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The Role of Diet in the Prevention and Management of Peptic Ulcer Disease

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Abstract **Original Research Article**

Peptic ulcer disease (PUD), characterized by sores in the lining of the stomach or duodenum, is primarily caused by Helicobacter pylori infection and the use of NSAIDs. Dietary choices play a pivotal role in its prevention and management, alongside conventional therapies. To evaluate the role of diet in the prevention and management of peptic ulcer disease. This cross-sectional study was conducted in Department of Medicine, Medical College for Women and Hospital and Ibn Sina Diagnostic and Consultation Centre, Uttara, Dhaka, Bangladesh, during the period from January 2021 to June 2023. Total 60 patients with peptic ulcer disease were included in this study. The study involved 60 subjects, with a mean age of 45.2 ± 12.3 years. Most participants were male (58.3%), and urban residents predominated (66.7%, $p = 0.042$). Spicy foods (75%) were the most consumed, followed by caffeinated beverages (50%) and acidic foods (41.7%). Protective foods like fiber-rich diets (33.3%), bananas (30%), honey (20%), and fermented foods (16.7%) were less common. Spicy foods were strongly linked to severe PUD (100%, $p = 0.002$), while bananas and honey were more frequent in mild cases (50% and 25%, respectively, $p < 0.05$). Protective foods significantly reduced healing time (e.g., bananas: 12.6 ± 2.4 days), while spicy foods delayed it (18.2 ± 2.4 days). Duodenal ulcers were most prevalent (50%). This current study demonstrates significant associations between dietary habits and the severity, type, and healing outcomes of peptic ulcer disease.

Keywords: Diet, Prevention, Management, and Peptic Ulcer Disease.

INTRODUCTION

Peptic Ulcer Disease (PUD) remains a significant global health challenge, characterized by the formation of sores in the gastric or duodenal mucosa due to an imbalance between mucosal protective mechanisms and aggressive factors like gastric acid and pepsin.[1] Affecting up to 10% of the global population during their lifetime, PUD exerts a substantial burden on healthcare systems, particularly in resource-limited settings. [2] The primary etiological factors include infection with Helicobacter pylori (H. pylori), accounting for nearly 70% of cases globally, and the widespread use of nonsteroidal anti-inflammatory drugs (NSAIDs), which compromise gastric mucosal defenses. [3] Secondary factors such as smoking, alcohol consumption, stress, and dietary patterns exacerbate the condition, underscoring the multifactorial nature of its pathogenesis. [4] Despite advances in therapeutic strategies, PUD continues to cause considerable morbidity and mortality. Globally, the incidence of PUD has declined due to improved management of H. pylori and NSAID-associated risks, yet it persists as a major health concern in low-income and middle-income countries, including Bangladesh. [5] In Bangladesh, the prevalence of PUD is influenced by a combination of socioeconomic factors, limited healthcare access, and cultural dietary habits, which include high consumption of spicy and oil-rich foods. [6,7] Furthermore, the over-the-counter availability of NSAIDs and a lack of nutritional awareness exacerbate the condition, particularly in rural areas where healthcare infrastructure is limited. [8] Diet emerges as a critical modifiable factor in the prevention and management of PUD. Certain dietary elements, such as spicy foods and caffeine, are considered ulcerogenic due to their ability to stimulate gastric acid secretion and impair mucosal defenses. [9] Conversely, protective dietary components such as fiber,

flavonoids, and probiotics are known to enhance mucosal integrity and promote ulcer healing. Foods rich in fiber, for example, mitigate gastric acid's damaging effects by increasing mucosal resistance, while flavonoids and polyphenols exert anti-inflammatory and antioxidant properties, aiding tissue repair and reducing oxidative stress. [10,11] Probiotics, particularly strains like Lactobacillus rhamnosus GG, have demonstrated efficacy in enhancing mucosal healing and reducing H. pylori colonization through modulation of gut microbiota and stimulation of angiogenesis. [12] Specific foods such as bananas, honey, and fermented products are also recognized for their gastro-protective effects. Green bananas have shown significant potential in promoting mucosal healing and reducing ulcer indices, making them an essential dietary component for PUD management in regions like Bangladesh, where they are culturally accepted and readily available. [13] Honey, with its antibacterial and anti-inflammatory properties, has been effective against H. pylori and in accelerating ulcer healing, while fermented foods reduce inflammatory markers and improve mucosal integrity, thus alleviating symptoms and promoting recovery.[14] Cultural dietary practices in Bangladesh significantly influence the prevalence and management of PUD. Urban populations exhibit a higher intake of processed and fried foods, correlating with increased PUD risk, while rural diets, although simpler, often lack essential protective nutrients such as vitamins and probiotics.[6] This disparity underscores the need for tailored nutritional interventions that incorporate affordable, locally available foods like green bananas and fermented products to address these dietary deficiencies. However, these efforts are hindered by healthcare challenges, including limited awareness, insufficient resources, and the high prevalence of self-medication with NSAIDs. [7,8] Through this research, we aim to bridge the knowledge gap regarding the interplay between diet and PUD in Bangladesh, highlighting the potential for dietary interventions to mitigate the disease's impact.

OBJECTIVES

To evaluate the role of diet in the prevention and management of peptic ulcer disease.

METHODOLOGY & MATERIALS

This cross-sectional study was conducted in Department of Medicine, Medical College for Women and Hospital and Ibn Sina Diagnostic and Consultation Centre, Uttara, Dhaka, Bangladesh, during the period from January 2021 to June 2023. Total 60 patients with peptic ulcer disease were included in this study. The inclusion criteria encompassed patients aged 18 to 65 years with a confirmed diagnosis of PUD via endoscopy or clinical evaluation who were willing to provide informed consent. Patients with severe comorbidities, such as malignancy or liver cirrhosis, pregnant or lactating women, and individuals on immunosuppressive therapies were excluded. Data were collected using a structured questionnaire. Consent of the patients and guardians were taken before collecting data. After collection of data, all data were checked and cleaned. After cleaning, the data were entered into computer and statistical analysis of the results being obtained by using windows-based computer software devised with Statistical Packages for Social Sciences version 22. P value of less than 0.05 was considered statistically significant.

RESULT

Table-I: Demographic characteristics of the study subjects (N=60)

Characteristic	Frequency (N)	Percentage (%)	p-value
Age (Years)			
Mean ± SD	45.2 ± 12.3		
Gender			
Male	35	58.3	0.076
Female	25	41.7	
Residence			
Urban	40	66.7	0.042
Rural	20	33.3	

Statistical analysis was done by Chi-square test
p value < 0.05 indicates significant

The study included a total of 60 subjects. As shown in Table I, mean age of the participants was 45.2 ± 12.3 years, where majority of the participants were male (58.3%), while 41.7% were female. Urban residents constituted 66.7% of the study population, significantly higher than rural residents (33.3%) (p = 0.042).

Table-II: Food consumption pattern among the study subjects (N=60)

Food Item	Frequent Consumption	Occasional Consumption	Rare Consumption	p-value
Spicy Foods	45 (75%)	10 (16.7%)	5 (8.3%)	0.002
Caffeinated Beverages	30 (50%)	15 (25%)	15 (25%)	0.014
Acidic Foods	25 (41.7%)	20 (33.3%)	15 (25%)	0.027

Food Item	Frequent Consumption	Occasional Consumption	Rare Consumption	p-value
Fiber-rich Diet	20 (33.3%)	25 (41.7%)	15 (25%)	0.045
Banana Consumption	18 (30%)	30 (50%)	12 (20%)	0.008
Honey Usage	12 (20%)	18 (30%)	30 (50%)	0.021
Fermented Foods	10 (16.7%)	15 (25%)	35 (58.3%)	0.073

Statistical analysis was done by Chi-square test
p value < 0.05 indicates significant

Table II outlines the dietary consumption patterns of the participants. Spicy foods were the most frequently consumed item (75%), followed by caffeinated beverages (50%) and acidic foods (41.7%). In contrast, protective foods such as fiber-rich diets (33.3%), bananas (30%), honey (20%), and fermented foods (16.7%) were consumed less frequently. Statistically significant associations were observed between frequent consumption of spicy foods, caffeinated beverages, acidic foods, and disease severity ($p < 0.05$).

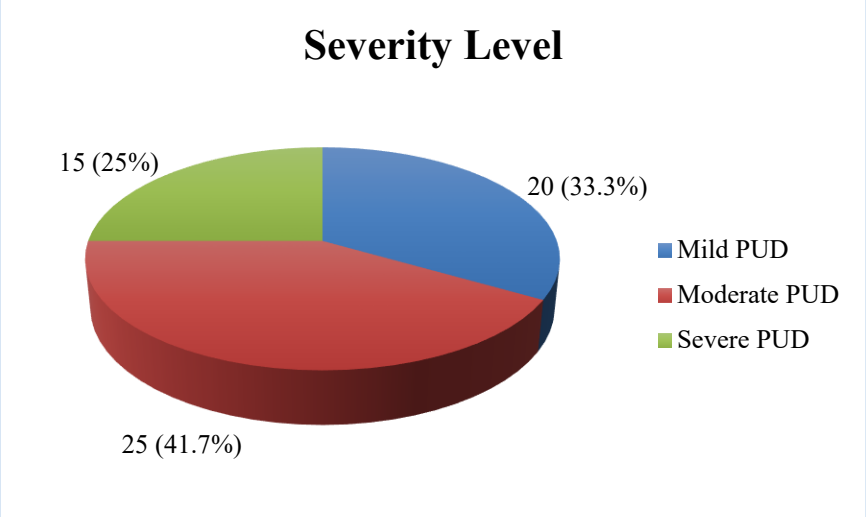

Figure 1: Disease severity among the study subjects (N=60)

Figure 1 illustrates the severity levels of PUD among the study subjects. Mild PUD was observed in 33.3% of participants, moderate PUD in 41.7%, and severe PUD in 25%.

Table-III: Association between dietary pattern and disease severity among the study subjects (N=60)

Food Item	Mild PUD (n = 20)	Medium PUD (n = 25)	Severe PUD (n = 15)	p-value
Spicy Foods	10 (50%)	20 (80%)	15 (100%)	0.002
Caffeinated Beverages	5 (25%)	15 (60%)	10 (66.7%)	0.011
Acidic Foods	6 (30%)	12 (48%)	7 (46.7%)	0.027
Fiber-rich Diet	8 (40%)	10 (40%)	2 (13.3%)	0.045
Banana Consumption	10 (50%)	8 (32%)	0 (0%)	0.001
Honey Usage	5 (25%)	6 (24%)	1 (6.7%)	0.023
Fermented Foods	4 (20%)	4 (16%)	2 (13.3%)	0.081

Statistical analysis was done by Chi-square test
p value < 0.05 indicates significant

Table III highlights the association between dietary patterns and disease severity. Spicy foods were consumed frequently by all participants with severe PUD (100%, $p = 0.002$), while protective foods like bananas and honey were more commonly associated with mild PUD (50% and 25%, respectively, $p < 0.05$). Fermented foods showed no significant association with severity ($p = 0.081$).

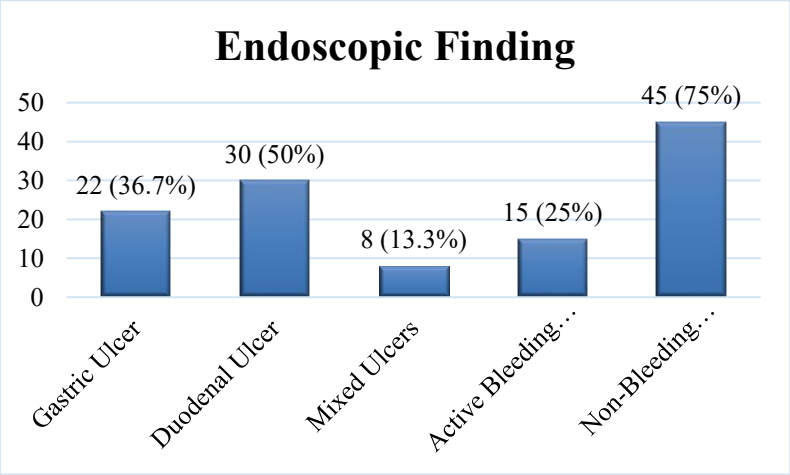

Figure 2: Endoscopic findings among the study subjects (N=60)

Figure 2 outlines the endoscopic findings, with duodenal ulcers being the most prevalent (50%), followed by gastric ulcers (36.7%) and mixed ulcers (13.3%). Active bleeding ulcers were present in 25% of participants, while non-bleeding ulcers were observed in 75%.

Table-IV: Association between dietary pattern and endoscopic findings among the study subjects (N=60)

Food Item	Gastric Ulcer	Duodenal Ulcer	Mixed Ulcers	Active Bleeding Ulcers	Non-Bleeding Ulcers	p-value
Spicy Foods	18 (81.8%)	25 (83.3%)	7 (87.5%)	12 (80%)	20 (44.4%)	0.004
Caffeinated Beverages	10 (45.5%)	15 (50%)	5 (62.5%)	8 (53.3%)	12 (26.7%)	0.017
Acidic Foods	12 (54.5%)	10 (33.3%)	3 (37.5%)	7 (46.7%)	18 (40%)	0.029
Fiber-rich Diet	8 (36.4%)	12 (40%)	4 (50%)	3 (20%)	21 (46.7%)	0.038
Banana Consumption	7 (31.8%)	10 (33.3%)	3 (37.5%)	1 (6.7%)	19 (42.2%)	0.006
Honey Usage	5 (22.7%)	7 (23.3%)	2 (25%)	2 (13.3%)	15 (33.3%)	0.041
Fermented Foods	3 (13.6%)	5 (16.7%)	2 (25%)	1 (6.7%)	12 (26.7%)	0.057

Statistical analysis was done by Chi-square test
p value < 0.05 indicates significant

Table IV presents the association between dietary patterns and endoscopic findings. Spicy foods were significantly associated with all ulcer types, particularly mixed ulcers (87.5%) and active bleeding ulcers (80%) ($p = 0.004$). Similarly, caffeinated beverages and acidic foods were linked with higher prevalence in severe endoscopic findings, such as active bleeding ulcers ($p < 0.05$). Protective foods, such as fiber-rich diets, bananas, and honey, were inversely associated with severe findings, including active bleeding ulcers.

Table-V: Healing time based on dietary pattern among the study subjects (N=60)

Food Item	Healing Time (Days, Mean ± SD)
Spicy Foods	18.2 ± 2.4
Caffeinated Beverages	17.5 ± 2.1
Acidic Foods	16.8 ± 2.0
Fiber-rich Diet	13.2 ± 2.8
Banana Consumption	12.6 ± 2.4
Honey Usage	12.2 ± 2.1
Fermented Foods	14.5 ± 2.6

Table V highlights the impact of dietary patterns on healing time. The consumption of protective foods such as bananas (12.6 ± 2.4 days), honey (12.2 ± 2.1 days), and fiber-rich diets (13.2 ± 2.8 days) was associated with significantly shorter healing durations compared to spicy foods (18.2 ± 2.4 days) and caffeinated beverages (17.5 ± 2.1 days).

DISCUSSION

Peptic ulcer disease (PUD) remains a significant public health challenge, with dietary factors playing a central role in its prevention and management. This cross-sectional study was conducted in Department of Medicine, Medical College for Women and Hospital and Ibn Sina Diagnostic and Consultation Centre, Uttara, Dhaka, Bangladesh, during the period from January 2021 to June 2023. Total 60 patients with peptic ulcer disease were included in this study. The mean age of participants in this study was 45.2 ± 12.3 years, with males constituting 58.3% of the sample, consistent with global findings indicating a higher prevalence of PUD in men. For instance, a study in Northern Saudi Arabia conducted by Albaqawi et al. [15] reported a male predominance of 70.2% among PUD patients, reflecting similar gender trends. Urban residents made up 66.7% of our sample, significantly higher than rural residents (33.3%, p = 0.042). This aligns with findings by Basak et al. [16], who reported urban dominance in PUD cases in Bangladesh, attributed to lifestyle and dietary differences. Spicy foods were the most frequently consumed item among participants (75%), followed by caffeinated beverages (50%) and acidic foods (41.7%). Protective foods such as fiber-rich diets, bananas, honey, and fermented foods were consumed by 33.3%, 30%, 20%, and 16.7% of participants, respectively. Frequent consumption of spicy foods was significantly associated with severe PUD (100%, p = 0.002), consistent with findings from Fouladvand et al. [17], who observed that pro-inflammatory diets, including spicy foods, exacerbated PUD severity. Similarly, Mohammed et al. [13] noted the protective role of bananas in reducing gastric lesions and improving mucosal healing, which aligns with our finding that banana consumption was more common in mild PUD cases (50%, p = 0.001). Duodenal ulcers were the most common endoscopic finding (50%), followed by gastric ulcers (36.7%) and mixed ulcers (13.3%). Active bleeding ulcers were present in 25% of participants, whereas non-bleeding ulcers were observed in 75%. Spicy foods were associated with mixed ulcers (87.5%) and active bleeding ulcers (80%, p = 0.004). These results mirror findings from Timshina et al. [18], who also reported a significant association between spicy food intake and bleeding ulcers. Protective foods like bananas and honey showed inverse associations with severe findings, aligning with Almasaudi et al. [19], who demonstrated honey's ability to reduce oxidative stress and inflammatory markers in gastric ulcers. Healing times varied significantly based on dietary patterns. Spicy foods and caffeinated beverages were associated with prolonged healing durations of 18.2 ± 2.4 days and 17.5 ± 2.1 days, respectively. Conversely, bananas (12.6 ± 2.4 days), honey (12.2 ± 2.1 days), and fiber-rich diets (13.2 ± 2.8 days) significantly reduced healing durations. These findings are supported by Mohammed et al. [13], who observed that banana pulp powder significantly reduced ulcer indices and promoted mucosal repair. Similarly, Ragab et al. [14] highlighted honey's gastroprotective role in healing ethanol-induced ulcers, consistent with our results. While previous studies extensively highlight the roles of bananas and honey in ulcer management, the protective impact of fiber-rich diets in our study (healing time: 13.2 ± 2.8 days) aligns with findings by Vomero and Colpo [10], who demonstrated fiber's role in enhancing mucosal integrity and reducing inflammatory processes. Furthermore, fermented foods showed limited association with healing or severity in our study (p = 0.081), consistent with Lam et al. [20], who found probiotics like Lactobacillus rhamnosus beneficial only under certain conditions. This study highlights the critical role of dietary patterns in the prevention and management of PUD, providing valuable insights for developing culturally tailored dietary interventions. Future studies should explore the long-term impacts of these dietary modifications and investigate synergistic effects with pharmacological treatments.

Limitations of the study

In our study, there was small sample size and absence of control for comparison. Study population was selected from one center in Dhaka city, so may not represent wider population. The study was conducted at a short period of time.

CONCLUSION

This current study demonstrates significant associations between dietary habits and the severity, type, and healing outcomes of PUD. The frequent consumption of spicy, caffeinated, and acidic foods exacerbates PUD severity and prolongs healing time, while protective foods such as bananas, honey, and fiber-rich diets play a beneficial role in disease management. The findings underscore the need for dietary modifications tailored to individual needs and regional dietary patterns to optimize PUD outcomes.

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