

PEPTIC ULCER DISEASE AND SOCIOECONOMIC STATUS

Mirela BAŠIĆ DENJAGIĆ, Nada ČALIĆ-PAVLOVIĆ, Mirna ALEČKOVIĆ – HALILOVIĆ

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Mirela BAŠIĆ DENJAGIĆ,
Nada, ČALIĆ-PAVLOVIĆ
Mirna ALEČKOVIĆ – HALILOVIĆ

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The most common reason for peptic ulcer disease is infection with *Helicobacter pylori* (*H.pylori*) and the use of drugs such as nonsteroidal anti-inflammatory drugs (NSAID) and aspirin (ASA). Low socioeconomic status (SES) could affect development of ulcer disease.

The **aim** of this work is to determine whether low SES is one of the risk factors for ulcer disease, and to determine whether *H.pylori* infection, usage of NSAID and ASA is more frequent among patients with low SES.

Material and methods: This is a prospective study on 273 consecutive patients which were divided in three groups: first with duodenal ulcer (DU) - 108 patients, second with gastric ulcer (GU) - 104 patients and control group with 61 patients with dyspeptic symptoms without ulcers. All patients had their *H.pylori* status determined. Through interview other socioepidemiological data and medication history were obtained. Results: Patients with low financial status more often had both types of ulcers ($p<0,001$). High school was not finished by 140 patients and 46% of them have no qualifications. Only 8% of them have university diploma and 8, 9 % is illiterate. Gastric ulcer is more often seen in patients without any school degree, among women and among divorcees and widowers ($p<0,001$). There were no difference in *H. pylori* infection and usage of NSAID among population with low and higher SES. ASA is more often used among patients who did not finish high school.

Conclusion: Low SES is a risk factor for peptic ulcer disease independent of *H.pylori* infection and NSAID.

Key words: peptic ulcer disease, socioeconomic status, *Helicobacter pylori*, NSAID

INTRODUCTION

Peptic ulcer disease is characterized by defects in mucosal integrity of upper gastrointestinal tract. The cause of those ulcerations is multifactorial and is a subject of many research. The most common reason is infection with *Helicobacter pylori* and use of nonsteroidal anti-inflammatory drugs (NSAID) and acetylsalicylic acid (ASA) [1]. Earlier studies determined that low level of education is associated with the development of ulcer disease [2] and that patients with low SES, four times more often suffer from peptic ulcer disease [3]. The reason why this population is under more risk of development of ulcer disease is unknown. It is known that they are more often infected by *H.pylori* [4] but it is not clear whether this is the reason why this population is more affected by peptic ulcer disease. Patients with cardiovascular disease and with arthritis [5] are more often in low SES group and they use more ASA and NSAID, which could be a possible reason for ulcer development among those population, even though it is still not proven. In the setting where 4-20% of

patients with ulcer disease are *H.pylori* and NSAID/ASA negative [6, 7] it is important to find whether low SES is one of the risk factors for ulcer development and to determine whether two most common etiological factors such as *H.pylori* infection and usage of NSAID and ASA are also risk factors for ulcers in this population, or there is another explanation why this population is so vulnerable.

The aim of this study was to determine whether low SES is one of the risk factors for the development of peptic ulcer disease and to determine whether *H.pylori* infection and usage of medication such as ASA and NSAID is more common among population with low SES.

PATIENTS AND METHODS

The research was prospective and included 273 consecutive patients which were divided into three groups based on findings of gastrointestinal endoscopy: first with duodenal ulcer (N= 108), second with gastric ulcer (N= 104) and third, control group, which consisted of 61 patients with

Affiliations:

University Clinical Center Tuzla, Clinic for internal disease, 75000 Tuzla, Bosnia and Herzegovina

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Corresponding author:

Bašić Denjagić Mirela

e-mail: mabasic@hotmail.com

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dyspeptic symptoms without ulcer disease who did not use eradication treatment for *H. pylori* previously.

Other necessary information was obtained through interview such as: gender, age, use of medications such as NSAID and ASA. Patients were asked multiple choice questions regarding their socioeconomic status, financial conditions, employment, level of education and marital status. All patients were tested for *H. pylori* infection by rapid urease test during endoscopy or by serology in ones with active bleeding.

Statistical data analysis

For statistical analysis standard method of descriptive statistics were used, and for testing of statistical

significance of differences among groups we used parametric and non-parametric tests. Statistical hypothesis were tested on the level of $\alpha=0,05$ meaning that differences among groups is considered significant if $p<0,05$.

RESULTS

The study included 273 patients with mean age of 58 in range of 18 to 89 years. There were 131 men and 142 women. Socioeconomic characteristics that were compared between groups are: financial status, working status, level of education, marital status which is shown in table 1.

Table 1. Results of socioeconomic parameters among groups

| Parameters of socioeconomic status | | Duodenal ulcers (N=108) % | | Gastric ulcer (N=104) % | | Control group (N=61) % | |
|------------------------------------|--|------------------------------|--------|----------------------------|--------|---------------------------|-------|
| Financial status | Bad | 25 | 23,1%* | 26 | 25,0%* | 6 | 9,8 % |
| | Middle | 68 | 63,0% | 68 | 65,4% | 36 | 59,1% |
| | Good | 11 | 10,2% | 4 | 3,8% | 16 | 26,2% |
| | Excellent | 4 | 3,7% | 6 | 5,8% | 3 | 4,9% |
| Employment | Unemployed | 47 | 43,5% | 45 | 43,3% | 23 | 37,7% |
| | Employed | 31 | 28,7% | 18 | 17,3% | 17 | 27,9% |
| | Retired | 30 | 27,8% | 41 | 39,4% | 21 | 34,4% |
| | University degree | 9 | 8,3% | 5 | 4,8% | 8 | 13,1% |
| Education | Higher national diploma | 3 | 2,8% | 2 | 1,9% | 2 | 3,3% |
| | High school diploma | 47 | 43,5% | 26 | 25,0% | 31 | 50,8% |
| | Vocational school without high school degree | 9 | 8,3% | 6 | 5,8% | 0 | 0,0% |
| | Non-qualified workers | 40 | 37,1% | 65 | 62,5%* | 20 | 32,8% |
| Marital status | Married | 84 | 77,8% | 64 | 61,5% | 49 | 80,3% |
| | Single | 9 | 8,3% | 0 | 0,0% | 5 | 8,2% |
| | Widow | 11 | 10,2% | 34 | 32,7%* | 4 | 6,6% |
| | Divorced | 4 | 3,7% | 6 | 5,8%* | 3 | 4,9% |

Legend: * Differences among groups were significant with $p<0,05$

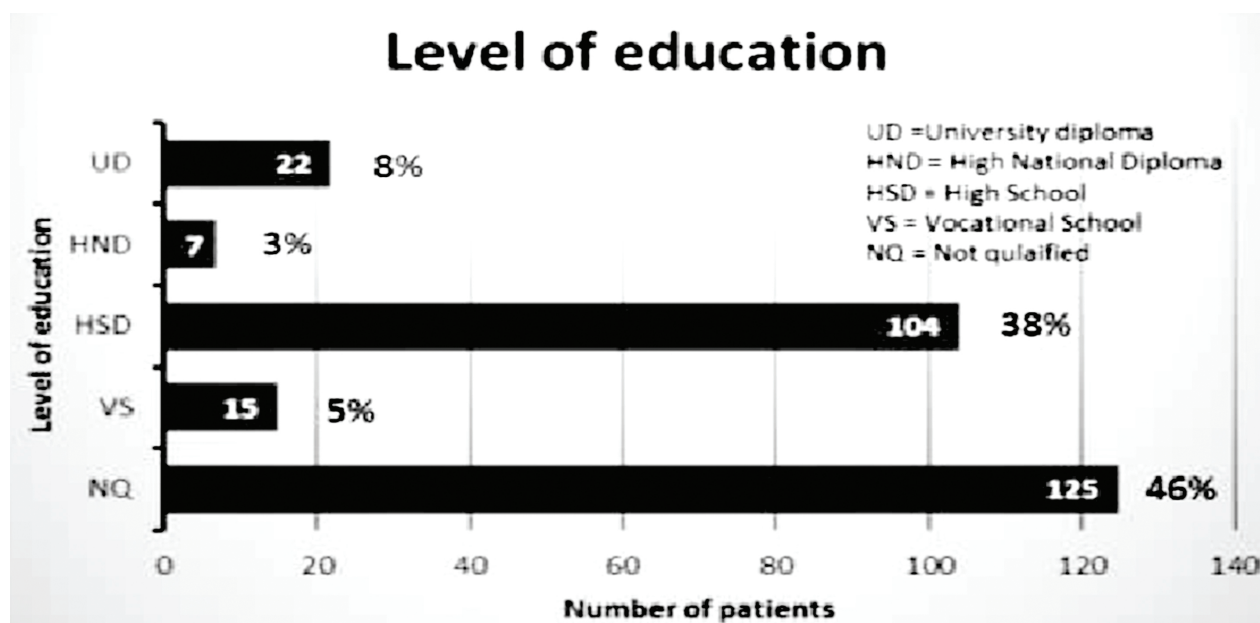
More patients with low financial status is registered among both groups with ulcers. However, when employment status was compared among groups there was no statistical difference between the groups.

Out of 273 patients 140 of them or 51, 3% did not finish high school, and 46% is completely unqualified meaning that they either completed or attended only few grades of elementary school. Only 8% of them had university degree (Figure 1).

Frequency of ulcers between patients with different education level was compared. Patients with no qualifications had significantly more gastric ulcers ($p=0001$). Further analysis showed that out of patients who were not qualified, 49% was able to work meaning they were younger the 65 years. Out of that number 82% is unemployed, and most of them were women ($X^2=29, 27$; $df =1$; $p<0,001$). Among patients with

ulcer disease, 19 (17 women and 2 men, with mean age 77, 5) were illiterate, which represented 8,9% of all patients.

There was a statistically significant difference between groups regarding marital status, proving that patients who were divorced or widowed suffered from gastric ulcers more often ($p<0,001$). Further analysis was performed to find whether patients with no high school education were more frequently infected with *H. pylori* or more prone to consuming ulcerogenic drugs (ASA and NSAID), or to ulcer bleeding compared to high school graduates. Aspirin was used significantly more often by less educated patients ($p<0,001$). There was no difference among other possible etiologic factors between those two groups. Results are depicted in table 2.



Legend: UD = University diploma; HND = High National Diploma, HSD = High School, VS = Vocational School, NQ = Not qualified

Figure 1. Level of education of patients

Table 2. Results of different etiological factors according to level of education

| Etiological factors | Patients without high school diploma (N=140) | | Patients with at least high school diploma (N=133) | |
|----------------------------|--|--------|--|-------|
| H. pylori infection | | | | |
| Positive | 85/140 | 60,7% | 79/133 | 59,4% |
| Negative | 55/140 | 39,3% | 54/133 | 40,6% |
| ASA | | | | |
| Yes | 83/140 | 59,3%* | 38/133 | 28,6% |
| No | 57/140 | 40,7% | 95/133 | 71,4% |
| NSAID | | | | |
| Yes | 54/140 | 38,6% | 37/133 | 27,8% |
| No | 86/140 | 61,4% | 96/133 | 72,2% |
| Bleeding ulcers | | | | |
| Yes | 61/120 | 50,8% | 46/92 | 50,0% |
| No | 59/120 | 49,2% | 46/92 | 50,0% |

Legend: * Differences among groups were significant with $p < 0,05$

Analysis of ASA and NSAID consumption according to financial status was performed and no difference was found ($p=0,54$ and $p=0,16$, respectively). Likewise,

in this study financial status had no influence on H. pylori infection ($X^2=1,7$; $df=3$; $p=0,64$). Results are presented in table 3.

Table 3. Results of frequency of common etiological factors for ulcer according to financial status

| Financial status | ASA users (Yes/No) | NSAID Users (Yes/No) | H. pylori infection (+/-) |
|------------------|--------------------|----------------------|---------------------------|
| Low (N=57) | 29/28 | 22/35 | 36/21 |
| Middle (N=172) | 76/96 | 60/112 | 105/67 |
| Good (N=31) | 11/20 | 5/26 | 17/14 |
| Excellent (N=13) | 5/8 | 4/9 | 6/7 |
| p value | p = 0,54 | p = 0,16 | p = 0,64 |

There was also no difference in frequency of duodenal and gastric ulcers among patients with low financial

status infected by H. pylori ($p = 0,73$).

DISCUSSION

Results of our prospective study, which was conducted on 273 patients with duodenal/gastric ulcers or who had dyspeptic symptoms undoubtedly showed that low socioeconomic status is a risk factor for ulcer disease independent of *H. pylori* infection. Out of socioeconomic parameters, low financial status is associated with development of both ulcers, and low level of education, especially of women and marital status of widowers and divorcees is more often associated with the development of gastric ulcers. There was no difference in *H. pylori* infection among patients with lower or higher education level nor between patients with lower or higher financial status. That is the reason why this bacteria cannot be the reason why this population is at risk for development of peptic ulcer disease. ASA is more frequently used by patients with lower education levels, and there is no difference between ASA users according to different financial status. The use of NSAID also cannot explain why patients with low socioeconomic conditions are prone to ulcers because there was no difference among NSAID users between examined groups. Results of this study indicate that classical etiological factors cannot explain the difference in the more frequent diseases among this population so we must continue to seek for other explanations.

In epidemiological study from Finland where authors researched how financial status in childhood affects health in adult age it is concluded that long term poor financial situation in families has the biggest influence in development of ulcer disease later in life [8]. Similarly to our results Everhart et al. found that patients with low financial status and with lower level of education had more often ulcer disease [9]. Other studies indicated that low level of education is a risk factor for ulcer development [2, 10]. So, in the study by Levenstein et al. [11] authors determined that there was much higher risk for ulcer development in the future among patients who did not finish high school, especially among women which is in accordance to our study results.

Although 42% of patients in this study identified themselves as unemployed, it does not correspond to the real situation considering that many people have the unemployed status, although they are employed, but not registered as such in appropriate offices [12]. We think that it could be the reason why we fail to prove the association of employment status with ulcer development. In earlier studies it is proven that unemployment, especially in women increases the risk of ulcer disease [13].

It is determined that widowers and divorcees more frequently have gastric ulcers. The reasons for that are usually explained by stress during the divorce or marital dispute which was seen also in other studies [13, 14]. In recently published study it is shown that divorcees, widowers and singles as well as patients with low level of education and poor financial status more frequently suffer from gastric and esophageal cancer [15]. All above mentioned factors are also risk

factors for development of gastric ulcers which was verified in our study, and ulcer alone is also a risk factor for gastric cancer while duodenal ulcer does not carry that risk [16]. However, some studies did not prove that marital status is a risk factor for ulcer disease [3, 9].

Possible explanation in literature for more frequent occurrence of ulcer disease among patients with low SES is the fact that *H. pylori* infection is more frequent among them [17]. Our study proved that there is no difference in *H. pylori* status between poor and wealthy patients, which was similar to the results of Danish authors [3]. One could expect that patients with low financial income more often work difficult physical jobs which could cause significant muscle and joint strain leading to more frequent usage of pain killers such as NSAID [8]. In our study patients with low financial status did not use more frequently ASA nor NSAID, while patient who did not finish high school used ASA more frequently than others. It is possible that patients who need to use ASA or NSAID and are in the category of more educated patients, more often use concomitantly proton pump inhibitors, thus have less ulcer disease. In the study of Garcia et al. it is proven that gastroprotective medications often use patients with higher SES, but it also depends on the habits of prescribing physicians [18].

It is important to mention that low SES is not only risk factor for ulcer disease but also for cardiovascular diseases, diabetes, arthritis and cancer [5]. Those patients more often smoke, drink alcohol and are overweighted. Explanation for their behavior was offered by Culter and Lleras-Muney in their research. They proved that higher education leads to better cognitive function which then again lead to better health behavior. Just knowing that something is not good for your health is not enough to quit with the hazardous behaviors. One needs better cognitive abilities to reject what is not healthy. Those cognitive abilities are developed through higher education. Also, people who are more educated are surrounded by healthier social environment and have the support for adopting the healthy habits, then those less educated [19].

Although it has never been proven that psychological stress directly causes ulcerations, early studies before *H. pylori* discovery, showed that the most frequent reason for ulcers development in animal models is stress developed on the grounds of unpredictability and being unable to control life situations and environment [20]. People with low socioeconomic status are more exposed to those conditions. That might be an explanation why those patients have more frequent ulcer disease. This is the population which are presumably constantly worried and frustrated by existential questions, and in the same time are not equipped with good cognitive abilities nor with coping mechanisms. The fact that the most frequent etiological factors are not seen more often among those population we must search for other less conventional pathogenic mechanisms of this disease among them. If these mechanisms/factors are variable, one could introduce

preventive educative and behavioral methods in lower school grades such as elementary schools.

This study did not examine other less common factors that might also affect ulcer development among this population such as for instance their diet habits, alcohol consumption, occupation, and other medications that they might use. It is important to mention from experience that patients do not report usage of over the counter medications which they do not use every day or regularly, so usage of NSAID or ASA might be under reported.

CONCLUSION

Low financial status and low level of education as parameters of low SES are significantly more frequent in patients with ulcer disease when compared to controls and thus represent a risk factor for development of peptic ulcer disease. This risk cannot be explained by the most common risk factors such as *H. pylori* infection or drugs such as NSAID because they do not occur more often in the population with low SES. That is why one might search for better understanding of ulcer pathogenesis in this sub-population.

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