Risk factors for duodenal ulcer disease

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ABSTRACT

Objectives: To evaluate the role played by some of the traditional risk factors on the prevalence of duodenal ulcer disease in Jordan, where the prevalence of *Helicobacter pylori* is high.

Methods: This study was carried out in the Endoscopy unit at the Health Center, Jordan University of Science and Technology, Irbid, Jordan, during the period January 1998 through to july 1999. The patients' group consisted of 290 subjects with endoscopically proven duodenal ulcers and 161 subjects who were endoscoped for various indications and found to have no ulcers were considered as controls. Validated questionnaires were filled out before the procedure, containing data related to age, sex, area of residence, family history of ulcer, blood grouping, cigarette smoking, coffee and tea ingestion, and regularity of meals.

Results: The following factors were associated with increased ulcer prevalence, male gender, family history of ulcer, blood group O, skipping breakfast or more than one meal, coffee ingestion and cigarette smoking.

Conclusion: Many factors are important in the predisposition for ulcer disease in subjects with *Helicobacter pylori*. Modification of these factors would be essential to decrease the prevalence of ulcer disease and will result in large economic and medical savings.

Keywords: Duodenal ulcer, prevalence, *helicobacter pylori,* epidemiology, risk factors.

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Peptic ulcer disease (PUD) is associated with 2 major factors, namely *Helicobacter pylori (H.pylori)* and the use of non-steroidal anti-inflammatory drugs (NSAIDs) and the epidemiology of PUD reflects to a large extent the epidemiology of these factors. However, infection with *H.pylori* does not necessarily result in development of peptic ulceration despite development of gastritis in all infected subjects, ulceration develops in only 10%-15% of infected subjects.[1,2] This illustrates that development of peptic ulcer disease is determined by a complex interplay between host and environmental factors, which are different among different communities.[3] These factors should be evaluated in different countries to design methods of control to decrease prevalence of ulcers which, will have favorable effects on economy and decrease morbidity and mortality from this common disease.

Methods. ***Patients' selection.*** During the period January 1998 through to July 1999, there were 290 patients who had endoscopically proven duodenal ulcers among 1057 patients referred for endoscopy, and these constituted the patient group. In the remaining 767 patients, 155 subjects were excluded from the study for refusing to participate or had incomplete records. A group of 451 patients without duodenal ulcer (DU) were excluded from the study as they had one or more of the following exclusion criteria: 1. Receiving histamine 2-receptor blockers (H2-blockers) or proton pump inhibitors regularly or irregularly 2. Received eradication therapy for *H.pylori* 3. Had history of DU disease but follow up endoscopy was negative for ulcer. 4. Had gastric ulcers. The remaining patients, 161 subjects, having no DU by endoscopy and none of the mentioned exclusion criteria, were considered the

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Table 1 - Distribution of patients according to age and sex.

Age	Ulcer group N=290			Control group N=161		
	M	F	Total	M	F	Total
Less than 20 years	11	9	**20**	8	18	**26**
20-29 years	38	20	**58**	17	27	**44**
30-39 years	46	33	**79**	17	25	**42**
40-49 years	21	15	**36**	14	15	**29**
50-59 years	22	19	**41**	6	6	**12**
More than 60 years	31	25	**56**	5	3	**8**

N=number, M=male, F=female

Table 3 - Relation between ulcer prevalence and total family income.

Family income JD/month	Ulcer group N (%)	Control group N (%)	P
Below 300	151 (52.1)	67 (41.6)	0.04
300-500	64 (22.1)	41 (25.5)	NS
500-1000	55 (19)	36 (22.4)	NS
More than 1000	20 (6.9)	17 (10.6)	NS

JD=Jordanian dinar=1.41 US$, N=number, NS=not significant, P=p value

control group. Patients who were considered eligible for the study were interviewed and a structured history was obtained using a questionnaire containing the following data in addition to other information.

Demographic data. Age, sex and area of residence.

Habits. Regularity of meals, skipping breakfast, lunch or evening meal. Ingestion of coffee and tea with number of cups consumed from each daily. Cigarette smoking and number of cigarettes smoked per day.

Socio-economic data. Educational level and total family income.

Genetic and familial data. Blood group and family history of duodenal ulcer.

Results.

Demographic features. Duodenal ulcers were more common in males, 169 males versus 121 females in the ulcer group, compared to 67 and 94 in the control group, p=0.001, odds ratio (OR) =2. Ulcers were more frequent in the age group 30-39 and above the age of 60, least in those below 20 years, **Table 1.** No significant differences existed in ulcer prevalence between rural and urban areas, there were 174/290 (60%) in the ulcer group who live in rural areas, compared to 101/161 (40%) in the control group, p= 0.63.

Genetic and familial factors. Family history of ulcers was seen more in the ulcer group, 105/290 (36.2%) in the ulcer group had history of "ulcer" in first degree relatives, compared to 32/161 (19.9%) in the control group, p =0.0005, OR 2.8. There were 81 subjects with known blood group in ulcer patients, 46 of them (56.8%) were O positive, compared to 12/34 (35.3%) in controls, p=0.05, OR=2.4.

Socio-economic factors. Ulcers were found to be increased in illeterates and in subjects with lower educational level compared to those with higher education, **Table 2.** Those who had low total family income had more ulcers compared with subjects who had higher income, **Table 3.**

Habits. Subjects who habitually skipped breakfast or more than one meal daily had more

Table 2 - Relation between ulcer prevalence and educational level.

Education	DU N (%)	Control N (%)	P
Illiterate	48 (16.6)	15 (9.3)	0.05
School	89 (30.7)	39 (24.2)	NS
College	56 (19.3)	20 (12.4)	NS
University	80 (27.6)	74 (46)	0.0001
Postgraduate	17 (5.9)	13 (8.1)	NS
Total	**290 (100)**	**161 (100)**	

N=number, DU=duodenal ulcer, NS=not significant, p=p value

Table 4 - Relation between skipping meals and ulcer prevalence.

Meals	Ulcer group N (%)	Control group N (%)	P
Breakfast	91 (31.8)	31 (19.3)	0.008
Midday meal	38 (13.1)	25 (15.5)	NS
Evening meal	39 (13.4)	28 (17.4)	NS
More than one meal per day	30 (10.3)	7 (4.3)	0.04

N=number, NS=not significant

ulcers compared to those who take 3 meals daily. There was no significant differences in subjects who missed midday or evening meals only, **Table 4.** Consumption of coffee was more frequent in ulcer patients, with strong relation between the amount ingested and ulcers, **Table 5,** while tea consumption was not, **Table 6.** Cigarette smoking was more common in the ulcer group, 115/290 (39.7%), compared to 46/161 (28.6%) in the control group, p=0.024, OR=1.6. Number of cigarettes smoked per day was even more strongly associated with ulcer disease than total number of smokers, **Table 7.**

Table 5 - Relation between coffee consumption and ulcer prevalence.

Coffee consumption	Duodenal ulcer N (%)	Control N (%)
Not at all	18 (6.2)	10 (6.2)
1-2 cups/day	125 (43.1)	99 (61.5)
3-5 cups/day	59 (20.3)	23 (14.3)
6 and more	88 (30.3)	29 (18)
N=number, p-value=0017		

Table 6 - Relation between ulcer prevalence and ingestion of tea.

N of cups/day	Duodenal ulcer N (%)	Normal N (%)
Never	29 (10)	11 (6.8)
1-2/day	63 (21.7)	47 (29.2)
3-5/day	108 (37.2)	46 (28.6)
More than 6/day	90 (31)	57 (35.4)
N=number, P-value=0.092		

Table 7 - Relation between number of cigarettes smoked per day and ulcer prevalence.

N of cigarettes per day	Duodenal ulcer N (%)	Normal N (%)
Less than 10/day	8 (2.8)	18 (11.2)
11-20/day	25 (8.6)	13 (8.1)
More than 20/day	87 (30)	15 (9.3)
Total	**120 (41.4)**	**46 (28.6)**
N=number, p-value=0.00001		

Discussion. *Helicobacter pylori* were found in 88% subjects with DU and 62% controls in Jordan (unpublished data). This indicates that, despite development of gastritis, not every subject infected with *H.pylori* develops ulcer. Other factors, environmental, host-related or factors related to the organism may affect the outcome of this infection. This study was designed to assess the effects of various factors; so called traditional factors, considered to predispose to duodenal ulceration in Jordan, where the prevalence of *H.pylori* is high and these factors could be important in the prevalence of ulcers. The difficulty which usually encounters such studies is the lack of a reliable non-invasive method for the diagnosis of DUs, making the selection of a true control group difficult, in fact those who are considered "controls" are in the majority patients who had non-ulcer dyspepsia or other nonspecific indications for endoscopy as weight loss, anemia, anorexia and phobia of malignancy.

In spite of this, we think that important data and conclusions can be taken from such studies. In this study ulcers were found more in men, in agreement with several studies.[3-7] This sex difference is attributed to the presence of more risk factors in men especially smoking and psychological stresses. This male preponderance is declining recently in western countries with a changing pattern of smoking and increased stresses in working women in these communities.[8] The peak age for ulcer prevalence is different among different studies and in different populations and times. In this study, ulcers were most frequent in the 4th decade, and above the age of 60, rare in subjects below 20 years, attributed to the low incidence of *H.pylori* in younger subjects as a result of improved socioeconomic conditions in the country in recent years. The possibilty of finding ulcers increases with increase in age in subjects referred for endoscopy. This point should be kept in mind when the demand on endoscopy is more than could be offered. These results are in accordance with other studies showing a shift in ulcer prevalence towards older age groups, due to increased prevalence of *H.pylori* infection and increased NSAIDs use with age, with 2 peaks for ulcer incidence noted, one in the 4th decade and the other above the age of 60 years.[3-5,9] No differences existed in this study between the prevalence of DU in rural or urban areas, attributed to the high mixing rate between the 2 communities in Jordan, with lack of distinctive features for each population.

The presence of first degree relatives with "ulcers" increased the risk to acquire ulcer disease by 2.8 in this study, similar to other studies.[10] The problem which is raised with this family history is that such

history is not definite and diagnosis of ulcer could have been made empirically by a general practitioner. This limitation may be a drawback for such a conclusion, but this inaccurate diagnosis of DU is present in both patient and control groups, decreasing the error of such a conclusion. This familial aggregation of ulcers is multifactorial: exposure to the same environmental factors, sharing psychological stresses, food habits and similar risk of exposure to *H.pylori* infection, in addition to genetic factors.

The relation between blood groups and DU is still not settled. The results in this study support the concept that DUs are more prevalent in subjects with blood group O, consistent with other studies.[11,12] This increased liability for ulcers in blood group O may be explained by increased availabilty of *H.pylori* receptors in the gastric mucosa of subjects with blood group O as compared with other blood groups.[11] Others showed no effect for blood group in the prevalence of DUs.[13]

Both family income and level of education had effects on ulcer prevalence, reflecting the impact of stress due to poverty and low income with inability to meet the life expenses on the prevalence of ulcers. [14-17] Increased colonization of *H.pylori* in these conditions due to low socioeconomic status contributes largely to this.[18]

Folklore has incriminated dietary indiscretion as a cause for ulcers and dietary factors have been hypothesized to account for some of the regional variations of ulcer disease but controversies surround this hypothesis due to difficulties in having randomized, controlled studies.[19] Missing one of the 3 daily meals is a common phenomenon, but some habitually skip breakfast or other meals most of the days of the week. This was found to be associated with increased ulcerations especially in subjects who skip breakfast or more than one meal daily. This may be explained by the effects of prolonged unneutralized gastric acidity, in addition, missing meals leads usually to increased consumption of coffee, and cigarettes, both of them increase gastric acidity and decrease defensive mechanisms of the gastric mucosa for ulceration.[20,21] Effect of smoking and coffee ingestion on ulcer incidence was the subject of many studies with different results. Smoking is well known to have a number of adverse effects on mucosal aggressive and protective factors.[20] Strong association was demonstrated in this study between cigarette smoking and prevalence of DU, and this prevalence increases linearly with increase in the number of cigarettes smoked, irrespective of the duration of smoking. Although negative studies have been published,[22] the weight of evidence supports an association between smoking and DU in *H.pylori* infected subjects.[23,-26] On the other hand, coffee is a strong stimulant for acid secretion and produces dyspepsia in many individuals.[21,22,26] In this study, there was strong association between drinking coffee and the prevalence of DU, and ulcer increases with increase in the number of cups of coffee ingested daily. Although tea has also stimulant effect on acid secretion, but ingestion of tea was not associated with significant effect on ulcer prevalence.

In conclusion, in areas where *H.pylori* prevalence is high, the effect of the traditional risk factors on ulcer prevalence is important, studying of these factors and adopting methods to control them may be effective in reducing ulcer prevalence. Improvement in socioeconomic status, dietary instructions, moderation of coffee ingestion and cessation of cigarette smoking, all may help to decrease the prevalence of ulcer in the community and its impact on health and economy.

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