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Effect of helicobacter pylori positivity and dyspepsia on depression and somatosensory amplification

Meltem Pusuroglu[1], Bayram Kizilkaya[2]

[1]Recep Tayyip Erdogan University, Faculty of Medicine, Department of Mental Health and Diseases, Rize, Türkiye
[2]Recep Tayyip Erdoğan University, Training And Research Hospital, Internal Medicine Clinic, Rize, Türkiye

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Abstract

Helicobacter pylori gastritis is an infection frequently observed around the world. In our research, the effect of Helicobacter pylori positivity on depression and somatosensory amplification was investigated. The research included a total of 112 patients with dyspeptic complaints, 52 Helicobacter pylori positive and 60 Helicobacter pylori negative, and a healthy control group of 54 cases without any complaints. Participants completed the Beck Depression Inventory and the Somatosensory Amplification Scale. There was no effect of Helicobacter pylori positivity on depression levels (p=0.116), while Helicobacter pylori positivity had a significant effect on somatosensory amplification (F=6.794; p=0.010; η^2=0.40). There were significant effects of dyspeptic complaints on depression levels (F=6.695; p=0.011; η^2=0.039) and somatosensory amplification (F=7.554; p=0.007; η^2=0.044). It was identified that somatosensory amplification, sex and family history were each statistically significant explanatory variables for depression (p=0.001 β^2=0.255; p=0.038 β^2=0.150; p=0.002 β^2=0.230). There was a 0.269 increase in depression for each 1-unit increase in somatosensory amplification, the female sex increased depression by 2.463 units and positive family history increased it by 4.949 units. Helicobacter pylori positivity was not found to be a significant explanatory variable for depression (p=0.412). While Helicobacter pylori positivity did not have an effect on depression, it was found to be effective in somatosensory amplification. The presence of dyspeptic complaints was effective on both depression and somatosensory amplification. Somatosensory amplification was one of the factors predicting depression in patients with dyspeptic complaints. Somatosensory amplification is an important factor in patients with Helicobacter pylori positivity and dyspeptic complaints. Mental diseases should not be ignored during the monitoring and treatment of this patient group.

Keywords: Helicobacter pylori, depression, somatosensory amplification, somatization, medically unexplained symptoms

Introduction

Helicobacter pylori (HP) is an infection transmitted from person to person through the fecal oral route or in drinking water. Incidence increases with decreasing socioeconomic status. In spite of this, the incidence is still excessive and a significant portion of patients attending clinics with dyspepsia complaints are observed to have HP infection [1]. Stomach mucosa is a suitable environment for HP and it colonizes stomachs in half the world; however, it does not cause any symptoms [2]. Diagnosis and treatment of HP is easy; however, it is encountered as an important cancerogenic agent due to causing frequent recurrent infections and chronic gastritis [3].

Some research showed that chronic gastric diseases like HP, irritable bowel syndrome and reflux disease may have similar genetic predisposition. There is research suggesting that this genetic predisposition may be associated with depressive disorder [4]. Data about a common genetic model are limited in the literature; however, the chronic discomfort caused by gastrointestinal system complaints like HP gastritis may enhance sensitivity to depression, burnout and somatic complaints. Additionally, mental diseases like stress and depression may increase gastrointestinal symptoms causing a negative feedback

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Corresponding Author: Meltem Pusuroglu, Recep Tayyip Erdogan University, Faculty of Medicine, Department of Mental Health and Diseases, Rize, Türkiye
Email: meltempusuroglu@gmail.com

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cycle [5].

Depression is a mental disorder progressing with unhappiness, lack of motivation and depressed mood. In people with diseases involving long-term chronic progression and pronounced uncomfortable physical symptoms, depression symptoms like sadness, hopelessness may emerge, which may reduce functionality of patients and negatively affect daily life. Patients with unhappiness symptoms may be more susceptible to somatic sensations. In chronic diseases, especially those with physical symptoms, it is important to assess patients in mental terms [6,7]. In gastrointestinal system disorders with chronic uncomfortable symptoms, like HP infection, it is thought that the frequency of depression may increase and there is research about this in the literature.

The basis of our research is the hypothesis that there may be a correlation between HP infection with depression symptoms especially with somatosensory amplification. The main hypothesis of our research is that in addition to being HP positive, patients may be affected more by depression if they have somatic complaints. Research about this topic is limited in the literature. This type of research is valuable in terms of drawing attention to mental symptoms during the treatment process for chronic gastrointestinal disorders.

Material and Methods

The research was performed in Recep Tayyip Erdogan University Education and Research Hospital Internal Medicine clinic from 01.04.2022-12.12.2022 with patients applying due to dyspeptic complaints like abdominal pain, burning in the stomach, bloating, vomiting and nausea and a healthy control group. The research included patients aged 18-65 years, without any chronic disease like diabetes, chronic obstructive pulmonary disease or coronary artery disease, and with academic capacity appropriate for the scales used in the study, with no diagnosis of mental disease in the last 2 years and not using medication and a healthy control group comprising random patient relatives. People with dementia, alcohol and substance addiction, and neuropsychiatric diseases affecting cognitive capacity like mental retardation were excluded from the research. Patients sequentially attending the clinic with dyspepsia complaints and meeting the inclusion criteria had HP positivity investigated with endoscopic histopathological investigations and feces examination. Histopathological materials were evaluated by the Giemsa method. Patients were divided into 2 separate groups according to both HP positivity and negativity along with dyspeptic complaints. Firstly verbal and written consent was obtained from participants suitable for participation in the study. Participants accepting participation in the study were referred to a mental health and diseases expert and clinical interviews were held with participants according to DSM-5 diagnostic criteria. Participants with any mental disease were excluded from the study. Participants suitable for inclusion in the research completed the Beck Depression Inventory and the Somatosensory Amplification Scale. The sociodemographic data of participants were recorded. Ethics committee permission for the research was obtained from Recep Tayyip Erdogan University Non-Interventional Clinical Research Ethics Committee Chair (Ethics committee permission no: 2022/70). All implementations in the research were performed in accordance with institutional and/or national research committee ethical standards and the 1964 Helsinki Declaration and later revisions or comparable ethical standards.

Data collection tools

Beck Depression Inventory: This is a scale questioning depression levels comprising a total of 21 questions. It was developed in 1961 by Beck et al. with the aim of determining depression levels [8]. It investigates depression from both affective and cognitive aspects and is frequently used in clinic to determine depression levels. Each item on the scale is assessed from 0-3 points and the maximum points that can be obtained are 63. Points are assessed as mild depression for 10-17 points, moderate depression for 18-29 points and severe depression for 30-63 points and the cut-off point for the scale is 17. Though research identified cut-off points for Turkish society, increasing points are assessed as increasing depression level. The validity and reliability analyses for the scale found the Cronbach alpha value was 0.74, while in our sample the Cronbach alpha value was 0.78. The Turkish validity and reliability study for the scale was completed by Hisli [9,10].

Somatosensory Amplification Scale: This scale was developed in 1988 by Barsky et al. to assess somatosensory amplification. It is a self-report scale about somatosensory amplification comprising 10 questions. Each item is given points from 1 to 5 and increasing points are associated with increasing somatosensory amplification. The scale does not have a cut-off value. It measures the person's reaction and sensitivity to somatic sensations that are not pronounced in daily life [11]. Analyses of the scale found the Cronbach alpha value was 0.78, while in our sample the Cronbach alpha value was 0.76. The Turkish validity and reliability study for the scale was performed by Güleç et al. [12].

Statistics: Research data were uploaded to the computer environment and analyzed with Statistical Package for Social Sciences (SPSS) for Windows 25.0 (Armonk, NY: IBM Corp.). Descriptive statistics are presented as mean±standard deviation and percentages. Analysis of categoric variables used the Pearson chi-square test. Fit of variables to normal distribution was investigated using visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov test/Shapiro-Wilk test). Variables identified to fit normal distribution had one-way ANOVA used to assess statistical significance between groups. The statistical significance level was accepted as $p<0.05$. The effect of HP positivity and presence of dyspepsia complaints on Beck Depression Inventory and Somatosensory Amplification Scale points was investigated with two-way MANOVA. Analysis results are presented as arithmetic mean±standard deviation. A multiple linear regression model was created with age, sex, HP

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positivity, presence of dyspeptic complaints, family depression history and somatosensory amplification level as independent variables and Beck Depression Inventory points as dependent variable. Due to the multicollinearity problem, the presence of dyspeptic complaints was removed from the model and all data were assessed with the enter method. Statistical significance level was accepted as $p<0.05$.

Results

The research included a total of 112 patients with dyspeptic complaints, including 52 HP positive and 60 HP negative , and 54 people in a healthy control group with no complaints. Participants were grouped as those with dyspepsia complaint and HP positive, those with dyspepsia complaints and HP negative, and controls. The sociodemographic data for the groups are given in Table 1 and there was no statistically significant difference identified between the sociodemographic data for the groups (Table 1).

Two-way MANOVA was used to investigate the effect of HP positivity and dyspepsia on depression and somatosensory amplification. In the analysis, the Beck Depression Inventory and Somatosensory Amplification Scale points were dependent variables and HP positivity and presence of dyspepsia were independent variables. HP positivity had no effect on depression levels ($p=0.116$); however, HP positivity had significant effect on somatosensory amplification ($F=6.794$; $p=0.010$; $\eta^2=0.40$). The HP positive group had significantly higher somatosensory amplification points (27.75±7.343) compared to the HP negative group (22.39±7.425). Dyspeptic complaints had significant effects on depression levels ($F=6.695$; $p=0.011$; $\eta^2=0.039$) and somatosensory amplification ($F=7.554$; $p=0.007$; $\eta^2=0.044$). Those with dyspeptic complaints had significantly higher Beck Depression Inventory points (12.26±9.053) compared to the group without dyspeptic complaints (7.35±4.61). Similarly, the group with dyspepsia had higher mean Somatosensory Amplification Scale points (25.83±7.616) compared to the group without dyspepsia (20.43±6.87) (Table 2). The Beck Depression Inventory points and Somatosensory Amplification Scale points for the groups are shown in Figure 1.

Table 1. Sociodemographic data of the groups

	HP (+) group mean±SD (n=52)		HP (-) group mean±SD (n=60)		Control group mean±SD (n=54)		p
Age	44.58±10.63		40.65±10.83		41.15±13.19		0.163
	n	**%**	**n**	**%**	**n**	**%**	
Gender							0.210
Female	32	61.5	31	51.7	24	44.4	
Male	20	38.5	29	48.3	30	55.6	
Education							0.312
Primary school	24	46.2	18	30	19	35.2	
High school	15	28.8	25	41.7	16	29.6	
University	13	25	17	28.3	19	35.2	
Marriage status							0.810
Married	41	78.8	36	60	34	63	
Single	11	21.2	24	40	20	37	
Occupation							0.340
Unemployed	24	46.2	31	51.7	22	40.7	
Officer-worker	17	32.7	23	38.3	25	46.3	
Retired	11	21.2	6	10	7	13	
Depression in the family							0.813
Yes	14	26.9	13	21.7	13	24.1	
No	38	73.1	47	78.3	41	75.9	

One way ANOVA, chi square

Table 2. The effect of HP positivity and presence of dyspepsia on Beck Depression Inventory and somatosensory amplification scores and descriptive statistics of the scales

		F	p	Partial eta square			BDS (Mean±SD)	SSAS (Mean±SD)
HP (+/-) group	BDI[1]	2.496	0.116	0.015	**HP**	Positive	13.52±9.694	27.75±7.343
	SSAS[2]	6.794	**0.010***	0.04		Negative	9.36±7.096	22.39±7.425
Dyspepsia (+/-)	BDI[1]	6.695	**0.011***	0.039	**Dyspepsia**	Yes	12.26±9.053	25.83±7.616
	SSAS[2]	7.554	**0.007***	0.044		No	7.35±4.61	20.43±6.87

[1]R^2:0.82; [2]R^2:0.132, two way MANOVA, Pillai's Trace p value HP Group: 0.027, Dyspepsia: 0.005, BDI: Beck Depression Inventory, SSAS:Somatosensory Amplification Scale;*$p<0.01$

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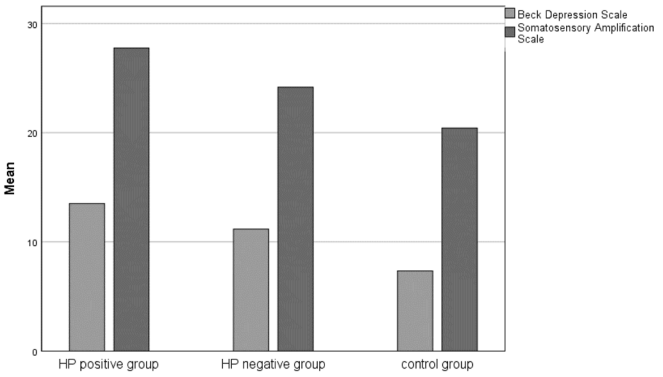

Figure 1. Beck Depression Inventory And Somatosensory Amplification Scale

A multiple linear regression model was created to predict depression levels based on age, sex, family depression history, HP positivity and somatosensory amplification points. The calculated model was found to be statistically significant ($F=10.061$; $p<0.001$; $R^2=0.215$).

Somatosensory amplification, sex and family history were each identified to be statistically significant explanatory variables for the dependent variable ($p=0.001$ $\beta^2=0.255$; $p=0.038$ $\beta^2=0.150$; $p=0.002$ $\beta^2=0.230$). Depression level increased by 0.269 units for each 1 unit increase in somatosensory amplification, by 2.463 units for female sex and 4.949 units for positive family history. HP positivity was not found to be a significant explanatory variable for depression ($p=0.142$) (Table 3).

Table 3. Linear regression model of depression level with predictor variables

	β[1] (95% CI)	SE	β[2]	t	p	Zero	Partial	VIF
(Constant)	4.119 (-1.877-10.116)	3.036		1.357	0.177			
Age	-0.064 (-0.163-0.035)	0.050	-0.091	-1.273	0.205	-0.111	-0.100	1.072
SSAS	0.269 (0.106-0.431)	0.082	0.255	3.263	**0.001****	0.395	0.250	1.284
HP (positive)	1.948 (-0.658-4.554)	1.320	0.111	1.477	0.142	0.236	0.116	1.178
Gender (female)	2.463 (0.137-4.789)	1.178	0.150	2.092	**0.038***	0.216	0.163	1.088
Depression in the family (yes)	4.949 (1.900-7.999)	1.544	0.230	3.205	**0.002****	0.304	0.246	1.081

$F=10.061$, *P<0.05 **p<0.01, $R^2=0.215$; SE of Estimate=7.265; [1]unstandardized coefficients, [2]standardized coefficients, Durbin-Watson=1.736, SSAS: Somatosensory Amplification Scale, SE: standart error, HP: helicobacter pylori

Discussion

In our research, the effect of dyspeptic complaints and HP positivity on depression and somatosensory amplification levels were researched. When the study findings are examined, HP positivity did not affect depression levels, while it increased somatosensory amplification levels. However, the presence of dyspeptic complaints increased both depression and somatosensory amplification levels, independent of HP positivity. When the results are examined, rather than HP positivity, it may be said that chronic gastric complaints may cause more depression and more sensitivity to somatic sensations. Patients may focus more on somatic symptoms due to chronic gastric complaints and this may cause depression.

In the literature, there are studies researching the correlation between HP positivity and depression; however, results are contradictory. Research by Gu et al. investigated a broad sample population and identified a positive correlation between HP positivity and depression [13]. Similarly, research by Mohamed et al. identified a significant correlation between HP positivity and depression [14]. There are several studies available indicating that HP positivity may be associated with depression and other neuropsychiatric diseases. This correlation may be associated with the impacts of HP on the gastrointestinal system, along with the effect of the brain-intestine axis. Data about neuropsychiatric effects that may occur as a result of induction of proinflammatory mechanisms with HP colonization are increasing in recent periods. Additionally, it is thought that HP plays an especially effective role in the relationship between microbiota and brain. The stomach is like a second brain in the intestinal system with impacts on the central nervous system and there is an indirect relationship with mental disease [15,16]. Though the effect of HP on mental diseases has been researched, the results are not always consistent. Some studies, like our research, did not identify a relationship between depression and HP positivity. Research by Cader et al. found depression levels in the HP positive group were similar to the control group [5]. Similarly, research by Soboka found that though the prevalence of depression increased with dyspeptic complaints, they did not identify a correlation between HP positivity and depression frequency [17]. In our research, HP positivity was not found to affect depression; however, HP positivity was associated with depression mediated by somatosensory amplification as it increased amplification levels for somatic sensations.

Uncomfortable gastric symptoms are observed most of the time with HP gastritis. Patients with uncomfortable symptoms like pain in the stomach, nausea and vomiting may experience negative mood making them more susceptible to somatic complaints. In this situation, patients may experience more severe chronic disease symptoms as they are more susceptible to somatic complaints. Similar to our research, there are studies available showing that dyspeptic complaints cause depression and other mental diseases [18-20]. Research by Mussell et al. showed that people with gastrointestinal symptoms had more depression [21]. Similarly,

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Walker et al. reported that people stating they had gastrointestinal symptoms had increased lifelong frequency of depression compared to people without gastrointestinal symptoms[22]. Somatosensory amplification involves feeling somatic and visceral sensations at pronounced and very intense levels. Some individuals are more sensitive to somatic sensations [11]. Similar to our research, somatosensory amplification is a predictive variable for depression [23-25]. Especially in recent times, somatosensory amplification has become an important topic in terms of more severe progression of symptoms in chronic somatic diseases. One of the underlying causes of somatic complaints that do not resolve in patients is somatosensory amplification levels. This patient group have a tendency to feel somatic symptoms more and to express and amplify them more. When underlying somatosensory amplification levels are ignored, treatment may not provide the desired efficacy. This situation may cause difficulties in the treatment of chronic disease [26-28]. Chronic dyspeptic complaints may be assessed as a risk factor in terms of somatosensory amplification. In our research, the presence of dyspeptic complaints was found to increase somatosensory amplification levels. Research by Jones et al. assessed patients with dyspepsia and a control group. Patients with dyspepsia were found to have higher somatosensory amplification levels [29]. Addition of antidepressants to the treatment of patients attending with HP positivity is an occasional topic of research in the literature. At the same time, it is thought that somatosensory amplification levels may positively respond to antidepressant treatment. The use of antidepressants in the treatment of patients positive for HP without resolution of chronic gastric complaints may be considered as another option. When HP positivity frequently recurs and the desired response is not obtained from treatment, mental disease should be considered and treatment planned accordingly, which may provide positive outcomes in HP treatment [30-32]. To the best of our knowledge, there is no research in the literature about the relationship between HP and somatosensory amplification and this study is the first on the topic. HP gastritis is a chronic gastritis factor commonly observed around the world. The excess incidence, and diseases it causes make it a serious public health problem [33]. For this reason, there is a need for advanced research to be performed about the topic.

Conclusion

In conclusion, though HP gastritis is not directly associated with depression, it may cause mental disorder in patients due to frequent recurrence and chronic gastric complaints. Not investigating and not treating underlying mental diseases may cause this patient group to receive longer treatments and not to fully heal. As a result, it is important to include mental assessment in the treatment process as HP causes both direct neuropsychiatric impacts and chronic gastric complaints leading to mental diseases. Research about HP infection, frequently observed around the world and an important public health problem, is valuable.

Limitations of the research: Our research is a single-center study so generalization of findings may not provide very accurate results. Similar research being performed in different centers will contribute to the literature. Additionally, inclusion of other chronic disease factors or possible causes that may explain depression will make the research design stronger. In the literature, there is no other study performed with this design. From this perspective, our study is valuable.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
Ethics committee permission for the research was obtained from Recep Tayyip Erdogan University Non-Interventional Clinical Research Ethics Committee Chair (Ethics committee permission no: 2022/70).

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