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B12 Deficiency and Helicobacter Pylori Enfections in Adolescents

Adolesanlarda B12 eksikliği ve Helikobakter Pylori Sıklığı

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ABSTRACT

Objective: *Low intake of Vitamin B12 (vit B 12) with malabsorptions are the most critical factors causing the deficiency. Vit B 12 deficiency has also been associated with Helicobacter pylori (HP) gastritis in previous studies. This study's main goal is to find a similar relation with recent studies or an opposite conclusion. For this purpose we choose the most suitable group; patients with the same two diseases HP gastritis and vit B 12 deficiency.*

Methods: *The whole study was conducted retrospectively. İn the study we included 19 patients (mean age: 15.6 ± 1.3 years). The B12 levels of patients undergoing upper gastroscopy for any reason were studied. We tried to figure out whether B12 deficiency and HP positivity were statistically significant. The Electrochemiluminescence immunoassay method has been used for serum vit B12 level measurement.*

Results: *There are 15 (62.5%) patients with neurological symptoms and 6 (25.0%) patients with fatigue and weakness. Only 3 (12.5 %) patients have no symptoms. There was no statistical significance between these groups (p=0.224). There are 18 (75%) patients with HP positivity. HP positive and negative patients have levels of B12 108.6 ± 31.1 pg/mL and 113.5 ± 41.2 pg/mL respectively (p=973).*

Conclusion: *There were no statistical significance with vitamin B 12 levels in HP-positive patients and HP-negative patients. İt sure be beneficial to use a bigger aspect patients group to have better results between HP infection and vitamin B 12 deficiency relation.*

ÖZET

Amaç: *Malabsorbsyon B12 eksikliği sebeplerindendir. B12 vitamin eksikliğine neden olan beslenme yetersizliği yada uygunsuz diyet sebeplerden sayılabilir. Yapılan pek çok çalışmada B12 vitaminin eksikliği Helikobakter pilori (HP) ile ilişkilendirilmiştir. Bu çalışmadaki amacımız eksikliği olan adolesanlarda B12 ve HP birlikteliğinin araştırılmasıdır.*

Yöntem: *Çalışma kaynak teşkil eden veriler retrospektif olarak hasta dosyalarının meslektaşlarımız tarafından taranması yolu ile elde edilmiştir. Meslektaşlarımızın çalışmakta bulunduğu merkezlerde üst gastrointestinal sistem endoskopisi ve hızlı üreaz testleri ile HP tanısı almış hastaların B12 düzeyleri taranarak çalışmaya dahil edilmişlerdir. Çalışmaya 19 hasta (ortalama yaş: 16.2 ±2.3 yıl) dâhil olmuş bu hastaların B12 vitamini düzeyi elektrokemiluminesens immunoassay ile ölçülmüştür.*

Bulgular: *Çalışmamızda hastaların 17'sinin (%58.5) nörolojik semptomlar ile başvurduğu görüldü. Başka sebepler ile tetkik edilen diğer hastaların üçünde (%13.5) B12 vitamini eksikliği tespit edildi.Bazı hastalarda ise 8 (%25.0) yorgunluk ve halsizlik şikâyetlerin ana şikayetlerini oluşturduğu görüldü. B12 düzeyleri kıyaslandığında semptomatik ve asemtomatik hasta gruplarının B12 vitamini düzeyleri arasındaki fark anlamlı bulunmadı. (p=0.224). Hastaların onsekizinde (%75) HP pozitifliği saptanırken HP pozitif hastaların vitamin B12 düzeyleri ile HP negatif hastaların B12 düzeyleri kıyaslandığında sırasıyla 103.4 ± 34.3 pg/mL ve 117.5 ± 43.2 pg/mL değerlerine ulaşıldı. (p=973).*

Sonuç: *B12 vitamini düzeyleri kıyaslandığında HP enfeksiyonu pozitif olan çocuklarda düzeyler daha düşük olmakla beraber HP negatif hastalarla arasındaki fark anlamlı bulunmamıştır. Bu birlikteliğin gösterilebilmesi için geniş hasta grupları ile daha büyük ölçekte çalışmaların yapılması yararlı olabilir.*

Keywords:
Adolescents
Vitamin B 12
Helicobacter pylori

Anahtar Kelimeler:
Adolesan
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INTRODUCTION

Helicobacter pylori (HP) is a gram-negative bacterium that is common throughout the world. While its prevalence in the adult population is about 50% in developed countries, it reaches 90% in developing countries. Infection is acquired in childhood and may be lifelong if not treated. (1) HP Infection can lead to gastritis, gastric ulcers, gastric cancer, and micronutrient deficiencies. Vitamin B12 deficiency has also been seen in patients with HP gastritis. Vitamin B12 cannot be synthesized in the human body (2).

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It is available only in animal foods. Dairy products, meat, eggs, poultry, fish, and shellfish are foods rich in vitamin B12. There are many studies investigating the molecular biology of vitamin B12 deficiency. In vitamin B12 deficiency, purine and pyrimidine cannot be synthesized, resulting in megaloblastic anemia (3). The accumulation of methylmalonyl- CoA may be responsible for neurological findings (4). Vitamin B12 deficiency is usually due to malabsorption, it can also occur in the elderly, vegans, and strict vegetarians due to low intake. The aim of this study is to determine if there is a relationship between HP and vitamin B12 deficiency.

MATERIAL AND METHODS

This is a retrospective study. Adolescent patients with vitamin B12 deficiency who underwent endoscopy were our study group. After the local ethics commetee aproval study begin. (12/11/21) Vitamin B12 levels were measured by the electrochemiluminescence immunoassay method. Vitamin B12 deficiency was defined as a serum vitamin B12 level < 150 pmol/L (< 200 pg/mL) with two measurements repeated on different days and concurrent hematologic or neurologic findings of vitamin B12 deficiency. Patients with known vitamin B12 deficiency due to chronic illness such as Crohn's disease, celiac disease, and gastric or intestinal resection were excluded from the study. Patients with familial cobalamin metabolic disorders and IF-related deficiencies who had received vitamin B12 or multivitamin therapy in the past year were also excluded from the study. Their diets included animal products and were not vegans or vegetarians. Patient age and sex, complaints at presentation, and vitamin B12 levels were obtained from medical and computer records. Endoscopy of the upper gastrointestinal tract was performed in all patients. Endoscopically, two biopsies were taken from the esophagus, corpus, antrum, and duodenum. A biopsy specimen from the antrum was placed in a preparation containing urea agar and a pH indicator for the rapid urease test (CLO test duo, Kimberly-Clark-Ballard Medical Products, Draper, UT). The other specimens were placed in 10% formalin immediately after collection and examined histopathologically. The cases with positive urease test and HP, detected by histopathological examination, were accepted as HP positive. Patients in whom HP was not found on either examination were considered HP negative.

All data were collected using the SPSS v11.0 program, and statistics were generated using this program. Numerical data were expressed as mean ± standard deviation (SD). The chi-square test was used to compare group ratios. When the expected values in the eyes were less than 5, the group ratios were compared using Fisher's exact chi-square test. A comparison of the means of the three groups was performed with the Kruskal-Wallis test. The means of the two groups were compared using the Mann-Whitney U test. A p-value of less than 0.05 was considered significant.

RESULTS

Twenty-four patients (mean age: 15.6 ± 1.3 years), 18 of whom were girls (75.0%), were included in this study. While 15 (62.5%) of the 24 patients included in the study had neurological symptoms such as headache, dizziness, numbness/tingling in the arms and/or legs, 6 (25.0%) patients complained of weakness and fatigue and were examined for hematological findings. . Three (12.5%) patients were referred to our outpatient clinic after an examination for other reasons revealed vitamin B12 deficiency (Table 1).

There was no difference between the vitamin B12 levels of patients who had neurologic or hematologic symptoms and asymptomatic patients (Table I). There was no difference between boys and girls in vitamin B12 levels (119.8 ± 42.9 pg/ml and 106.5 ± 29.8 pg/ml, p= 0.312, respectively). Five patients (20.8%) had dyspepsia, while the remaining patients had no stomach-related symptoms. Two children in one HP positive and the other HP negative group had weight-to-height ratios of 84% and 86%, respectively; all other children had normal values for age and weight-to-height. None of the patients were vegan or vegetarian. There were no patients with inadequate or imbalanced nutrition in their dietary history. In 18 (75%) of 24 patients with B12 deficiency, HP was positive in the rapid urease test (Table I). All of these patients were histopathologically positive for HP. Endoscopically, gastritis was present in 23 (96%) of 24 patients (endoscopic erosive pangastritis in one (4%) patient, endoscopic hyperemic antral gastritis in 4 (18%) patients, endoscopic hypertrophic pangastritis in two (8.7%) patients, and in the remaining 16 (69.3%) patients.), endoscopic erythematous pangastritis) was noted in one patient, whereas normal endoscopic findings were observed in 1 patient. Antral atrophic gastritis with HP was detected histopathologically in two of our patients (8.3%), and HP -positive chronic gastritis was found in 16 (67%) patients (Table I). While the mean vitamin B12 level of HP -positive patients was 108.6 ± 31.1 pg/ml, the mean B12 level of HP -negative patients were 113.5 ± 41.2

Table 1: Demographic, anthropometric, hematological and endoscopic characteristics of patients with vitamin B12 deficiency

	Neurological (n= 15)	hematological (n=6)	asymptomatic (n= 3)	p *
Age	15.2 ± 1.3	16.5 ± 1.3	16.0 ± 1.0	0.191
Girl/Boy	11 /4	5 / 1	2 / 1	0.837
Height for Age	98.6 ± 4.5	99.0 ± 5.6	98.0 ± 3.2	0.575
Weight for Height	110.6 ± 13.6	89.9 ± 5.9	92.9 ± 4.9	0.425
B12 vit. (pg/mL)	110.1 ± 37.0	97.5 ± 16.7	129.3 ± 31.4	0.224
Athrophic gastritis, n(%)	1 (6.7)	1 (16.7)	0 (0.0)	0.646
HP (+) patients, n (%)**	9 (60)	6 (100)	3 (100)	0.091

**Kruskal Wallis test*

pg/ml, and no statistical difference was found (p=973).

DISCUSSION

In this study, an upper gastrointestinal tract endoscopy was performed to investigate the frequency of HP in children with vitamin B12 deficiency (5). HP was found in 75% of children with various clinical symptoms and vitamin B12 deficiency. Although serum vitamin B12 levels were lower in patients with HP positivity, no statistically significant difference was found (6). Many studies in adults have reported vitamin B12 deficiency in patients with HP gastritis in the literature (7). The mechanisms by which Helicobacter pylori infection causes B12 deficiency are not fully known (8).

Vitamin B12 ingested with food is bound to proteins. Vitamin B12, separated from proteins in the acidic environment of the stomach, binds to the transporter haptocorin (protein-R), also called transcobalamin I, which is found in saliva. About 80% of circulating vitamin B12 is bound to haptochorin (9). In the acidic environment of the stomach, haptochorin has a greater affinity for vitamin B12 than intrinsic factor (IF). After the haptochorin-vitamin B12 complex enters the small intestine, it is partially digested by pancreatic enzymes and combines with IF, which has a higher affinity for vitamin B12 in the alkaline environment of the intestine. In addition, IF is resistant to digestion by pancreatic enzymes (10). The vitamin B12- IF complex that reaches the terminal ileum is taken up into the cell by phagocytosis by binding to its specific receptors (5,9,10). Because of these pathogenetic mechanisms, the stomach plays an important role in vitamin B12 metabolism, and B12 metabolism is also affected in gastric diseases. Although vitamin B12 levels were low in the HP-positive group in our study, the difference between HP-negative patients was not significant. It is suggested that this is due to the small number of patients in our study. In the literature, there are few studies and case reports of children investigating the relationship between HP and vitamin B12 deficiency (4,6,7). In all these case reports and studies, HP positivity was found to be associated with B12 deficiency (11). On the other hand, there are also studies in the literature that show that there is no correlation between HP infection and B12 levels (12). Because dietary habits, polymorphisms in B12 metabolic pathways, and the frequency of HP may vary from country to country, new studies with large groups of patients are needed on this topic. In our study, the detection rate of HP positivity in children with B12 deficiency was 75% (13). In a study of adults conducted by Kaptan et al, the rate of HP positivity in patients undergoing endoscopy for B12 deficiency was 56%. In this study, the elimination of HP resulted in an increase in B12 levels in 40% of patients, and the researchers found that performing endoscopy in patients with B12 deficiency and treating HP was sufficient to increase B12 levels in many cases. Although all children in our study were diagnosed with B12 deficiency, the rate of atrophic gastritis was low (14). In a study of adults, Tamura et al. showed that the HP-positive group had a higher atrophic gastritis score and lower vitamin B12 levels than the HP-negative group. In this study, it was hypothesized that the low vitamin B12 level was related to the decrease in gastric acid secretion due to atrophic gastritis. However, although the rate of atrophic gastritis was low in our study, the HP positivity was high. In other words, an infection of HP can cause vitamin B12 deficiency without causing atrophic gastritis. A similar result was seen in the study by Elsaghier et al. (15). Although a significant association was demonstrated between infection of HP and vitamin B12 levels, it proved to be independent of the presence of atrophic gastritis. Similarly, it is noted that the only endoscopic finding in patients with B12 deficiency may be HP-positive gastritis.

CONCLUSION

Studies on children performed in larger numbers may shed more light on this issue. In conclusion, although vitamin B12 levels in children with HP infection in our study were lower than in patients with vitamin B12 deficiency, no significant difference was found between patients with HP -negative disease. It would be useful to conduct larger studies to show the relationship between HP infection and vitamin B12 deficiency.

Conflict of Interest: No conflict of interest was declared by the authors.

Ethics: Ethical permission was obtained from the Univesity of Afyon, Medical Faculty Clinical / Human Research Ethics Committee for this study with date 10.12.2021 and number 119, and Helsinki Declaration rules were followed to conduct this study.

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