Original Article

Impact of Helicobacter pylori Eradication Therapy on Gastrointestinal Symptom Relief and Quality of Life in Dyspeptic Patients

Anam Shahzadi[1], Sadaf Anjum[2*], Shahreyar Lashari[3]

1 Fatima Memorial College, Lahore, Pakistan

2 University of Lahore, Lahore, Pakistan

3 Riphah International University, Lahore, Pakistan

*** Correspondence: sadaf.anjum@uipt.uol.edu.pk**

ABSTRACT

Background: Dyspepsia occurs frequently and often has been attributed to Helicobacter pylori infection. Randomized trial results indicate variable benefit of eradication therapy regarding symptoms and quality of life, and meta-analyses indicate only slight benefit on average. **Objective**: To evaluate the effect of H. pylori eradication therapy on the treatment of gastrointestinal symptoms, quality of life, and microbiologic eradication of H. pylori in H. pylori seropositive dyspeptic patients in the secondary care setting of South Asia. **Methods**: In this parallel group randomized controlled trial at the Iqra Hospital in Lahore, Pakistan, a total of 60 consenting adult volunteers aged 18-65 years old and experiencing dyspepsia for at least three months with biopsy-confirmed H. pylori infections were randomly allotted 1:1 to the treatment arm involving standard eradication therapy consisting of the standard triple regimen administered for two weeks versus the standard non-eradication therapy regimen. The end points assessed at the four- to eight-week post-therapy interval included global dyspepsia severity using the 0-to-10 numeric rating scale, symptoms' frequency of occurrence (mean number of episodes per week), gastrointestinal quality of life using the 0-to-100 visual analogue scale, and patient global assessments of overall wellness graded from 1 to 5. Intention-to-treat statistical analysis used t-testing. **Results**: Eradication therapy reduced global dyspepsia symptoms more than control (mean difference in post-treatment scores: 3.9 vs 5.8, $p < 0.001$) and improved total quality of life score (mean difference: 8.3, $p = 0.002$). H. pylori cure rates were 67% vs 10% (risk difference: 0.57). Adverse event rates were higher but mild. **Conclusion**: In H. pylori-positive dyspeptic patients in Pakistan, treatment achieves marked benefits in symptoms and quality of life when compared to conventional management and has a high rate of eradication and acceptable tolerance.

Keywords: dyspepsia; Helicobacter pylori; eradication therapy; randomized controlled trial; quality of life

Received: 07 September 2025
Revised: 21 September 2025
Accepted: 08 October 2025
Published: 31 October 2025

Citation: Click to Cite

Copyright: © 2025 The Authors.

Publisher: Link Medical Interface (LMI), Pakistan.

License: This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0) License.

INTRODUCTION

Dyspepsia presents a significant burden to health care services. A considerable measure of dyspeptic presentations to gastroenterology and primary care practices can be attributed to non-ulcer dyspepsia. Infection caused by Helicobacter pylori has been widely linked to peptic ulceration and also to non-ulcer dyspepsia, and there has been observational support

suggesting the existence of a modest and statistically significant relationship between infection and dyspeptic symptoms. In line with this theory, the hypothesis of H. pylori eradication therapy being used as a disease-modifying approach has been suggested to confer a jump-start benefit over acid management in H. pylori-infected dyspeptic sufferers.

Randomized controlled trials and meta-analyses had inconsistent findings regarding the benefits of H. pylori eradication regarding symptoms and quality of life. Some meta-analyses and Cochrane reviews demonstrated that there was a small but significant benefit of eradication therapy in reducing the persistence of dyspepsia: approximately 8-10% of the absolute risk reduction and a number needed to treat of approximately 15-18. Other meta-analyses related to non-ulcer dyspepsia showed approximately twice the odds of symptomatic improvement when there was a successful eradication of the bacteria. However, the clinical significance of the observed effect size in heterogeneous patient groups has been questioned in the face of statistical significance.

Individual trials had inconsistent results, especially in functional/dyspepsia patients without ulcers. In larger multicenter trials, combined omeprazole and antibiotic treatment was found to be superior to omeprazole therapy alone in the resolution of dyspepsia symptoms in shorter-term sufferers and to remain symptomatically improved up to three years in ulcer sufferers but diminished in reflux patients. However, Talley et al. could not detect a significant symptomatic response to eradication therapy compared to placebo in functional dyspepsia patients in the trial duration of 12 months. Later trials showed no fewer than mixed results: They ceased symptoms' improvement in symptom scales but not SF-36 quality of life.

However, recent studies indicate that the role of H. pylori eradication in patient-oriented outcomes might be affected by particular circumstances and the type of measurement tool used. Disease-specific/pros G-I questionnaires demonstrated a larger benefit concerning GI quality of life following successful treatment of functional dyspepsia, and there has been an improvement in reflux symptoms concerning quality of life in selected groups of patients undergoing reflux symptoms. Outpatient treatment of dyspeptic and ulcer patients demonstrated reduced symptoms of dyspepsia and healthcare usage following treatment. In contrast to this, meta-analyses found divergent results concerning the role of H. pylori eradication in patient-oriented quality of life measurement tools.

Studies were predominantly carried out in European, Australasian, or North American groups, often two decades ago and often in mixed groups. There has been no large body of trial data available from South Asia due to the differences of H. pylori infective rates and the accessibility of care in the region. Studies assessing the intensity of symptoms experienced, the frequency of symptoms, and the quality of life from the patient's point of view regarding their condition, alongside microbiologic eradication of the bacteria, are scarce.

In this context, the current RCT was planned and implemented to evaluate the hypothesis that H. pylori eradication therapy is superior to conventional non-eradication treatment in terms of extent of improvement in the severity of gastrointestinal symptoms and quality of life in H. pylori seropositive dyspeptic patients presenting to a secondary care teaching hospital in Pakistan. The hypothesis was that there would be a clinically significant difference in the global intensity of dyspepsia symptoms and their frequency, along with improvement in quality of life, compared to standard treatment.

MATERIALS AND METHODS

The parallel group randomized controlled trial was carried out at the Iqra Hospital at Lahore in Pakistan. The CONSORT guidelines for the parallel group trial of clinical research were taken into account in this trial. The patients presenting at the outpatient departments of gastroenterology and internal medicine of the above-determined hospitals/sidemities who had been suffering from dyspepsia were selected. The selection criterion of participants was being aged from 18 to 65 years old and having been suffering from episodic upper abdominal discomfort suggestive of dyspepsia and positive H. pylori test results from a urinary urease breath test/stool antigen. Informed consenting participants were also needed.

The exclusion criteria were previous treatment of H. pylori infection, previous gastric surgery, proven complications of peptic ulcerations at endoscopic examination, known GI and/or extra-GI malignancy, severe co-morbidity (e.g., decompensated hepatitis and heart failure), pregnancy and/or breastfeeding, and regular treatment with PPIs, H2RAs, and systemic antibiotics in the four weeks preceding trial entry. Endoscopic examinations were carried out when clinically indicated to exclude the possibility of structural lesions. Organic pathology requiring standard care constituted a reason for exclusion.

Participants who met the consecutive inclusion criteria were invited to participate. They signed the informed consent only after their eligibility had been established and they had been informed. Sixty participants were randomly allotted at a ratio of 1:1 to treatment groups A and B, who received H. pylori eradication therapy and non-eradication management, respectively. For random allocation, participants' enrollment was done according to a list of variable blocks produced using a computer-generated random number sequence. This list was produced by a statistician who did not directly participate in participant enrollment and in the measurement of the outcome. The allocation of participants was concealed through the use of opaque envelopes containing the participants' treatment allocations. The participants and researchers involved in treatment delivery were aware of the participants' allocation because the trial was open-label. The statistical analyzer and personnel evaluating the outcome, however, were blind to the treatment allocations of the participants.

Group A was administered standard triple therapy (PPI and two antibiotics) for a period of 14 days according to local guidelines. In group B, standard care without the aim of eradicating the bacteria was administered. This included acid reduction therapy, lifestyle modifications, dietary changes, and symptomatic treatment when needed. The patient’s medications that did not affect H. pylori infection were also permitted. The duration of patient follow-up was the predefined period post-therapy. The primary endpoint of the treatment was measured at the 4-to-8-week interval post-therapy.

The data was collected through a structured case report form. The baseline data collection consisted of the following: existing patient demographics, anthropometrics, lifestyle characteristics, and medical comorbidities. The clinical data collection consisted of the duration of symptoms of dyspepsia and the pattern of symptoms. Additionally, existing treatments received were also recorded. In the baseline assessments that were carried out, the following information was noted: the type of test used and the results of the test regarding the patient's H. pylori condition. The results also took into account the findings of the endoscopy test entrusted to the patient. This equally involved the patient's symptoms of dyspepsia through the following: the patient's global level of dyspepsia as estimated through the usage of the number rating scale from 0 to 10. Additionally, the patient's seven

symptoms of dyspepsia were estimated through the same number rating scale from 0 to 10. Symptom frequency was estimated through the number of days in the past seven days in which the patient experienced upper abdominal pain, postprandial discomfort, and nighttime symptoms. The patient's quality of life measurements involved the usage of the GI symptoms inventory. The main effect was the difference between groups regarding the change in global dyspepsia symptoms from baseline to the post-treatment visit. The secondary endpoints were the change in sum of symptom-specific NRS ratings, change in upper abdominal pain and postprandial discomfort days per week, change in total quality of life and its components, patient global assessments of their state of well-being, and the H. pylori cure rate at the visit of interest (negative urea breath test/stool antigen). The H. pylori testing at the visit of interest occurred as the clinical circumstances allowed. A cure was considered only in Group B if there was documentation of negativity. This reflected the understanding that the likelihood of spontaneous clearance was low. To avoid bias, the study used a randomized trial with allocation concealed and balanced prognostic factors. Open-label treatment might cause performance bias due to adjusted measurement tools and the data entry personnel and statistician's blind approach. Co-interventions of additional acid suppression and/or prokinetics were noted to be used in sensitivity analyses. Confounding factors might be influenced by the duration of symptoms and the patient's comorbid conditions. The calculation of the sample size had the goal of a relevant difference of 1.5 points in the global change of dyspepsia symptoms scored from 0 to 10, using a standard deviation of 2.0 and a two-sided significance level of 0.05 to achieve a power of 80% to detect the difference. This resulted in the need to study 27 participants in each group, and to account for a maximum of 10% lost to follow-up, the study was planned to enroll a maximum of 30 participants per group. The researchers decided to study a combined group of 60 participants. The results of the continuous measurements were reported using the mean and standard deviation to compare the groups using the two-sample t-test. The differences within the groups were also studied using the paired t-test. The categorical measurements were studied using the chi-squared test or the Fischer Exact test as appropriate. In analyzing the primary endpoint of the study, ANCOVA was used. The effect measure was presented as the mean value along with the 95% CI. The standardized effect measure was also calculated using Cohen’s d. A two-sided p-value of <0.05 was used as the significance level without corrective measure for multiple endpoint testing. Results from secondary endpoints were considered supporting data. To the extent possible, missing data were reduced through active follow-up. In the case of missing single post-course treatment results, sensitivity analyses based on the last observation carried forward approach and per-protocol analyses in treatment completers were employed. The study protocol received approval from the institutional ethics committee of the Iqra Hospital in Lahore. All participants were asked to give their written informed consent prior to randomization according to the Helsinki protocol and regulatory requirements. All participants gave their written informed consent prior to randomization.

RESULTS

Sixty H. pylori-positive dyspeptic patients were randomly allotted equally to eradication therapy (Group A) and conventional care (Group B). The two groups had no significant difference in their characteristics at the start of the study (Table 1). The mean age was 41.7 ± 10.8 years, although there was a slight preponderance of males (58.3%). The duration of symptoms was approximately 10 months. The lifestyle factors of the patients were evenly distributed regarding the following: the patient’s consumption of cigarettes (31.7%), alcohol (11.6%), and NSAIDs (21.6%). The comorbidity level of the two groups was also evenly distributed, as 38% of each had at least one comorbid condition. The two groups also

did not differ in their findings regarding endoscopy: the incidence of gastritis was approximately equal at

Table 1. Baseline Demographics and Clinical Characteristics (n = 60)

Variable	Eradication (n = 30)	Control (n = 30)	Total (n = 60)	p-value
Age (years), mean ± SD	42.1 ± 10.4	41.3 ± 11.2	41.7 ± 10.8	0.72
Sex (Male/Female)	18 / 12	17 / 13	35 / 25	0.79[1]
BMI (kg/m²), mean ± SD	25.8 ± 3.4	26.1 ± 3.1	26.0 ± 3.2	0.68
Duration of symptoms (months), mean ± SD	9.8 ± 4.1	10.3 ± 4.3	10.1 ± 4.2	0.64
Smoking (Yes, %)	33%	30%	31.7%	0.79[1]
Alcohol use (Yes, %)	13%	10%	11.6%	0.67[1]
NSAID use (Yes, %)	20%	23%	21.6%	0.77[1]
Any comorbidity present (Yes, %)	36%	40%	38%	0.72[1]
H. pylori positive (%)	100%	100%	100%	–
Urea breath test used (%)	60%	63%	–	0.81[1]
Stool antigen test used (%)	40%	37%	–	–
Endoscopy performed (%)	70%	67%	–	0.78[1]
Endoscopic gastritis (%)	46%	50%	–	0.72[1]
Endoscopic duodenitis (%)	20%	17%	–	0.74[1]
Endoscopic ulcer (%)	10%	13%	–	0.69[1]

Table 2. Dyspepsia Symptom Severity and Frequency

Outcome	Group A (n = 30)	Group B (n = 30)	Comparison (post)
Global dyspepsia score, baseline (mean ± SD)	7.1 ± 1.2	7.0 ± 1.3	–
Global dyspepsia score, post (mean ± SD)	3.9 ± 1.4	5.8 ± 1.5	–
Change (post – baseline), mean (SD)	−3.2 (1.6)	−1.2 (1.4)	–
Within-group p-value (baseline vs post)	<0.001[2]	0.004[2]	–
Mean difference in post-treatment scores (B – A)	–	–	1.9
95% CI for difference	–	–	1.17 to 2.63
Standardized effect size (Cohen's d)	–	–	1.31

Table 3. Symptom-Specific NRS (0–10)

Symptom	Group A Pre	Group A Post	Mean Change A	Group B Pre	Group B Post	Mean Change B	p-value
Epigastric pain/burning	6.8 ± 1.1	3.2 ± 1.2	−3.6	6.7 ± 1.2	5.4 ± 1.4	−1.3	<0.001
Postprandial fullness	7.0 ± 1.4	4.0 ± 1.1	−3.0	6.9 ± 1.3	5.6 ± 1.4	−1.3	<0.001
Early satiety	6.2 ± 1.3	3.8 ± 1.3	−2.4	6.1 ± 1.3	5.0 ± 1.2	−1.1	0.002
Bloating/distension	6.6 ± 1.2	4.1 ± 1.3	−2.5	6.5 ± 1.2	5.3 ± 1.3	−1.2	0.003
Nausea	5.8 ± 1.4	3.3 ± 1.0	−2.5	5.7 ± 1.3	4.9 ± 1.1	−0.8	0.001
Belching	6.0 ± 1.3	3.7 ± 1.1	−2.3	6.1 ± 1.2	5.0 ± 1.2	−1.1	0.004
regurgitation	6.4 ± 1.1	3.9 ± 1.2	−2.5	6.2 ± 1.1	5.3 ± 1.3	−0.9	0.002

Table 4. Symptom Frequency (Days with Symptom per Week)

Outcome	Group A Pre	Group A Post	Group B Pre	Group B Post	p-value
Any upper abdominal pain (days/7)	6.1 ± 0.9	2.5 ± 1.2	6.2 ± 1.0	4.8 ± 1.3	<0.001
Postprandial discomfort (days/7)	6.4 ± 0.8	3.1 ± 1.2	6.3 ± 0.7	5.1 ± 1.1	0.001
Night-time symptoms (days/7)	4.8 ± 1.6	2.0 ± 1.4	4.7 ± 1.5	3.8 ± 1.6	0.01

Table 5. Quality of Life (QoL) and Patient Global Wellbeing

QoL Domain	Group A Pre	Group A Post	Group B Pre	Group B Post	Mean Difference	95% CI	p-value[4]
Total QoL score	52.3 ± 8.4	66.5 ± 9.1	51.8 ± 7.9	58.2 ± 8.5	8.3	3.8 to 12.8	0.002
Physical functioning	58.4 ± 9.0	72.2 ± 8.8	59.1 ± 8.3	64.0 ± 9.1	8.2	–	0.01
Emotional wellbeing	49.0 ± 10.0	61.4 ± 10.1	48.7 ± 9.7	53.0 ± 10.0	8.4	–	0.04
Social functioning	54.0 ± 7.1	65.5 ± 8.5	53.7 ± 7.0	58.3 ± 7.9	7.2	–	0.02
Role limitations	50.8 ± 8.2	64.2 ± 9.1	50.1 ± 8.7	56.1 ± 9.5	8.1	–	0.03
Sleep quality	48.2 ± 9.8	61.0 ± 10.5	49.1 ± 9.4	54.0 ± 10.4	7.0	–	0.04

Table 6. Patient Global Assessment of Wellbeing (1–5)

Group	Pre (Mean ± SD)	Post (Mean ± SD)	Mean Change	p-value within group[2]	p-value
Group A – Eradication	2.1 ± 0.7	3.9 ± 0.8	+1.8	<0.001	–
Group B – Control	2.0 ± 0.6	2.8 ± 0.7	+0.8	0.002	0.001

Table 7. Eradication, Safety, and Key Outcome Summary

Variable	Group A Pre	Group A Post	Group B Pre	Group B Post	95% CI	p-value
Global dyspepsia score (0–10)	7.1	3.9	7.0	5.8	1.17 to 2.63	<0.001
Symptom NRS sum (0–70)	44.8	25.0	44.3	36.5	–	<0.01
QoL total score (0–100)	52.3	66.5	51.8	58.2	3.8 to 12.8	0.002
Days with upper abdominal pain (per week)	6.1	2.5	6.2	4.8	–	<0.001
Days with postprandial discomfort (per week)	6.4	3.1	6.3	5.1	–	<0.01
Global wellbeing (1–5)	2.1	3.9	2.0	2.8	–	<0.01

Table 8. H. pylori Eradication and Adverse Events

Outcome	Eradication (n = 30)	Control (n = 30)	Effect measure
Eradication success (%)	67% (20/30)	10% (3/30)	0.57 (95% CI 0.37-0.77); RR 6.7
Adverse events (any, %)	30%	12%	p = 0.07[1]
Most common adverse event	Nausea (20%)	Mild abdominal pain (8%)	–

The mean global dyspepsia symptoms at baseline were high and equivalent in both groups (7.1 ± 1.2 vs 7.0 ± 1.3). After treatment, the global dyspepsia symptoms showed a significant mean reduction of 3.2 points (45% improvement, $p < 0.001$) in the eradication group to 3.9 ± 1.4 compared to the mean reduction of 1.2 points (17% improvement, $p = 0.004$) in the control group to 5.8 ± 1.5 (Table 2). The mean global dyspepsia symptoms differed significantly between the two groups, with a difference of 1.9 points (95% CI of difference: 1.17-2.63), indicating a large standardized effect size of 1.31 favoring the eradication group. In the various symptom components of dyspepsia, the reduction of epigastric pain, early satiety, postprandial fullness, bloating, nausea, belching, and heartburn showed larger benefits in treatment group A than in group B, which showed differences of mean changes of symptoms of 1.1-2.3 points and mostly $p < 0.01$. The mean number of days of symptoms per week also showed a larger reduction from the baseline of upper abdominal pain of 6.1 to 2.5 days in group A than the reduction from 6.2 to 4.8 days in group B ($p < 0.001$). The same trend was observed in the postprandial discomfort symptoms, which dropped from 6.4 to 3.1 days in group

The quality of life results also showed improved outcomes in the eradication group. The SIBMTO total QoL scores increased from a mean of 52.3 ± 8.4 at baseline to 66.5 ± 9.1 at the end of the study in Group A and from 51.8 ± 7.9 at baseline to 58.2 ± 8.5 at the end of the study in Group B (Table 3). The mean difference at the end of the study was 8.3 points (95% CI: 3.8, 12.8, $p = 0.002$). The results of the paired-domain comparisons demonstrated the superiority of the eradication treatment approach in terms of the domains of physical functioning, emotions, social functioning, work/role limitations due to physical health problems, and problems with sleep, and the p-values were found to be emotions p=0.01, social functioning p=0.02, work/role limitations due to physical health problems p=0.02, problems of sleep p=0.02, and physical functioning p=0.04, respectively. Patient global assessments showed an improvement of 1.8 points from a mean of 2.1 ± 0.7.

Microbiological results are also correlated with symptoms and QoL responses. Eradication of H. pylori was confirmed in 67% (20/30) of patients in Group A compared to 10% (3/30) in Group B, demonstrating an absolute risk difference of 0.57 (95% CI: 0.37–0.77) and a

relative risk of 6.7 (Table 4). Adverse event rates were higher in the treatment arm (30% vs. 12%), due mostly to episodic vomiting, but did not reach conventional statistical significance (p=0.07). No serious side effects were observed. In essence, the above findings support that in this particular group of dyspeptic patients from Lahore, H. pylori treatment caused larger increments in global dyspepsia symptoms, symptoms' frequency, and quality of life due to the disease.

DISCUSSION

This RCT involved dyspeptic patients who were confirmed to be H. pylori-positive and attended a secondary care center in Pakistan, and it found a large and clinically important difference in global dyspeptic symptoms between those who received eradication treatment and those who received standard non-eradication treatment. The mean difference in global dyspepsia scores at the end of treatment was 1.9 points (95% CI: 1.17–2.63), along with a standardized effect size of 1.31, demonstrating a large treatment effect that was consistent across different symptoms and frequency of symptoms. These results are consistent with the previous RCTs demonstrating the greater resolution of symptoms following H. pylori eradication. However, the effect size in the current study is at the high end of previous studies observed, especially in non-ulcer and unselected dyspepsia patients (1–5, 11).

The meta-analyses of non-ulcer dyspepsia trials demonstrated the small absolute benefits of eradication therapy with relative risk reductions of 8-10% and numbers needed to treat of 15-18 to cure one additional patient (2,3). The extent of benefit observed in the current group of patients, in both the absolute reduction of symptom scores and the proportions of patients deriving marked symptomatic benefit, might be due to several factors: the high baseline levels of symptoms, which might not be driven to be symptomatic enough to reach medical care in less stringent community practices without the exclusion of patients suffering from significant organic pathology, plus the comprehensive approach to symptoms and lifestyle modifications together applied in both arms of the study. Likewise, consistent with observations that symptoms of shorter duration will benefit considerably from the active treatment of non-ulcer dyspepsia (5), our patients had had symptoms of about a median duration of approximately 10 months before entry, which may be short enough to be substantially amenable to a disease-modifying treatment. The point-by-point benefits of the treatment also confirm the clinical significance of the difference observed in numeric endpoints.

The quality of life results are also less consistent in the literature, ranging from no benefit in generic scales despite symptomatic resolution to marked benefit in disease-specific or gastrointestinal scales (3, 7–10, 14, 15). In this study, the total QoL scores improved by 14.2 points in the eradication group and 6.4 points in the control group, a difference of 8.3 points favoring the treatment group, whose CI did not contain zero. This benefit was noted in the domains of physical function and symptoms and emotions, social interaction and work function, and also in the domain of quality of sleep. This benefit was also combined with almost 1 point of additional benefit in the global QoL in the treatment arm. These results are what might be expected: Suzuki & Buzas found QoL improved substantially following eradication of functional dyspepsia, rather than the nonbeneficial change found in QoL using generic scales reported in the study of Bektas & Koskenpato (7–10). Contemporaneous measurement of quality of life using scales validated against gastrointestinal symptoms may improve sensitivity of the measurement to that which patients value directly.

The large difference in the rate of eradication of 67% in Group A compared to only 10% in Group B, together with the close relation between microbiologic cure and symptomatic response, reflects previous observations demonstrating that symptomatic benefit is far more likely when H. pylori infection has been successfully eradicated (1, 4, 11, 13, 15). The risk difference of 0.57 and relative risk of 6.7 in favor of eradication support the biological plausibility of the clinical differences observed. The incidence of adverse events was sufficiently low and consisted only of transient nausea in the treatment group. Although the absolute risk was higher than in the controls, no severe complications occurred, and the overall safety profile was consistent with previous experience of treatment regimens (2, 3, 5-7). In this context, the consequences of the results appear clearly to favor benefit over harm of the treatment in this particular subgroup of dyspeptic patients. This trial must also be considered in the context of the existing body of contradictory trials and meta-analyses. Talley et al. found no symptomatic benefit from functional dyspepsia despite eradication success, and recent Cochrane reviews and economic models have stressed the net benefit of therapy likely being modest at best and perhaps case-mix and outcome-dependent (2, 3, 6, 14). Our study's inclusion of endoscopic patients with gastritis and duodenitis might represent a pool of patients who would be selectively receptive to the benefits of H. pylori therapy, under the suggestion of Laheij and others (4, 5, 11, 15). The absence of formal stratification based on symptoms of reflux esophagitis has likely underestimated the diminished benefit of symptoms post-eradication in this study and remains an important concept ripe for additional research. A number of additional limitations must also be mentioned. The study took place at a single center and had a sufficiently small number of participants; although randomization resulted in equivalent groups at baseline evaluation, the results of subgroup comparisons are not precise. The unblinded study protocol may have been subject to expectation and performance bias, although the utilization of standardized numeric scales and blind statistical analysis reduces the impact of this factor but does not eliminate it entirely. In turn, the study did not account for multiple direct statistical comparisons of numerous secondary endpoints and can only be considered supportive rather than confirmatory of those findings. In addition, the study only presented a short-term evaluation of the treatment's effect and did not provide data regarding the longer-term prevention of ulcers and symptomatic relapse reported in community and economic studies (12–14). In spite of the noted limitations of the study, its internal consistency concerning intensity, frequency of symptoms, quality of symptoms' impact, and symptoms' eradication argues in favor of the overall validity of the primary hypothesis. The clinical implication of the results is that treatment of H. pylori infection aimed at its eradication in H. pylori-positive dyspeptic patients can be expected to provide important symptomatic and quality-of-life benefits in addition to those of acid suppression therapy in secondary care settings of the South Asia region. The magnitude of treatment effect along with the acceptable safety profile of treatment and the additional long-term benefits of reduced peptic ulcer risk observed in previous studies provide support for the role of treatment of H. pylori infection through its eradication at the forefront of the algorithms of dyspepsia treatment, though this must be informed by the patient's co-morbidities of reflux esophagitis and the patient's preferences (2, 3, 11-15).

CONCLUSION

In this single-center RCT of H. pylori-positive dyspeptic patients at the Iqra Hospital in Lahore, treatment-induced H. pylori eradication caused a substantially greater improvement than standard non-eradication therapy in the general dyspeptic symptom severity, frequency of symptoms, GI-specific quality of life, and patient global assessments of benefit, reflecting the marked differences in microbiologic eradication achieved. These

results support the utility of H. pylori eradication regimens as an integral part of the treatment approach in such patient groups and draw attention to the requirement of larger multicentric trials to optimize patient selection and final patient benefit. They also appear consistent with but are substantially more persuasive than the modest average results reported in previous meta-analyses.

DECLARATIONS

Ethical Approval
This study was approved by the Institutional Review Board of University of Lahore, Lahore, Pakistan
Informed Consent
Written informed consent was obtained from all participants included in the study.
Conflict of Interest
The authors declare no conflict of interest.
Funding
This research received no external funding.
Authors' Contributions
Concept: AS; Design: SA; Data Collection: SL; Analysis: AS, SL; Drafting: AS.
Data Availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.
Acknowledgments
Not applicable.
Study Registration
Not applicable.

REFERENCES

1. Jaakkimainen RL, Boyle E, Tudiver F. Is Helicobacter pylori associated with non-ulcer dyspepsia and will eradication improve symptoms? A meta-analysis. BMJ. 1999;319(7216):1040–4. doi:10.1136/bmj.319.7216.1040.

2. Moayyedi P, Soo S, Deeks J, Delaney B, Harris A, Innes M, et al. Eradication of Helicobacter pylori for non-ulcer dyspepsia. Cochrane Database Syst Rev. 2011;(2):CD002096. doi:10.1002/14651858.CD002096.

3. Du L, Chen B, Kim JJ, Kim S, Shen J, Dai N. Helicobacter pylori eradication therapy for functional dyspepsia: systematic review and meta-analysis. World J Gastroenterol. 2016;22(12):3486–95. doi:10.3748/wjg.v22.i12.3486.

4. Laheij RJF, Jansen JBMJ, van de Lisdonk EH, Severens JL, Verbeek ALM. Symptom improvement through eradication of Helicobacter pylori in patients with non-ulcer dyspepsia: a review. Aliment Pharmacol Ther. 1996;10(5):843–52. doi:10.1046/j.1365-2036.1996.86258000.x.

5. McColl K, Murray L, El-Omar E, Dickson A, El-Nujumi A, Wirz A, et al. Symptomatic benefit from eradicating Helicobacter pylori infection in patients with nonulcer dyspepsia. N Engl J Med. 1998;339(26):1869–74. doi:10.1056/NEJM199812243392601.

6. Talley NJ, Janssens J, Lauritsen K, Rácz I, Bolling-Sternevald E. Eradication of Helicobacter pylori in functional dyspepsia: randomised double blind placebo controlled trial with 12 months' follow up. BMJ. 1999;318(7187):833–7. doi:10.1136/bmj.318.7187.833.

7. Koskenpato J, Färkkilä M, Sipponen P. Helicobacter pylori eradication and standardized 3-month omeprazole therapy in functional dyspepsia. Am J Gastroenterol. 2001;96(3):689–94. doi:10.1111/j.1572-0241.2001.04240.x.

8. Bektas M, Soykan I, Alkan M, Altan M, Ozden A. The effect of Helicobacter pylori eradication on dyspeptic symptoms, acid reflux and quality of life in patients with functional dyspepsia. Eur J Intern Med. 2009;20(4):406–10. doi:10.1016/j.ejim.2008.11.007.

9. Suzuki H, Masaoka T, Sakai G, Ishii H, Hibi T. Improvement of gastrointestinal quality of life scores in cases of Helicobacter pylori-positive functional dyspepsia after successful eradication therapy. J Gastroenterol Hepatol. 2005;20(11):1652–60. doi:10.1111/j.1440-1746.2005.04039.x.

10. Buzás G. The effect of Helicobacter pylori eradication and prokinetic treatment on the quality of life in functional dyspepsia. Orv Hetil. 2004;145(7):343–8.

11. Hirata K, Suzuki H, Matsuzaki J, Masaoka T, Saito Y, Nishizawa T, et al. Improvement of reflux symptom-related quality of life after Helicobacter pylori eradication therapy. J Clin Biochem Nutr. 2013;52(2):172–8. doi:10.3164/jcbn.12-107.

12. Hobbs FD, Delaney BC, Rowsby M, Kenkre JE. Effect of Helicobacter pylori eradication therapy on dyspeptic symptoms in primary care. Fam Pract. 1996;13(3):225–30. doi:10.1093/fampra/13.3.225.

13. Phull PS, Ryder SD, Halliday D, Price AB, Levi AJ, Jacyna MR. The economic and quality-of-life benefits of Helicobacter pylori eradication in chronic duodenal ulcer disease: a community-based study. Postgrad Med J. 1995;71(837):413–8. doi:10.1136/pgmj.71.837.413.

14. Wilhelmsen I. Quality of life and Helicobacter pylori eradication. Scand J Gastroenterol Suppl. 1996;215:138–45. doi:10.3109/00365529609095546.

15. Malfertheiner P, Mössner J, Fischbach W, Layer P, Leodolter A, Stolte M, et al. Helicobacter pylori eradication is beneficial in the treatment of functional dyspepsia. Aliment Pharmacol Ther. 2003;18(7):615–25. doi:10.1046/j.1365-2036.2003.01695.x.