



Investigation of *Helicobacter pylori* Infection Prevalence Using C14-Urea Breath Test and Its Relationship with Socioeconomic, Family, and Environmental Factors

Murat Sadic^{1,*}, Fadimana Nur Aydinbelge¹, Gokhan Koca¹, Koray Demirel¹, Aylin Akbulut¹, Suleyman Kalayci¹ and Meliha Korkmaz¹

¹Department of Nuclear Medicine, Ankara Training and Research Hospital, University of Health Sciences, Ankara, Turkey

*Corresponding author: Department of Nuclear Medicine, Ankara Training and Research Hospital, University of Health Sciences, Ankara, Turkey. Tel: +90-3125953608, Fax: +90-3125953856, Email: mdmuratsadic@gmail.com

Received 2017 September 18; Revised 2019 July 24; Accepted 2019 July 28.

Dear Editor,

Studies of *Helicobacter pylori* show that it is the cause of duodenal ulcers, gastric ulcers, gastric adenocarcinoma, and primary gastric B cell lymphoma (MALT lymphoma). *Helicobacter pylori* is the first established carcinogenic bacterium. Thus, it is very important to diagnose and treat *H. pylori* infection and determine the effectiveness of eradication treatments. The C14-urea breath test (C14-UBT) is a rapid, well-tolerated, non-invasive method to detect *H. pylori*, with a sensitivity of 94.9% and specificity of 100% (1). We employed C14-UBT to investigate the prevalence of *H. pylori* infection and evaluate its association with epidemiological, demographic, socioeconomic, and environmental factors of patients.

In this study, we recruited 2,929 patients (1,751 females; 1,118 males; mean age: 35.54 ± 20.41 years; range 3 - 82 years) who had been referred for C14-UBT between April 2007 and January 2017. The exclusion criteria included previous gastric surgery, *H. pylori* eradication treatment, and equivocal C14-UBT results (25 - 50 cpm). *Helicobacter pylori* infection status was determined with C14-UBT. The patients were assessed based on a standard questionnaire completed by the patients or their parents. The patients were grouped according to age, gender, blood group, body mass index (BMI), past medical history, demographic properties such as education level, smoking and/or alcohol habit, the existence of common systemic disease, presence of companion animals, and the family history of gastric disease.

Capsules of urea (Helicap[®], Isotop, Budapest, Hungary) labeled with 37 kBq (1 μCi) of C-14 were swallowed with 50 mL of water. After 15 min, the patients breathed out into a card (Heliprobe BreatheCard[™], Kibion, Stockholm, Sweden) until the indicator color turned from orange to yellow. The activity was counted for 250 seconds

and the results were given in counts per minute (cpm) by a Heliprobe analyzer (Heliprobe[™]-analyzer, Kibion, Stockholm, Sweden) as a special Geiger-Müller counter. The values of ≤ 25 cpm indicated no infection, between 25 and 49 cpm indicated a suspicion, and ≥ 50 cpm indicated an infection. Statistical analysis was performed by SPSS 20.0 using the Wilcoxon signed-rank test, Student's *t* test for unpaired data, and simple regression analysis, as appropriate. A *P* value of < 0.05 was considered statistically significant.

According to the results, 1,390 (47.4%) cases were *H. pylori*-positive (42.55% in males and 50.77% in females). The rate of UBT positivity was 262/609 (43%) in the pediatric group, 877/1749 (50%) in the adult group, and 251/571 (44%) in the geriatric group. The difference was statistically significant between pediatrics and the other age groups (*P* = 0.043). A positive correlation was found between C14-UBT positivity and age (*r* = 0.76) (Table 1). There was a significant relationship between C14-UBT positivity and existence of common systemic disease, education level, and income level (*P* = 0.018, *P* = 0.042, *P* = 0.037, respectively) (Table 2). C14-UBT positivity was not correlated with gender, smoking/alcohol habits, family history of gastric disease, presence of companion animals, BMI, and blood type (*P* > 0.05).

Epidemiological studies show that the prevalence of *H. pylori* infection increases with age because of inadequate hygiene, low education level, and low socioeconomic conditions in developing countries (2-4). Similar to previous studies (1, 5), our study demonstrated that *H. pylori* infection was not associated with smoking, alcohol habits, blood groups/Rh factors, and gender. We did not find any relationship between *H. pylori* positivity and BMI, the presence of companion animals, and a positive family history

Table 1. Relationship Between Age and C14-UBT Results^{a,b}

	Number	Age, y	C14-UBT (+)	C14-UBT (-)
Pediatrics (< 16 years)	609	13.19 ± 2.91	262 (43)	347 (57)
Adults (16 - 65 years)	1749	36.18 ± 12.51	877 (50)	872 (50)
Geriatrics (> 65 years)	571	69.51 ± 5.68	251 (44)	312 (56)
Total	2929	35.54 ± 20.41	1390 (47.4)	1531 (52.6)

Abbreviations: C14-UBT (+), positive result for C14-Urea Breath Test; C14 UBT (-), negative result for C14-Urea Breath Test.

^aThere was a statistically significant difference between the pediatric group and the other age groups ($P = 0.043$) and a positive correlation between C14-UBT positivity and age ($r = 0.76$).

^bValues are expressed as mean ± SD or No. (%).

of gastric disease. we believe that an existing chronic diseases or condition (such as diabetes, asthma, hypertension, renal disease, rheumatologic disease, and other gastrointestinal diseases) may show predisposition of *H. pylori* positivity.

As a conclusion, there is a statistically significant correlation between *H. pylori* positivity and increasing age, education level, income level, and presence of common systemic disease, while no significant relationship was found between *H. pylori* prevalence and the other parameters; these findings were in accordance with the literature.

Footnotes

Conflict of Interests: The authors declare that there is no conflict of interest in this study and no proprietary interest in the products named in this article.

Funding/Support: It is not declared by the authors.

References

1. The EUROGAST Study Group. An international association between *Helicobacter pylori* infection and gastric cancer. *Lancet*. 1993;**341**(8857):1359-62. [PubMed: 8098787].
2. Sadic M, Atilgan HI, Koca G, Demirel K, Baskin A, Aydinbelge N. Comparison of the *Helicobacter pylori* infection with C14 urea breath test and demographic variables in elderly population. *Med J Ankara Tr Res Hosp*. 2016;**49**(2):94-9.
3. Korkmaz M, Sadic M, Koca G, Demirel K, Atilgan HI, Ozyurt S, et al. The relationship of *Helicobacter pylori* infection with demographic, socioeconomic and environmental factors: Ankara Hospital experience. *Kafkas J Med Sci*. 2013;**3**(2):74-9. doi: 10.5505/kjms.2013.63626.
4. Samareh-Fekri M, Hashemi Bajgani SM, Shafahi A, Asadi-Zarandi M, Mollaie H, Jamali Paghhalhe A. Detection of *Helicobacter pylori* in the bronchoalveolar lavage of patients with lung cancer using real-time PCR. *Jundishapur J Microbiol*. 2016;**9**(11). e32144. doi: 10.5812/jjm.32144. [PubMed: 28138371]. [PubMed Central: PMC5240154].
5. Petrovic M, Artiko V, Novosel S, Ille T, Sobic-Saranovic D, Pavlovic S, et al. Relationship between *Helicobacter pylori* infection estimated by 14C-urea breath test and gender, blood groups and Rhesus factor. *Hell J Nucl Med*. 2011;**14**(1):21-4. [PubMed: 21512660].

Table 2. The Percentage of Patients with Positive Test Results According to Gender, Past Medical History, Education level, Income Level, Smoking/Alcohol Habits, Gastric Disease History in the Family, the Presence of Companion Animals, BMI, and ABO/Rh Blood Group Type^a

Characteristics	Case Number	C14 UBT (+), No.	Hp Positivity Rate, %	P Value
Sex				0.216
Female	1751	889	50.77	
Male	1178	501	42.53	
Past medical history				0.018
None	1933	963	49.82	
Diabetes Mellitus	147	76	51.70	
Asthma	128	65	50.78	
Hypertension	189	97	51.32	
Renal Disease	11	6	54.55	
Rheumatologic Diseases	84	43	51.19	
Other GIS Diseases	437	140	32.04	
Education level				0.042
Illiterate	243	137	56.38	
Primary Education	1547	733	47.38	
High School	771	383	49.68	
University	357	132	36.97	
Master or Doctorate	11	3	27.27	
Level of income				0.037
Low	1187	658	55.43	
Middle	1241	489	39.40	
High	501	243	48.50	
Smoking and/or alcohol habit				0.296
Yes	540	282	52.22	
No	2389	1108	46.38	
Presence of family history of gastric disease				0.187
Yes	645	338	52.40	
No	2284	1052	46.06	
Presence of companion animals				0.772
Yes	183	126	68.85	
No	2746	1264	46.03	
BMI				0.214
Low	606	271	44.72	
Normal	1136	568	50.00	
High	753	338	44.89	
Obese	325	171	52.62	
Morbidly obese	109	42	38.53	
ABO/Rh blood group type				0.836
A Rh (+)	887	326	36.75	
B Rh (+)	855	415	48.54	
AB Rh (+)	480	167	34.79	
O Rh (+)	275	122	44.36	
A Rh (-)	187	97	51.87	
B Rh (-)	143	55	38.46	
AB Rh (-)	67	30	44.78	
O Rh (-)	35	18	51.43	

Abbreviations: BMI, body mass index; C14-UBT (+), positive result for C14-Urea Breath Test; Hp, *Helicobacter pylori*.

^aThere was a significant relationship between the test positivity and the past medical history, education level, and income level (P = 0.018, P = 0.042, P = 0.037, respectively). The *H. pylori* positivity was not correlated with gender, smoking/alcohol habits, gastric disease history in the family, the presence of companion animals, BMI, and blood type (P > 0.05).