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Original Article

# Health literacy and Helicobacter Pylori in patients who underwent endoscopic examination for dyspepsia

**Umut Eren Erdogdu[1] ,Taskin Erkinuresin[2], Haci Murat Cayci[3], Mustafa Akar[4], Hakan Demirci[5], Ufuk Arslan[3], Ali Tardu[3]**

[1]Bursa Yuksek Ihtisas Training and Research Hospital, Department of General Surgery, Bursa, Turkey
[2]Bursa Yuksek Ihtisas Training and Research Hospital, Department of Pathology, Bursa, Turkey
[3]Bursa Yuksek Ihtisas Teaching and Research Hospital, Department of Gastroenterological Surgery, Bursa, Turkey
[4]Bursa Yuksek Ihtisas Training and Research Hospital, Department of Gastroenterology, Bursa, Turkey
[5]Bursa Yuksek Ihtisas Training and Research Hospital, Department of Family Medicine, Bursa, Turkey



## Abstract

**Aim:** The main factors most frequently associated with Helicobacter pylori (HP) in studies include patient age, poor socio-economic status, and antibiotic use. Limited/inadequate Health Literacy (HL) is also associated with poor health conditions. A possible relationship between HP and HL has not been shown in the literature yet. This study aimed to explore the relationship between HL and HP infection both of which have comparable patient profile.

**Material and Methods:** The study evaluated the data regarding 188 patients who underwent gastroscopy due to the complaint of dyspepsia in cross-sectional analytic design. Health Literacy was evaluated using European Health Literacy Survey Questionnaire (HLS-EU-Q47) scale. The presence of HP was confirmed by histopathological examination.

**Results:** Median age was smaller in the HP-positive group (p=0.001). In Helicobacter pylori-positive patients, mean scores were only high for household and taking part in community activities questions in the HLS-EU-Q47 scale. While 47.20% of the patients in the HP (+) group were smokers, 31.30% of the patients in the HP (-) group were smokers, with a difference between HP groups in terms of smoking status (p=0.026).

**Conclusion:** There was no relationship between HP and HL in this sample. HL probably does not play a role in HP positivity but its prognostic role can be discussed further in prospective studies.

**Keywords:** Health literacy; antibiotics; smoking; health promotion; disease prevention; helicobacter pylori

## INTRODUCTION

Helicobacter pylori (HP) is a microaerophilic and gram-negative microorganism. HP infection may lead to several gastro-duodenal diseases including chronic gastritis, peptic ulcer, mucosa-associated lymphoid tissue (MALT) lymphoma, and gastric cancer (1). HP gastritis has been identified to be an infectious disease which is transmitted via oral-oral, fecal-oral and gastro-oral routes (2,3). The prevalence of HP infection is especially high in countries with low socio-economic status and poor sanitary conditions (4,5). Studies have shown that the prevalence of HP in the United States is 35.6% of the general population, however, it is 74.8% in Alaska natives. The countries in which HP is the most prevalent include Nigeria (87.7%), Portugal (86.4%), Estonia (82.5%), Kazakhstan (79.5%) and Pakistan (81%). The countries with the lowest prevalence of HP have been reported to be Switzerland (18.9%), Denmark (22.1%), New Zealand (24%), Australia (24.6%) and Sweden (26.2%) (6).

Health Literacy (HL) has been defined as the cognitive and social skills which determine the ability and motivation of individuals to gain access to, understand and use information in order to promote and maintain their health by WHO (World Health Organization) in 1998 (7). Today,

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**Corresponding Author:** Umut Eren Erdogdu , Bursa Yuksek Ihtisas Training and Research Hospital, Department of General Surgery, Bursa, Turkey **E-mail:** umuterdogdu@gmail.com

HL involves the matters of individuals gaining access to, understanding, interpreting and developing appropriate behaviors based on the necessary basic health information and services to make appropriate health-related decisions, and consequently health care, disease prevention and health promotion (8).

Among patients with colorectal cancer; patients with low HL receive less chemotherapy than the patients with high HL (9). The importance of having adequate HL to achieve best outcomes has been shown in patients with Type 2 Diabetes Mellitus (10). Furthermore in Chronic Obstructive Pulmonary Disease (COPD); poor HL has been associated with greater COPD severity, greater COPD desperation, and high rates of COPD-related emergency department visits (11).

Low socio-economic status and poor sanitation are associated with HP (12). Similarly, limited/inadequate HL is associated with poor health conditions. This study aimed to explore the possible relationship between HL and HP disease.

## MATERIAL and METHODS

### Study Design

The data regarding 188 patients who admitted to General Surgery and Gastroenterology clinics of the hospital between April 2017 and August 2017 with the complaint of dyspepsia and underwent was evaluated in cross-sectional analytic design. Before the study, the patients were informed in detail and gave written informed consent. Our study was performed in accordance with the Declaration of Helsinki. The local ethics committee of the hospital approved the study.

### Participants

Patients who are over 18 years old were included into the study. Patients who did not want to participate in the study, are illiterate, and are healthcare professionals were excluded from the study. Patients' demographic characteristics were recorded. 252 patients underwent gastroscopy during the study period and 61 of them were excluded as they gave inadequate numbers of answers (less than 43 out of 47) to the health literacy scale questions. And, three patients were excluded as no biopsy was taken during gastroscopy. In the study, patients were divided into two groups; HP (+) (n=89) and HP (-) (n=99).

### Interventions

Upon an appointment was made from the endoscopy unit, and after 8-hour fasting and oral local lidocaine hydrochloride (Vemcaine pump spray 10%; Vem Medical) application, gastroscopy was performed to patients who admitted to general surgery and gastroenterology clinics for dyspepsia by the same surgeon or the same gastroenterologist. Esophagus, stomach and duodenum were evaluated, and biopsies were taken from the antrum and corpus mucosa of the patients. Pieces were placed into formaldehyde solution, and all of them were sent to the same pathologist. Preparations were stained using hematoxylin-eosin, May-Grünwald and Periodic Acid Schiff – Alcian Blue (PAS-AB), and examined under light microscope. The preparations were reported as (+) mildly-, (++) moderately-, (+++) severely-positive based on the presence of bacteria.

The European Health Literacy Survey Questionnaire (HLS-EU-Q47) has been developed in 2011 (13). The validity of the scale for Turkish language has been established by Abacigil et al. (14). Questionnaire forms were filled by face-to-face interviews with patients. In each of 47 questions, four choices were given. The choices were arranged as 1=very difficult, 2=difficult, 3=easy, 4= very easy. No point was given for any question without an answer. Questionnaire questions were divided into subgroups as healthcare for the questions 1 to 16, disease prevention for the questions 17 to 31, and health promotion for the questions 32 to 47. At the end of the study a score of 0 to <25 was regarded as inadequate, a score of 25 to <33 as problematic, a score of 33 to <42 as adequate, and a score of 42 to 50 as perfect.

### Statistical analysis

The distribution normality of the variables was assessed using Shapiro-Wilk test. Continuous variables were expressed as median (minimum: maximum) values. Categorical variables were expressed as n (%). Mann Whitney U test was used for the comparisons between two groups based on the normality test, and Kruskal Wallis test was used for comparisons between more than two groups. In a case an overall significance was obtained after Kruskal Wallis test, subgroup analyses were conducted using Dunn Bonferroni approach. For the intergroup comparisons of categorical variables, Pearson chi-square and Fisher's exact chi-square tests were used. The internal consistency of HL scale was examined using Cronbach alpha coefficient. Reliability coefficients of the HL scale and its sub-scales were found to be α=0.940 for healthcare, α=0.921 for disease prevention, α=0.952 for health promotion, and α=0.974 for overall. For statistical analyses, SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) software was used, and p value of <0.05 was regarded as statistically significant.

## RESULTS

The study consisted of 188 patients. 108 patients were females, and 80 were males. Socio-demographic data distribution of the participants is shown in Table1.

Based on educational level, a difference was present in sub-scales of HLS-EU-Q47 and overall score of the scale (Table2). Healthcare scores were found to be lower in subjects with the educational level of “primary school and lower” than the subjects with the graduation status of “high school and over” (p<0,001). Disease prevention scores were found to be higher in subjects with the educational level of high school and over than the subjects with the educational level of “middle school” and “primary school and lower” (p=0.025 and p=0.012, respectively).

**Table 1. Socio-demographic characteristics of the patients**

| | n=188 |
|---|---|
| **Age (years)** | 44 (18:83) |
| **Sex (F/M)** | 108 (%57.40) / 80 (%42.60) |
| **Body Mass Index** | 27.10 (15.80:54.60) |
| **Total Duration of School** | 8 (0:22) |
| **Marital Status** | |
| Married | 137(%73.30) |
| Single | 44 (%23.50) |
| Divorced | 6 (%3.20) |
| **Educational level** | |
| Primary school and lower | 76 (%40.40) |
| Middle School | 41 (%21.80) |
| High School and over | 71 (%37.80) |
| **Reading Newspaper** | |
| Yes | 94 (%50) |
| No | 94 (%50) |
| **Reading Books** | |
| Yes | 88 (%46.80) |
| No | 100 (%53.20) |
| **Economic status** | |
| Poor | 20 (%10.60) |
| Medium | 130 (%69.10) |
| Good | 38 (%20.20) |
| **Smoking (yes)** | 73 (%38.80) |
| **Alcohol (yes)** | 10 (%5.30) |
| **Chronic disease (yes)** | 70 (%37.20) |

**Note: Data is given as median (minimum: maximum) and n (%)**

Health promotion scores were found to be lower in subjects with the educational level of "primary school and lower" than the subjects with the graduation status of "high school and over" (p=0.019). Overall index scores were found to be higher in subjects with the educational level of "high school and over" than the subjects with the graduation status of "middle school" and "primary school and lower" (p=0.001 and p=0.018, respectively).

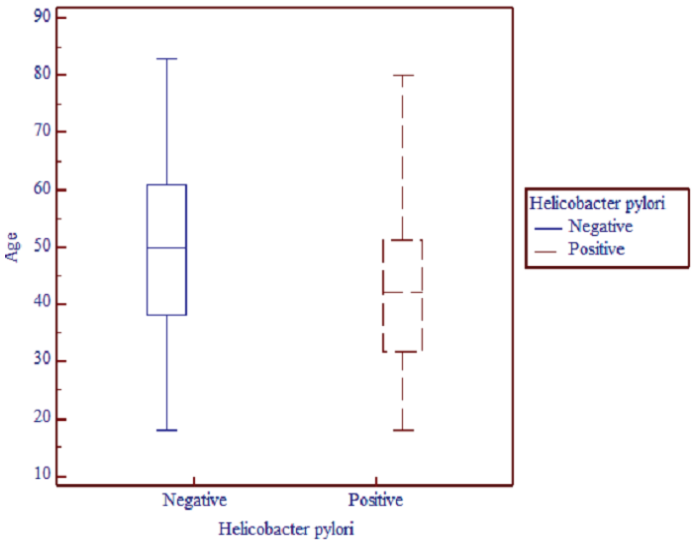


**Figure1.** The relationship between Helicobacter pylori and age

Median age was higher in the poor HLS-EU-Q47 group (p<0.001). Difference was present between HL groups in terms of educational level. The proportion of subjects with the graduation status of "primary school and lower" was higher in the poor HL group (p=0.043).

**Table 2. Distribution of health literacy and sub-scales**

| | Healthcare (q1-16) | Disease Prevention (q17-31) | Health Promotion (q32-47) | Overall (q1-47) |
|---|---|---|---|---|
| **Educational Level** | | | | |
| Primary school and lower (n=76) | 31.25 (8.33:50) | 30.56 (4.17:50) | 31.25 (0:50) | 30.08 (7.36:50) |
| Middle school (n=41) | 33.33 (0:44.79) | 30 (5.56:45.56) | 29.17 (0:50) | 31.21 (1.77:45.74) |
| High School and over (n=71) | 34.38 (3.33:50) | 33.33 (6.67:50) | 33.33 (8.33:50) | 33.33 (6.52:50) |
| **p-value** | **<0.001[a]** | **0.005[a]** | **0.011[a]** | **<0.001[a]** |
| **Economic Status** | | | | |
| Poor (n=20) | 32.29(13.54:48.96) | 28.89 (10:50) | 33.33 (9.38:48.96) | 31.90 (10.99:46.45) |
| Medium (n=130) | 33.33 (0:50) | 32.22 (4.17:50) | 31.25 (0:50) | 31.91 (1.77:50) |
| Good (n=38) | 34.38 (16.67:50) | 33.33 (11.11:50) | 33.33 (0:50) | 33.51 (9.78:50) |
| **p-value** | **0.074[a]** | **0.120[a]** | **0.235[a]** | **0.179[a]** |
| **Smoking Status** | | | | |
| Yes (n=73) | 33.33 (0:50) | 31.11 (4.17:50) | 32.29 (0:50) | 32.27 (1.77:50) |
| No (n=115) | 33.33 (8.33:50) | 33.33 (5.56:50) | 32.29 (6.25:50) | 31.91 (15.25:50) |
| **p-value** | **0.532[b]** | **0.081[b]** | **0.765[b]** | **0.934[b]** |

**Data is given as median (minimum: maximum) and n (%). A: Kruskal Wallis test, b. Mann Whitney test**

The proportion of subjects with the graduation status of "high school and over" was higher in the good HL group (p=0.002).

Median age was found to be smaller in the HP-positive group (p=0.001).No difference was detected between HP groups in terms of educational level and economic status (Table3). The proportion of smokers was higher in the HP-positive group (p=0.026) (Figure1).

**Table 3. General characteristics of the participants based on Helicobacter pylori positivity**

| | Helicobacter Pylori (-) (n=99) | Helicobacter Pylori (+) (n=89) | p-value |
|---|---|---|---|
| **Age (years)** | 50 (18:83) | 42 (18:80) | **0.001**[b] |
| **Educational Level** | | | |
| Primary school and lower | 44 (%44.40) | 32 (%36) | |
| Middle School | 18 (%18.20) | 23 (%25.80) | 0.349[c] |
| High School and over | 37 (%37.40) | 34 (%38.20) | |
| **Economic Status** | | | |
| Poor | 9 (%9.10) | 11 (%12.40) | |
| Medium | 69 (%69.70) | 61 (%68.50) | 0.747[c] |
| Good | 21 (%21.20) | 17 (%19.10) | |
| **Smoking Status** | | | |
| Yes | 31 (%31.30) | 42 (%47.20) | **0.026**[c] |
| No | 68 (%68.70) | 47 (%52.80) | |

Data is given as n (%). b: Mann Whitney test, c: Chi-square test

The scores of the answers given to questions 42 and 47 were determined to be higher in the HP (+) group than the HP (-) group (Table4). No difference was detected between groups in terms of answers to other questions.

While 47.20% (n=42) of the patients in the HP (+) group (n=89) were smokers, 31.30% (n=31) of the patients in the HP (-) group (n=89) were smokers, with a difference between HP groups in terms of smoking status (p=0.026) (Figure2).

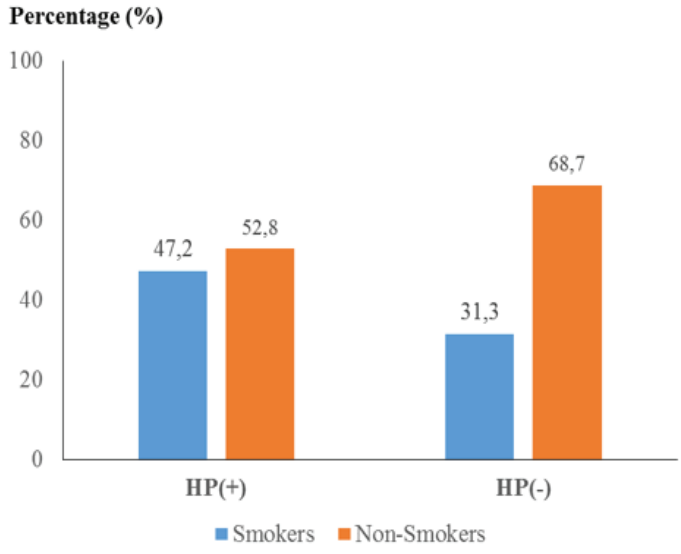


**Figure 2.** The relationship between Helicobacter pylori and smoking

**Table 4. Distribution of the answers of the cases and controls to HLS-EU Scale**

| | Helicobacter Pylori (-) | | | Helicobacter Pylori (+) | | | |
|---|---|---|---|---|---|---|---|
| | n | Median (Min:Max) | Mean±SD* | n | Median (Min:Max) | Mean±SD* | p-value |
| Q.1...find information about symptoms of illnesses that concern you? | 12 | 3 (1:4) | 2.81±0.74 | 88 | 3 (1:4) | 2.75±0.83 | 0.803[b] |
| Q.2...find information on treatments of illnesses that concern you? | 99 | 3 (1:4) | 2.90±0.72 | 87 | 3 (1:4) | 2.82±0.77 | 0.464[b] |
| Q.3...find out what to do in case of a medical emergency? | 98 | 3 (1:4) | 2.80±0.84 | 89 | 3 (1:4) | 2.87±0.86 | 0.465[b] |
| Q.4...find out where to get professional help when you are ill? | 98 | 3 (1:4) | 3.15±0.65 | 88 | 3 (1:4) | 3.28±0.68 | 0.120[b] |
| Q.5...understand what your doctor says to you? | 99 | 3 (1:4) | 3.05±0.76 | 88 | 3 (1:4) | 3.09±0.81 | 0.647[b] |
| Q.6...understand the leaflets that come with your medicine? | 98 | 3 (1:4) | 2.91±0.79 | 86 | 3 (1:4) | 3.01±0.74 | 0.336[b] |
| Q.7...understand what to do in a medical emergency? | 99 | 3 (1:4) | 2.73±0.77 | 89 | 3 (1:4) | 2.88±0.78 | 0.155[b] |
| Q.8...understand your doctor's or pharmacist's instruction on how to take a prescribed medicine? | 98 | 3 (1:4) | 3.14±0.66 | 89 | 3 (1:4) | 3.18±0.65 | 0.728[b] |
| Q.9.. judge how information from your doctor applies to you? | 96 | 3 (1:4) | 2.95±0.76 | 86 | 3 (1:4) | 3.12±0.69 | 0.151[b] |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Q.10...judge the advantages and disadvantages of different treatment options? | 98 | 3 (1:4) | 2.66±0.77 | 89 | 3 (1:4) | 2.73±0.81 | 0.619[b] |
| Q.11...judge when you may need to get a second opinion from another doctor? | 99 | 3 (1:4) | 2.72±0.78 | 89 | 3 (1:4) | 2.80±0.84 | 0.444[b] |
| Q.12...judge if the information about illness in the media is reliable? | 99 | 2 (1:4) | 2.48±0.80 | 89 | 3 (1:4) | 2.48±0.85 | 0.943[b] |
| Q.13...use information the doctor gives you to make decisions about your illness? | 96 | 3 (1:4) | 2.92±0.64 | 87 | 3 (1:4) | 2.98±0.68 | 0.432[b] |
| Q.14...follow the instructions on medication? | 99 | 3 (1:4) | 3.13±0.72 | 87 | 3 (1:4) | 3.30±0.75 | 0.069[b] |
| Q.15...call an ambulance in an emergency? | 99 | 3 (1:4) | 3.20±0.74 | 87 | 3 (1:4) | 3.24±0.82 | 0.540[b] |
| Q.16...follow instructions from your doctor or pharmacist? | 98 | 3 (1:4) | 3.21±0.68 | 87 | 3 (2:4) | 3.39±0.62 | 0.079[b] |
| Q.17...find information about how to manage unhealthy behaviour such as smoking, low physical activity and drinking too much? | 98 | 3 (1:4) | 3.07±0.78 | 86 | 3 (1:4) | 3.17±0.77 | 0.356[b] |
| Q.18...find information on how to manage mental health problems like stress or depression? | 99 | 3 (1:4) | 2.81±0.82 | 89 | 3 (1:4) | 2.85±0.81 | 0.676[b] |
| Q.19...find information about vaccinations and health screenings that you should have? | 98 | 3 (1:4) | 2.92±0.76 | 86 | 3 (1:4) | 2.94±0.69 | 0.907[b] |
| Q.20...find information on how to prevent or manage conditions like being overweight, high blood pressure or high cholesterol? | 99 | 3 (1:4) | 2.85±0.73 | 89 | 3 (1:4) | 2.83±0.80 | 0.937[b] |
| Q.21...understand health warnings about behaviour such as smoking, low physical activity and drinking too much? | 98 | 3(1:4) | 3.00±0.75 | 85 | 3 (1:4) | 3.02±0.76 | 0.780[b] |
| Q.22...understand why you need vaccinations? | 98 | 3 (1:4) | 2.93±0.78 | 88 | 3 (1:4) | 3.15±0.72 | 0.054[b] |
| Q.23...understand why you need health screenings? | 99 | 3 (1:4) | 3.05±0.63 | 89 | 3 (1:4) | 3.16±0.69 | 0.210[b] |
| Q.24...judge how reliable health warnings are, such as smoking, low physical activity and drinking too much? | 99 | 3 (1:4) | 2.93±0.76 | 88 | 3 (1:4) | 3.02±0.82 | 0.317[b] |
| Q.25...judge when you need to go to a doctor for a check-up? | 98 | 3 (1:4) | 2.79±0.74 | 89 | 3 (1:4) | 2.70±0.90 | 0.497[b] |
| Q.26...judge which vaccinations you may need? | 99 | 3 (1:4) | 2.75±0.82 | 89 | 3 (1:4) | 2.73±0.90 | 0.945[b] |
| Q.27...judge which health screenings you should have? | 99 | 3 (1:4) | 2.78±0.75 | 87 | 3 (1:4) | 2.68±0.90 | 0.623[b] |
| Q.28...judge if the information on health risks in the media is reliable? | 99 | 3 (1:4) | 2.56±0.81 | 89 | 3 (1:4) | 2.53±0.94 | 0.844[b] |
| Q.29...decide if you should have a flu vaccination? | 98 | 3 (1:4) | 2.78±0.86 | 87 | 3 (1:4) | 2.66±0.96 | 0.398[b] |
| Q.30...decide how you can protect yourself from illness based on advice from family and friends? | 99 | 3 (1:4) | 2.62±0.77 | 88 | 3 (1:4) | 2.68±0.97 | 0.367[b] |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Q.31...decide how you can protect yourself from illness based on information in the media? | 98 | 3 (1:4) | 2.54±0.81 | 86 | 3 (1:4) | 2.55±1.00 | 0.803[b] |
| Q.32...find information on healthy activities such as exercise, healthy food and nutrition? | 99 | 3 (1:4) | 3.06±0.71 | 86 | 3 (1:4) | 2.93±0.84 | 0.376[b] |
| Q.33...find out about activities that are good for your mental well-being? | 99 | 3 (1:4) | 2.83±0.77 | 86 | 3 (1:4) | 2.86±0.90 | 0.635[b] |
| Q.34...find information on how your neighborhood could be more health-friendly? | 99 | 3 (1:4) | 2.98±0.74 | 89 | 3 (1:4) | 2.94±0.84 | 0.971[b] |
| Q.35...find out about political changes that may affect health? | 99 | 3 (1:4) | 2.72±0.82 | 89 | 3 (1:4) | 2.76±0.90 | 0.586[b] |
| Q.36...find out about efforts to promote your health at work? | 98 | 3 (1:4) | 2.79±0.83 | 86 | 3 (1:4) | 2.88±0.89 | 0.242[b] |
| Q.37...understand advice on health from family members or friends? | 99 | 3 (1:4) | 2.99±0.72 | 89 | 3 (1:4) | 2.97±0.87 | 0.764[b] |
| Q.38...understand information on food packaging? | 99 | 3 (1:4) | 2.91±0.70 | 89 | 3 (1:4) | 2.81±0.86 | 0.485[b] |
| Q.39...understand information in the media on how to get healthier? | 97 | 3 (1:4) | 2.70±0.79 | 86 | 3 (1:4) | 2.80±0.84 | 0.248[b] |
| Q.40...understand information on how to keep your mind healthy? | 99 | 3 (1:4) | 2.86±0.71 | 89 | 3 (1:4) | 2.94±0.83 | 0.268[b] |
| Q.41...judge where you live affects your health and well-being? | 99 | 3 (1:4) | 2.93±0.75 | 89 | 3 (1:4) | 3.00±0.81 | 0.390[b] |
| Q.42...judge how your housing conditions help you to stay healthy? | 98 | 3 (1:4) | 2.98±0.63 | 89 | 3 (1:4) | 3.13±0.73 | **0.045[b]** |
| Q.43...judge which everyday behavior is related to your health? | 99 | 3 (1:4) | 3.04±0.67 | 87 | 3 (1:4) | 3.11±0.81 | 0.249[b] |
| Q.44...make decisions to improve your health? | 99 | 3 (1:4) | 2.95±0.72 | 89 | 3 (1:4) | 3.06±0.87 | 0.187[b] |
| Q.45...join a sports club or exercise class if you want to? | 98 | 3 (1:4) | 2.64±0.91 | 89 | 3 (1:4) | 2.85±0.92 | 0.092[b] |
| Q.46...influence your living conditions that affect your health and wellbeing? | 98 | 3 (1:4) | 2.65±0.83 | 89 | 3 (1:4) | 2.85±0.87 | 0.069[b] |
| Q.47...take part in activities that improve health and well-being in your community? | 99 | 3 (1:4) | 2.70±0.84 | 89 | 3 (1:4) | 2.92±0.88 | **0.048[b]** |

**Data is given as median (minimum: maximum) and mean ± SD* (Standard Deviation). b: Mann Whitney test**

## DISCUSSION

Helicobacter pylori (HP) infection showed difference only for household organization and taking part to health-related community activities among health literacy questions. Limited/inadequate HL was not associated with HP infection in patients who admitted to the outpatient clinic for dyspepsia. HP was observed more frequently in younger patients and smokers.

The main factors most frequently associated with HP in studies include patient age, socio-economic status and antibiotic use. The annual increase in HP positivity decreases with age (15). In a study regarding sex, HP has

been reported to be 3-fold more frequent in male children, however, other studies did not support this finding (16-18). The possibility of HP occurrence in children of HP-positive mothers is higher (19,20). HP elimination has been reported to be associated with age, sex, antibiotic use and ethnicity. HP elimination has a weak relationship with penicillin and macrolides, however, in children aged 1-2, HP was eliminated by one third using cephalosporin or sulfonamide (21). Incidental antibiotic encounters have been demonstrated to decrease the duration of HP infection (22). It is known that patients with low HL visit physicians more frequently. We also know that health costs are higher in these individuals. We know that, patients visiting physicians at inappropriate frequency increase the possibility of inappropriate antibiotic prescriptions. Thereby, if incidental antibiotic use provides HP elimination, exposure to this elimination may be the case in the low-HL patient group detected to be HP-negative. While exploring the relationship between HL and HP in prospective studies, curative therapy for HP and other antibiotic uses should be taken into consideration.

A weak relationship has been reported between smoking and HP (23). Present study also determined smoking as a risk factor for HP infection. The relationship of smoking with HP infection may be explained by the fact that infection can reside more easily on hypoxic tissue. The risk-increasing effects of smoking for HP include the facts that tobacco increases acid and pepsin secretion, causes changes in motility, and shows effects on prostaglandin synthesis, stomach blood stream and mucus secretion (23).

Our study evaluated patients who admitted to general surgery and gastroenterology outpatient clinics of a university hospital. In previous studies, HL has been found to be associated with help-seeking behavior in patients (24). Health-seeking patients might have visited a specific specialist. If the study was performed in a cross-sectional design, patients who were not seeking for help could also be evaluated and thereby, the true relationship between HL and HP in the population could be established. A previous study using non-invasive method has found the HP-positivity in Turkey over 80%. The present study found the HP positivity as 50%. Based on these results, it can be said that with an actually higher HP positivity, some cases may not be seeking for help. However, in light of our results, the finding that there is no relationship between HP and HL in patients who admitted to our outpatient clinics is important The literature data regarding this is lacking, and the present study is one of the pioneer studies on this subject.

Low socio-economic status and low level of income were found to be associated with HP. The relationship between educational level and HP is controversial. Some studies have found that HP infection is associated with low educational level, however, there are also studies claiming the exact opposite. Studies have revealed that rural life, living in a crowded household and using contaminated water supply are all associated with HP (25, 26). At the end of the study, HP-positive patients had higher mean scores in two questions of HLS- EU questionnaire, 'judge how your housing conditions help you to stay healthy' (question 42) and 'take part in activities that improve health and well-being in your community' (question 47). The relationship of HP positivity with household organization and taking part in health-related community activities should be further explored in detail in future studies.

**Study Limitations**

The research's power is a limitation. 25.4% of the planned subjects for the study could not fill health literacy questionnaire adequately. Therefore, our number of subjects is limited. However, it is one of the first studies exploring the relationship between HP and HL, therefore, it is valuable. The fact it is not community-based is a limitation. Individuals who are seeking health admit more frequently to general surgery or gastroenterology outpatient clinic. A cross-sectional examination of the relationship between HP and HL using a non-invasive method may reveal the possible relationship in between. In future studies, these matters should be taken into consideration.

## CONCLUSION

In conclusion, a relationship between HP and HL could not be established in this sample. We think that age and smoking are the major determinants of HP positivity. These relationships should be explored in detail in future multi-center studies in primary care.

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*Umut Eren Erdogdu ORCID: 0000-0001-6700-1858*
*Taskin Erkinuresin ORCID: 0000-0003-1725-6590*
*Haci Murat Cayci ORCID: 0000-0002-4833-1509*
*Mustafa Akar ORCID: 0000-0001-9664-2849*
*Hakan Demirci ORCID: 0000-0003-0434-4807*
*Ufuk Arslan ORCID: 0000-0002-3050-167X*
*Ali Tardu ORCID: 0000-0003-0287-6789*

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