12 were more prevalent among males those over the age of 50 (44.4%), compared to those aged 30-49 years (22.2%) and 16-29 years (33.3%) ($p=0.01$). On the other hand, low levels of cobalamin were more prevalent among females those under the age of 50 (75%), compared to those over the aged of 50 (25%) ($p<0.001$). According to the results of a complete blood counts, 80 participants (31%) had anemia ($Hb < 120g/L$). The prevalence of anemia in the low vitamin B12 group was 12% (6/50) and in the normal vitamin B12 group was 35% (74/206). Macrocytosis ($MCV > 95fL$) was reported in 26% (13/50) of cases who also had vitamin B12 < 150pmol/L, and 7% (15/206) of cases with vitamin B12 ≥ 150 pmol/L ($p=0.004$). There were no

significant differences between B12 levels and red cell size, Hb levels, PLT and WBC counts (Table). None of the cohort had folate deficiency.

Table. Population characteristics

Variables	B12 deficiency (≤ 150 pmol)	Normal B12 (≥ 150 pmol)
	n= 50	n= 206
Male/Female	18/32	82/124
Age (years) ^π	40.9±15.7	40.2±15.0
Mean corpuscular volume (fL) ^π	84.2 ±9.0	85.6±6.8
Hb (g/L) ^π	137±25	130±27
WBC ($\times 10^9/L$) [#]	7.02 (4-13)	9.8 (3-18)
PLT ($\times 10^9/L$) [#]	266 (164-719)	212 (158-482)

WBC white blood cell; Hb hemoglobin; PLT platelet; π mean±Standart Deviation; # median (range)

Figure1: The age distribution of the population by gender.

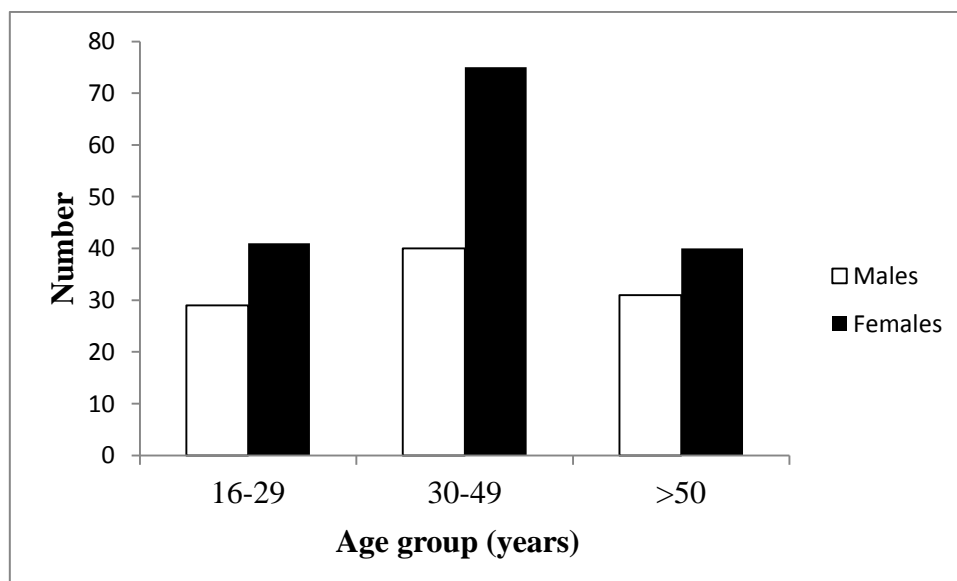
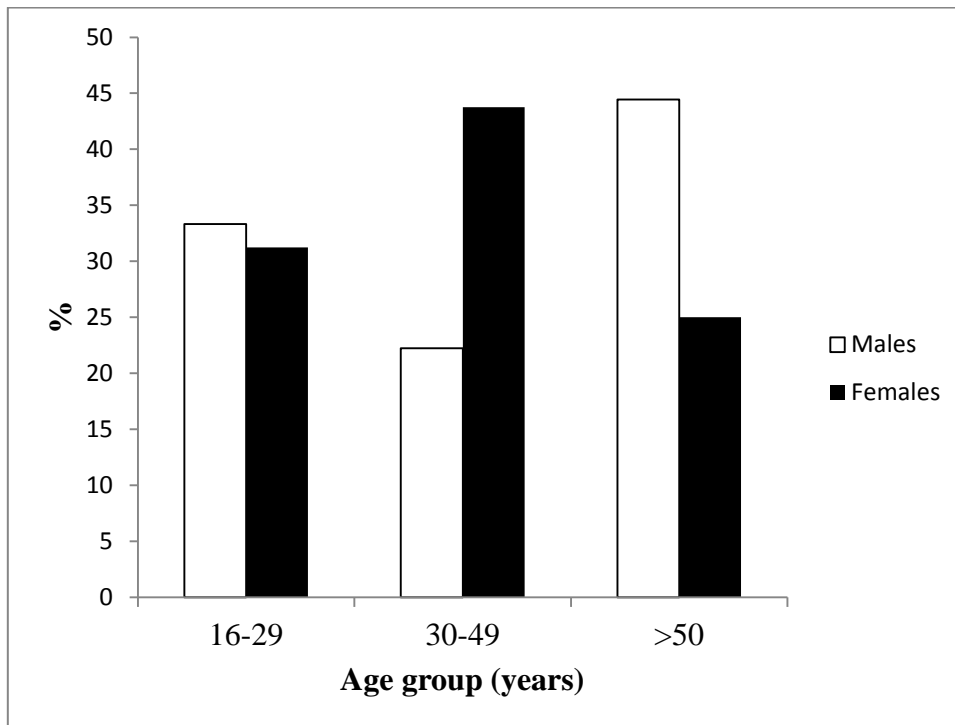


Figure 2: The age distribution of the vitamin B12 deficient group by gender.

DISCUSSION

This study has shown that vitamin B12 deficiency is prevalent among newly-arrived refugees from Syria to Turkey (19.5%). Low vitamin B12 levels were also more prevalent in older males. The true prevalence of cobalamin deficiency in the general population is unknown, but early detection by screening populations at risk is very important because of the possibility of nonspecific but irreversible neurological consequences [11, 12]. Nationally representative surveys have reported high prevalence of vitamin B12 deficiency among women of reproductive age in Germany (14.7%) [13], Vietnam (11.7%) [5], and the elderly in New Zealand (12%) [14]. The very few studies that have investigated the vitamin B12 deficiency in refugee source countries. In a study [7], cobalamin deficiency was found in 27% of post arrival medical screenings, and 32% of Bhutanese refugees in United States. This study also reported that refugees from Somalia were found to have cobalamin deficiency

12%. Another study, Benson et al. reported that 16.5% of refugees had vitamin B12 deficiency [8]. There are no nationally representative studies for Central Anatolia of Turkey. Our findings were similar with the other studies. Interestingly, we found that vitamin B12 deficiency more prevalent in older men and younger women. Contributing factors to this may inadequate dietary intake cause of unemployment and psychological problems, and gastric atrophy may cause of vitamin B12 deficiency in elderly persons, probably as a result of *Helicobacter pylori* infection. [15-18]. *Helicobacter pylori* testing is not a routine screening test in our hospital and is probably under diagnosed. Inadequate intake, due to low consumption of animal-source foods, is the main cause of vitamin B-12 deficiency in adults and likely the main cause in poor improve the status of most persons with low stores of this vitamin [19-21]. On the other hand, in our study anemia was common (31%), particularly in normal vitamin B12 group (35%). Already, the World Health Organization has estimated that the prevalence of anemia among refugees ranges from 21% to 68% [22]. Although iron deficiency is the most common cause of anemia in the world [23], we didn't evaluated the iron levels all participants. Because, there weren't anemia all of them.

Many people of refugee background may continue to have diets deficient in animal source foods after arriving in Turkey. Initial refugee health screening is essentially a form of preventative health care. Also, all newly-arrived refugees should be tested for cobalamin deficiency. It is important to recognize and treatment vitamin B12 deficiency early to prevent irreversible neurologic dysfunctions and increased cardiovascular problems and psychological diseases.

Compliance with Ethical Standards:

Funding: This study was no funded by any institution.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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