

COMPARISON OF THE HELICOBACTER PYLORI INFECTION WITH C14 UREA BREATH TEST AND DEMOGRAPHIC VARIABLES IN ELDERLY POPULATION

YAŞLI POPULASYONUNDA C14 ÜRE NEFES TESTİ İLE HELICOBACTER PYLORI ENFEKSİYONU VE DEMOGRAFİK DEĞİŞKENLERİN KARŞILAŞTIRILMASI

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**ABSTRACT**

**OBJECTIVE:** *The aim of this study was to investigate the prevalence of Helicobacter pylori (Hp) infection in elderly patients admitted for C14 urea breath test (UBT) and the relationship between Hp prevalence and epidemiologic, demographic variables.*

**MATERIAL AND METHODS:** *The study included 296 elderly patients (>65 years) (166 female, 130 male; mean age: 71±3.4 years, range 65-82) who were referred our nuclear medicine department to admit C14 UBT for Hp infection were included in the study. The patients were retrospectively evaluated and grouped according to the age, gender, blood group, past medical history, smoking and/or alcohol habit, presence of common systemic disease, body mass index, demographic properties like educational stage, presence of pet and evaluated the relationship of these properties with Hp positivity.*

**RESULTS:** *Helicobacter pylori prevalence was 48.9 % in our elderly study population. The statistical significance was found in the evaluation of positivity of C14 UBT result (p=0.04). Positive correlation was found between the positive UBT and increasing age. Statistical significance wasn't found between the positive Hp test and gender, ABO blood groups, smoking and/or alcohol habit, BMI value, presence of pet at home, any gastric complaints in family (p>0.05). There was statistical significance between education level, presence of common systemic disease and positive test result (p=0.001).*

**CONCLUSION:** *We found statistical significance between the Hp positivity and increasing age, education level, presence of common systemic disease and no significance relationship among Hp prevalence and the other parameters in accordance with the literature.*

**Keywords:** C14, H. pylori, Elderly

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## ÖZ

**AMAÇ:** Bu çalışmanın amacı, C14 üre nefes testi (ÜNT) için başvuran yaşlı hastalarda *Helikobakter pilori* (Hp) enfeksiyonunun prevalansını ve Hp prevalansı ile epidemiyolojik, demografik değişkenler arasındaki ilişkiyi araştırmaktır.

**GEREÇ VE YÖNTEMLER:** Çalışmaya nükleer tıp kliniğimize Hp enfeksiyonu için C14 ÜNT uygulanması amacıyla refere edilen 296 (166 kadın, 130 erkek; ortalama yaş:  $71 \pm 3,4$  yaş, aralık 65-82) yaşlı hasta (>65 yaş) dahil edildi. Hastalar retrospektif olarak değerlendirildi ve yaş, cinsiyet, kan grubu, geçmiş medikal hikayesi, sigara ve/veya alkol alışkanlığı, yaygın sistemik hastalık bulunması, vücut kitle indeksi (VKİ), eğitim seviyesi, evcil hayvan bulunması gibi demografik özelliklere göre gruplandı ve bunlarla Hp pozitifliği arasındaki ilişki değerlendirildi.

**BULGULAR:** *Helikobakter pilori* prevalansı, bizim yaşlı hasta popülasyonumuzda % 48,9'du. C14 ÜNT sonuçlarının pozitifliğinin değerlendirmesinde istatistiksel anlamlılık bulundu ( $p=0.04$ ). Pozitif ÜNT ile artan yaş arasında pozitif korelasyon bulundu. Pozitif Hp testi ile cinsiyet, ABO kan grupları, sigara ve/veya alkol alışkanlığı, VKİ değeri, evde evcil hayvan bulunması, ailede herhangi bir gastrik şikayet bulunması arasında istatistiksel anlamlılık saptanmadı ( $p>0,05$ ). Pozitif test sonuçları ile eğitim seviyesi, yaygın sistemik hastalık bulunması arasında istatistiksel anlamlılık vardı ( $p=0.001$ ).

**SONUÇ:** *Helikobakter pilori* pozitifliği ile artan yaş, eğitim seviyesi, yaygın sistemik hastalık bulunması arasında istatistiksel anlamlılık bulduk ve literatürle uyumlu olarak Hp prevalansı ile diğer parametreler arasında anlamlı ilişki yoktu.

**Anahtar Kelimeler:** C14, H. pilori, Yaşlılık

## INTRODUCTION

*Helicobacter pylori* (Hp) which colonizes under gastric mucosa without invasion, is a spiral-shaped flagella gram-negative bacteria. Microaerophilic environment at 37°C is necessary for growth of Hp1. *Helicobacter pylori* was first discovered in 1982 by Australian scientists Barry Marshall and Robin Warren, who identified it as the cause of chronic gastritis. Studies about Hp showed that it causes duodenal ulcers, gastric ulcers, gastric adenocarcinoma, primary gastric B cell lymphoma (MALT lymphoma) which is the first proved carcinogen bacteria (2,3).

The prevalence of Hp infection is 30-50 % in developed countries while it is 85-90 % in developing countries in adult population. It is currently accepted that approximately 50% of the world's population is infected with Hp. Majority of infected people are asymptomatic. However, 10-15% people with Hp suffer from peptic ulcers and 1% of patients will have gastric cancer or mucosa-associated lymphoid tissue lymphoma (1,4). Besides, recurrence ratio of the infection in the period of 4 years is 13.5% (5). This difference in Hp

prevalence may reflect changes in socioeconomic conditions. Notably, the most severe clinical outcomes, i.e., gastric cancer and complicated peptic ulcer diseases, usually occur in elderly patients (4).

The elderly often seek medical attention because of gastroduodenal diseases. The prevalence of Hp infection increases with age worldwide and associated with several gastroduodenal diseases (4). Epidemiological studies report an increased rate of gastrointestinal diseases in subjects older than 65 years, and these diseases constitute one of the most frequent indications for medical consultation in this population. Oesophageal and gastroduodenal diseases, especially Hp infection, are frequent in this population since they account for 40% of the total digestive pathologies in the elderly (6).

Thus, diagnosis, treatment, after eradication effectiveness of treatment of Hp infection is very important. The aim of this study was to investigate the prevalence of Hp infection, in elderly patients admitted for C14 urea breath test (UBT)

and the relationship between Hp prevalence and epidemiologic, socio-economic, demographic variables.

## MATERIAL AND METHODS

The study was approved by the local ethics committee and informed consent was obtained from patients or their relatives before entry to the study. It was conducted according to the Declaration of Helsinki and the guidelines for Good Clinical Practice.

We enrolled elderly patients (>65 years) (166 female, 130 male; mean age:  $71 \pm 3.4$  years, range 65-82) who were referred our nuclear medicine department to admit C14 UBT for H. pylori infection. Patients who had previous gastric surgery, Hp eradication treatment or those with equivocal UBT results (between 25 and 50 cpm) were excluded to prevent interference with the diagnostic accuracy of Hp infection. The Hp infection status was determined with UBT. A standard questionnaire was prepared to completed it. The assessments were based on these questionnaires. The patients were retrospectively evaluated and grouped according to the age, gender, blood group, past medical history, smoking and/or alcohol habit, presence of common systemic disease, body mass index, drug intake, demographic properties like educational stage, the presence of pet and evaluated the relationship of these properties with Hp positivity, which were extracted from the questionnaire.

At admission the patients or their relatives were asked about current use of drugs such as antibiotics, H2-antagonists and omeprazole, and alcohol and/or smoking habits. The consumption of bismuth and antibiotics was avoided by patients for four weeks and proton pump inhibitors for seven days before the RAI therapy so as not to conceal H. pylori activity.

### Urea Breath Test

All the patients fasted for four hours before the test and brushed their teeth 20 minutes before the test to minimize the bacterial flora that can produce urease in the mouth. A C14 capsule (Helicap, Isotop, Budapest, Hungary) containing  $1 \mu\text{Ci}$  C14 was taken with a cup of water. After a 15-minute waiting period, the patients breathed on the card (Heliprobe BreathCard, Kibion, Stockholm, Sweden) for about 3-4 minutes until the indicator colour turned to

yellow from orange. The results were calculated in 250 seconds with the heliprobe analyzer (Heliprobe-analyser, Kibion, Stockholm, Sweden) and were recorded as count per minute (cpm). The values of the cpm were classified according to the manufacturer's recommendations into 3 groups (cpm<25 not infected, cpm=25-50 suspicious, cpm>50 infected).

BMI is derived from the subject's height (cm) and weight (kg) ( $\text{kg}/\text{m}^2$ ) and reflects general nutritional status and divided into five categories as; (weak; BMI <20, normal; BMI 20-25, overweight; BMI 25.1-30, obesity; BMI 30.1-35, morbid obesity; BMI >35). Educational stage was classified as I: non-educational, II: primary education, III: collage, IV: university and V: master or doctorate.

### Statistical Analysis

Quantitative data were expressed as mean  $\pm$  SD. Data analysis was made with SPSS 20.0 for the comparison of the cpm values of the patients' UBT tests. For statistical analysis of data, the Wilcoxon signed-rank test, Student's t test for unpaired data, simple regression analysis and  $\chi^2$  test were used as appropriate. A p value of <0.05 was accepted as statistically significant.

## RESULTS

The study included 296 elderly patients (>65 years) (166 female, 130 male; mean age:  $71 \pm 3.4$  years, range 65-82); 166 (56%) were female and 130 (44%) were male. Hp was positive in 145/296 (48.9%) cases. In 88/166 (53%) females the test was positive, while 62/130 (47%) males positive for Hp. In this study, there was no statistically significant difference between genders for UBT positivity ( $p=0.011$ ), but positive correlation was found between the positive UBT and increasing age. In the comparison of the cpm values between the education levels and presence of common systemic disease especially the patients having other GIS disease in the study group, there was statistically significant difference between the groups ( $p=0.001$ ) (Table 1).

Fifty one (17.3%) of the patients had smoking and/or alcohol habit, however, this was not statistically significant ( $p=0.343$ ). A family history of dyspepsia was present in only 43% (Hp positivity 47.6%) of cases, but there was no statistically significant association with Hp prevalence

( $p=0.12$ ). There were only 4 patients with pets at home and this was not associated with Hp positivity ( $p=0.322$ ). According to the BMI, out of the total 296, 36.3% were weak, 20.1% normal, 31.2% were over weight, 7.3% were obese and 5.1% were morbid obese. UBT positivity was not seen significantly regarding the BMI values ( $p=0.196$ ) (Table 1). Figure 1 shows the proportions of patients with Hp positive test results presented by blood type. There was no statistically significant difference between ABO blood groups for UBT positivity ( $p=0.079$ ). Statistical significance was not found between the positive *Helicobacter pylori* test and gender, ABO blood groups, smoking and/or alcohol habit, BMI value, presence of pet at home, any gastric complaints in family ( $p>0.05$ ).

**Table 1:** The relationship between the Hp prevalence and patients characteristics including epidemiologic, socio-economic, demographic variables.

| Variabilities                  | n (%)    | Hp (+) % | p value |
|--------------------------------|----------|----------|---------|
| Gender                         |          |          | 0.11    |
| Female                         | 166 (56) | 53       |         |
| Male                           | 130 (44) | 47       |         |
| Past Medical History           |          |          |         |
| No                             | 21       | 7.9      | 0.023   |
| Diabetes Mellitus              | 82       | 76.3     | 0.313   |
| Astma                          | 19       | 23.6     | 0.931   |
| Hypertension                   | 76       | 82.1     | 0.682   |
| Renal Disease                  | 23       | 47.4     | 0.638   |
| Romatologic Disease            | 42       | 52.1     | 0.713   |
| Other GIS Diseases             | 33       | 60.2     | 0.001   |
| Educational Stage              |          |          | 0.001   |
| Non-Educational                | 10.2     | 4.8      |         |
| Primary Education              | 59.7     | 70.2     |         |
| Collage                        | 28.1     | 22.6     |         |
| University                     | 11.7     | 2.4      |         |
| Master or Doctorate            | 0.5      | 0        |         |
| Smoking and/or Alcohol Habit   |          |          | 0.343   |
| Yes                            | 17.3     | 53.8     |         |
| No                             | 82.7     | 46.2     |         |
| The Presense of Family History |          |          | 0.12    |
| Yes                            | 43       | 47.6     |         |
| No                             | 57       | 52.4     |         |
| The Presense of Pet            |          |          | 0.322   |
| Yes                            | 4        | 46.8     |         |
| No                             | 96       | 53.2     |         |
| BMI değerleri                  |          |          | 0.196   |
| Weak                           | 36.3     | 47.1     |         |
| Normal                         | 20.1     | 52.7     |         |
| Over Weight                    | 31.2     | 46.1     |         |
| Obesity                        | 7.3      | 48.3     |         |
| Morbid obesity                 | 5.1      | 56.1     |         |

## DISCUSSION

*Helicobacter pylori* infection is usually acquired before 10 years of age, but due to the poorer socioeconomic and sanitary conditions in elderly the prevalence of Hp infection increases in this age group. Majority of the patients infected with Hp remain asymptomatic, but 10-15 % of patients develop peptic ulcer disease and 1 % will develop gastric cancer or mucosa associated lymphoid tissue lymphoma (4). The high incidence of peptic ulcer in geriatric patients suggest that the mechanism of its development differ from those in younger patients. *Helicobacter pylori* infection seems to be equally responsible for peptic ulcer as immune deficit in elderly and broad unselective use of NSAIDs (7). In elderly patients with Hp positive peptic ulcer disease, gastric mucosa associated lymphoid tissue lymphoma and advanced forms of gastritis and in patients after resection of early gastric cancer or premalignant lesions eradication of Hp is strongly recommended (6).

*Helicobacter pylori* seropositivity was lower in the patients with high education level and the prevalence increased as the age increased (8). Presence of serum Hp antibodies is more frequent in older than younger subjects, with a progressive increase up to age 60 (9-11). In EUROGAST study group's study, the prevalence was higher in older age group than the younger age group as 62.4 % and 34.9 %, respectively. Lower levels of infection was seen in higher education of the subjects. When the education level decreased, Hp prevalence increased. Hp infection does not have association with smoking, alcohol usage and gender (12). *Helicobacter pylori* seroprevalence were similar between men and women (13, 14). In the current study, when the age increases, the prevalence of Hp increases. The prevalence of Hp was lower in high education levels. We did not find correlation between male and female patients in Hp positivity.

Milorad et al studied the relationship between Hp and blood groups and Rh factor on 227 patients with gastric biopsies. They did not find relationship between the groups in the prevalence of Hp (15). In our study we did not find any correlation between the blood groups and the Hp positivity. This may be due to the small number of the patient group which is the weakness of our study.

The transmission path of Hp was not exactly described, but transmission from human to human is the possible mechanism. Fecal-oral path is believed to be the responsible due to the high prevalence in bad hygienic places and crowded places. Oral to oral transmission may be also possible because Hp infected mothers' babies had also seropositivity (16, 17). Possible higher prevalence of Hp infection in crowded communities and household contacts confirms that the organism may spread by orofaecal route or from mouth to mouth via dental plaque (18-20). There was no significant correlation between Hp pylori IgG levels and age, length of stay, blood variables, history of NSAID consumption, dyspeptic symptoms, alcohol and smoking habits. Helicobacter pylori infected elderly patients should be treated carefully especially if NSAIDs are used to prevent transmission to younger family members or co-residents in geriatric institutions beside the treatment of peptic disease (9). Pets such as dogs and cats can get Hp infection, but the people who care the pets do not have increased infection (13, 14). In our study, we did not find correlation between Hp positivity and the pet presence or presence of family member with gastrointestinal diseases at home.

Neri et al did not find correlation between Hp infection and body mass index in a study that was made in geriatric rehabilitation ward. In contrast, in a metaanalysis study, Hp positive patients had higher BMI than Hp negative subjects (9). As the study of Neri et al, no correlation was present between the BMI and Hp prevalence in the current study.

Helicobacter pylori infection can be associated with many other non-gastrointestinal diseases such as hematological, cardiovascular, neurological, metabolic and dermatological diseases. The possible mechanism is thought to be associated with inflammatory mediators that is activated with Hp (21, 22).

Ciortescu et al did not find difference in prevalence of Hp infection between diabetics and non-diabetics and concluded that Hp does not effect glycemic status (23). Helicobacter pylori infection seems to be associated with the development of chronic bronchitis and frequent coexistence with pulmonary tuberculosis was found. There is also increased Hp seroprevalence with

bronchiectasis and lung cancer, but bronchial asthma was not related with Hp infection (24). Chronic renal failure patients have low prevalence of Hp infection. 36.2 % of patients receiving less than four years of dialysis had naturally cured Hp infection (25). Persistent antigenic stimulation of chronic Hp infection may induce a systemic inflammatory response and trigger autoimmunity. Helicobacter pylori can induce inflammation and activate host immunity, many researchers have thought that Hp infection may contribute to the development of autoimmune diseases (26, 27). In our study, Hp prevalence increases in presence of additional gastrointestinal system diseases, but there was no correlation between Hp positivity and the autoimmune diseases or bronchial asthma. There was a few patients with chronic renal failure and was not statistically significant with Hp positivity.

## CONCLUSION

As a conclusion, there is correlation between the Hp positivity and age, educational status and additional gastrointestinal system diseases.

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