Al-Rafidain J Med Sci. 2023;5:34-39.
DOI: https://doi.org/10.54133/ajms.v5i.147

AJMS
Online ISSN (2789-3219)

Research Article

Assessment of Anti-Helicobacter Pylori Eradication Regimens in Basrah Gastroenterology and Hepatology Hospital

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Received: 9 June 2023; Revised: 8 July 2023; Accepted: 10 July 2023

Abstract

Background: For *Helicobacter pylori* eradication failures, levofloxacin-based therapy has been widely recommended. ***Objective***: To find the most efficient *H. pylori* eradication treatment in Basrah. ***Method***: The Basrah Gastroenterology and Hepatology Hospital conducted a prospective descriptive study from September to December 2022. Patients with dyspepsia who presented to the outpatient clinic were tested for *H. pylori* infection. The study included 66 patients who had a confirmed diagnosis of infection by either a *H. pylori* stool antigen test or a urea breath test. They were allocated to one of two eradication regimens at random: regimen A (omeprazole, levofloxacin, and amoxicillin) and regimen B (omeprazole, clarithromycin, and metronidazole). Patients were re-evaluated and tested for *H. pylori* infection after a 4-week follow-up period. Symptom relief and medication side effects were recorded. ***Results***: Sixty-two patients were enrolled; the mean age was 34.97 years, with a range of 7 to 68 years. Thirty-six (58.1%) were female, while 26 (41.9%) were male. In the follow-up test, the majority of patients (85.5%) tested negative, representing the total eradication rate. When compared to regimen A, regimen B had a larger number of patients reporting side effects (29.1% vs. 9.7%). Regimen A demonstrated a significantly greater rate of effective eradication compared to regimen B. In regimen B, the percentage of patients who had no change in symptoms following therapy was larger (32.3%) than in regimen A (6.5%). ***Conclusion***: A levofloxacin-based treatment (regimen A) is more effective in eradicating *H. pylori* infection than regimen B.

Keywords: *H. pylori* eradication, Treatment regimens, Levofloxacin, Clarithromycin.

تقييم نظم معالجة بكتيريا الملوية البوابية في مستشفى البصرة لأمراض الجهاز الهضمي والكبد

الخلاصة

الخلفية: بالنسبة لحالات لفشل في القضاء على الملوية البوابية، يوصى على نطاق واسع بالعلاج القائم على الليفوفلوكساسين. **الهدف**: العثور على علاج استئصال الملوية البوابية الأكثر كفاءة في البصرة. **الطريقة**: أجرى مستشفى البصرة لأمراض الجهاز الهضمي والكبد دراسة وصفية مستقبلية من سبتمبر إلى ديسمبر 2022. تم اختبار المرضى الذين يعانون من عسر الهضم الذين قدموا إلى العيادة الخارجية لعدوى الملوية البوابية. شملت الدراسة 66 مريضا لديهم تشخيص مؤكد للعدوى إما عن طريق اختبار مستضد البراز أو كشف اليوريا في التنفس. تم توزيعهم لأحد نظامي العلاج عشوائيا: النظام A أوميبرازول، ليفوفلوكساسين، وأموكسيسيلين والنظام B أوميبرازول، كلاريثروميسين، وميترونيدازول. تمت إعادة تقييم المرضى بحثا عن عدوى الملوية البوابية بعد فترة متابعة مدتها 4 أسابيع. تم تسجيل تخفيف الأعراض والآثار الجانبية للأدوية. **النتائج:** تم تسجيل 62 مريضا بمتوسط العمر 34.97 سنة. وكان 58.1% من الإناث. في اختبار المتابعة، كانت نتيجة اختبار غالبية المرضى (85.5٪) سلبية كمعدل استئصال الكلي. كان للنظام ب عدد أكبر من المرضى الذين أبلغوا عن آثار جانبية (29.1٪ مقابل 9.7٪). أظهر النظام A معدلا أكبر من الاستئصال الفعال مقارنة بالنظام B. في النظام ب، كانت النسبة المئوية لمن لم تغيير الأعراض بعد العلاج أكبر (32.3٪) مقارنة بالنظام أ (6.5٪). **الخلاصة**: العلاج القائم على الليفوفلوكساسين أكثر فعالية في القضاء على عدوى الملوية البوابية من النظام الآخر.

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Article citation: Abdullah MA, Lafta KB, Dawwod EJ, Mesbh KA. Assessment of anti-helicobacter pylori eradication regimens in Basrah Gastroenterology and Hepatology Hospital. *Al-Rafidain J Med Sci*. 2023;5:34-39. doi: https://doi.org/10.54133/ajms.v5i.147

INTRODUCTION

Infection with Helicobacter pylori is one of the most frequent infectious disorders in the world, affecting 40–50% of the world's population. *H. pylori* has been designated as a group 1 carcinogen by the WHO and has been associated with the development of stomach cancer [1]. It is widespread worldwide, but prevalence varies substantially between nations and even within demographic groups within the same country [2]. *H. pylori* infection is closely associated with socioeconomic status [3]. In early childhood, the illness is spread orally and primarily within families [2,4]. Adult *H. pylori* infections are often chronic and incurable in the absence of specialized therapy; nevertheless, spontaneous elimination of the bacteria in children is believed to be prevalent and may benefit from antibiotic medication for other reasons [5]. To diagnose *H. pylori* infection, non-invasive procedures or endoscopic biopsy of the gastric mucosa can be employed; the suitable test depends on the clinical situation. Non-invasive procedures include the urea breath test, serologic tests, and stool antigen assays. The urea breath test detects active infection with greater than 90% sensitivity and specificity by relying on the quantity of H. pylori-derived urease activity in the stomach. The test is intended for both initial infection diagnosis and monitoring eradication therapy. To avoid false negative findings, the urea breath test should not be conducted until four weeks have passed. The urea breath test is reliable for children over the age of six, while younger children require further testing. Serologic testing for H. pylori infection in individuals prior to therapy is affordable and frequently utilized. Although approved laboratory-based techniques have the same sensitivity and specificity as the urea breath test, certain office-based tests have produced inconsistencies. Local validation is essential since *H. pylori* strains differ widely. Serologic testing is unreliable in young children and has little utility in determining therapeutic success. With sensitivity ranging from 89–98% and specificity over 90%, stool antigen tests for *H. pylori* are a feasible alternative to the urea breath test. If an eight-week delay following therapy is allowed, stool tests are appropriate for infection follow-up. Stool tests are successful in children of all ages and could become the non-invasive procedure of choice for this patient population. Patients over the age of 50, as well as those experiencing concerning symptoms such as anemia, gastrointestinal bleeding, or weight loss, should undergo an endoscopy to rule out an *H. pylori* infection. A urease test is the first test conducted on an antral biopsy specimen when endoscopy is clinically warranted. It detects urease activity in biopsy samples with a sensitivity of 79–100% and a specificity of 92–100%. Additional biopsies can improve sensitivity, but false-negative results have been reported in patients who are bleeding or have recently bled, as well as those who are receiving antibiotics or anti-secretory medications. If the urease test results are negative, additional biopsy specimens that have been preserved in fixative might be sent for histologic investigation. *H. pylori* culture with antibiotic sensitivity testing is not regularly used to diagnose *H. pylori* infection, but it is indicated when second-line therapy fails. *H. pylori* eradication has been proven to prevent stomach cancer. International guidelines say that the first-line treatment for an *H. pylori* infection is to take a proton pump inhibitor (PPI) or ranitidine-bismuth citrate with any two antibiotics (amoxicillin, clarithromycin, or metronidazole) for 7–14 days. Despite these recommendations, more than 20% of patients experienced *H. pylori* eradication failure. Because antibiotics are used indiscriminately, the failure rate for first-line therapy may be higher in actual clinical practice. As second-line therapy, a quadruple regimen of tetracycline, metronidazole, a bismuth salt, and a PPI is advised. The PPI-amoxicillin-levofloxacin combo is a solid choice for second-line therapy. If second-line therapy fails, patients should be examined on an individual basis. A culture should be done before deciding on a third-line treatment based on microbial antibiotic sensitivity, according to European recommendations. *H. pylori* isolates are typically resistant to both metronidazole and clarithromycin after two failed eradication attempts. Alternative alternatives for third-line therapy include quinolones, tetracycline, rifabutin, and furazolidone; high-dose PPI/amoxicillin therapy may also be promising [6]. The goal of this study was to find the most efficient regimen for eradicating *H. pylori* in Basrah.

METHODS

Study design and participants

A prospective descriptive study was conducted at the Basrah Gastroenterology and Hepatology Center, Basrah, Iraq, from September 1 to December 1, 2022. Patients with dyspepsia and/or epigastric pain who presented to the outpatient clinic were tested for *H. pylori* infection. The study enrolled a convenient sample of sixty-two patients who had a confirmed diagnosis of *H. pylori* infection either *H. pylori* stool antigen test or urea breath test. After meeting the inclusion and exclusion criteria, they were examined and enrolled. A questionnaire was used to interview each participant. The following information was gathered: age, gender, primary disease symptoms, and the initial diagnostic test. In addition, inquiries on whether the exclusion criteria were met were answered. Participants were subsequently randomized at random to one of two *H. pylori* eradication regimens: For 14 days, Regimen A contains a once-daily dose of 500 mg levofloxacin tablets, as well as a twice-daily dose of 1 g amoxicillin capsules and 40 mg omeprazole capsules. Regimen B consists of 500 mg clarithromycin tablets, 500 mg metronidazole tablets, and 40 mg omeprazole capsules taken twice daily. Each patient was given instructions on the dosage, frequency, and duration of treatment, as well as advice on drug adherence. Patients were instructed to report any potential side effects that may occur throughout their

therapy. Patients were re-interviewed after a 4-week follow-up period. Information on symptom alleviation and drug side effects was gathered. Additionally, attending patients were re-tested for *H. pylori* infection after the follow-up, either by *H. pylori* stool antigen test or by urea breath test. The study of the data removed four patients, two of whom discontinued therapy due to side effects and the other two who failed to attend follow-up sessions. As a result, the sample size was 62 patients. Each participant in this study provided written informed permission.

Inclusion Criteria

Symptomatic patients with abdominal pain and/or dyspepsia who had a positive *H. pylori* stool antigen test or urea breath test.

Exclusion Criteria

Pregnant and lactating women, patients with allergies to any medication used in *H. pylori* eradication, patients with a history of previous *H. pylori* eradication and current use of PPIs, and patients with dyspepsia from causes other than *H. pylori* infection were excluded.

Laboratory investigations

For individuals who had *H. pylori* stool antigen testing, a fresh stool sample was obtained in a clean container and immediately delivered to the laboratory for analysis. The sample was taken at least two weeks before using any antibiotics or proton pump inhibitors. Those who were tested with a urea breath test were given the following instructions: fast for at least 6 hours before the test and avoid any antibiotics or proton pump inhibitors for 2 weeks prior to the test. A baseline breath sample is normally obtained from the patient by asking him or her to blow into a balloon-like container or tube. The patient is subsequently given a urea dosage that has been labeled with either a radioactive or non-radioactive marker. A second breath sample is taken from the patient after 10–30 minutes. The two breath samples are compared to see if the patient is infected with H. pylori.

Statistical analysis

The data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. The numerical variables were described as mean and standard deviation, while the categorical data were represented as frequencies and percentages. Independent samples *t*-test was used to compare the means of two samples. The chi-square test was used to test the significance of the association between the categorical variables. p-value < 0.05 was the criterion of statistical significance.

RESULTS

Sixty-two *H. pylori*-infected patients were interviewed at the start of the trial and again after a 4-week follow-up period. The average age was 34.97 years, with a range of 7 to 68 years. Thirty-six (58.1%) were female, while 26 (41.9%) were male. Table 1 shows the gender and age group distributions of the study participants. According to the table, the bulk of participants (46.8%) were between the ages of 20 and 39, with 37.1% between the ages of 40 and 59, and only one participant (1.6%) between the ages of 60 and 80.

Table 1: Age and gender distribution of the study sample

Gender	Frequency	Percentage
Male	26	41.9
Female	36	58.1
Age Group (year)	Frequency	Percentage
<20	9	14.5
20-39	29	46.8
40-59	23	37.1
60-80	1	1.6
Total	62	100.0

Table 2 provides an in-depth look at the distribution of key clinical factors in *H. pylori* patients. The most prevalent symptom was epigastric pain or discomfort, which was reported by 48 (77.4%) of the 62 individuals. In terms of initial diagnostic testing, stool antigen tests were used in 54.8% of the patients. Furthermore, Regimen A and Regimen B were given to the same number of patients (31 in each group). The most prevalent side effect recorded by 17 (27.4%) participants was nausea, followed by diarrhea (10.0%).

Table 2: Clinical characteristics of the study sample

Variables	*n* (%)
Main symptom	
Abdominal pain or discomfort	48 (77.4)
Nausea or vomiting	30 (48.4)
Bloating or belching	28 (45.2)
Heartburn	19 (30.6)
Others: Loss of appetite, Weight loss	6 (9.7)
Initial diagnostic test	
Urea Breath Test	28 (45.2)
Stool antigen	34 (54.8)
Eradication Regimen	
Regimen A	31 (50.0)
Regimen B	31 (50.0)
Side effects	
Nausea	17 (27.4)
Diarrhea	10 (16.1)
Headache	5 (8.1)
Abdominal pain	5 (8.1)
Vomiting	3 (4.8)
Metallic taste in the mouth	3 (4.8)
Follow-up test	
Urea Breath Test	32 (51.6)
Stool antigen	30 (48.4)
Follow-up test result	
Negative	53 (85.5)
Positive	9 (14.5)
Total	62 (100.0)

In the follow-up test, the majority of patients (85.5%) tested negative, representing the total eradication rate. In contrast, just 14.5% of those who received treatment tested positive. Patients who tested positive for *H. pylori* at the outset of the research were randomly assigned to one of two *H. pylori* eradication regimens. As a result, two equal groups of 31 patients were compared. Table 3 reveals that the regiment A group's mean age is 37.52±13.31 years, while the regiment B group's mean age is 32.42±11.23 years. Participants' ages were comparable in both groups, and the difference in mean age was not statistically significant (p>0.05). The results also showed the gender breakdown of the two groups, with females outnumbering males in both groups. There is no significant difference in gender between the two groups (p>0.05).

Table 3: Age and gender distribution of the two study groups

Groups	Regimen A	Regimen B	*p*-value
Age (year)	mean±SD		
	37.52±13.31	32.42±11.23	0.517*
Gender	*n* (%)	*n* (%)	
Male	11 (35.5)	15 (48.4)	0.303**
Female	20 (64.5)	16 (51.6)	
Total	31 (100.0)	31 (100.0)	

* Independent samples *t*-test is used.

** Chi-square test is used.

Table 4 shows the findings of a clinical parameter comparison of the two regimens (Regimen A and Regimen B). In terms of the initial diagnostic test and the follow-up test, there was no statistically significant difference between the two regimens (p>0.05). Regimen B had a larger percentage of patients reporting side effects than Regimen A (29.1% *vs*. 9.7%, respectively). The difference, however, was not statistically significant (p>0.05). It is worth noting that the two patients who did not finish the treatment due to side effects were both on Regimen B.

Table 4: Comparison of two regimens according to different clinical parameters

Groups	Regimen A	Regimen B	*p*-value
Initial diagnostic test	*n* (%)	*n* (%)	
Urea Breath Test	15(53.6)	13(46.4)	0.610
Stool antigen	16(47.1)	18(52.9)	
Side Effects			
Experienced Side effects	3(9.7)	9(29.1)	0.053
No side effects	28(90.3)	22(70.9)	
Follow-up test			
Urea Breath Test	17(53.1)	15(46.9)	0.611
Stool antigen	14(46.7)	16(53.3)	
Follow-up test result			
Negative	29(93.5)	23(74.2)	0.040
Positive	2(6.5)	8(25.8)	
Symptoms after treatment			
Unchanged	2(6.5)	10 (32.3)	0.015
Improved	7(22.6)	2 (6.2)	
Completely relieved	22(71.0)	19 (61.3)	
Total	31(100.0)	31(100.0)	

The results revealed that Regimen A had a statistically significant (p<0.05) greater rate of effective *H. pylori* eradication than Regimen B. In particular, 93.5% of patients in Regimen A had negative follow-up test results, indicating successful *H. pylori* eradication, but only 74.2% of patients in Regimen B had the same outcome. Finally, there was a statistically significant difference between the two regimens in terms of symptom relief after therapy (p<0.05). Regimen B had a greater number of patients who had no change in symptoms after therapy (32.3%) than Regimen A (6.5%).

DISCUSSION

H. pylori eradication is critical for properly treating gastritis and peptic ulcer disease, as well as preventing stomach cancer. However, antibiotic resistance in *H. pylori* is a considerable barrier, and some patients have difficulty tolerating the treatment. As a result, it is critical to evaluate the success of certain treatment regimens on a regular basis, especially given the possibility of efficacy variances across groups. Creating local reporting on treatment efficacy becomes critical in supporting doctors in selecting the best treatment for a specific group. This is especially important in clinical practice, as treatment failure is a common problem [7,8]. Despite the fact that the vast majority of *H. pylori* infections are asymptomatic [9], the majority of participants in this study experienced symptoms; this is due to the fact that they were recruited from an outpatient clinic and were seeking medical guidance about their issues. There were abdominal pain and nausea in 77.4% and 48.4% of the patients, respectively. This was also discovered in a study by Abbas *et al*., where participants' most prevalent complaints were stomach pain and nausea [10]. In our study sample, the urea breath test and stool antigen test were employed as diagnostic tools as well as for follow-up to establish effective eradication. Both procedures are recommended in clinical practice because they are non-invasive, readily available, and have high sensitivity and specificity (both over 90%). Both are reliable tests for diagnosis and follow-up [11,12]. Despite being the gold standard for diagnosis, upper gastrointestinal endoscopy with biopsy and PCR testing is intrusive, expensive, and requires highly educated people [13]. Since patients were randomly assigned to one of two diagnostic tools, no significant correlation was detected when comparing the regimen A with regimen B in terms of diagnostic tests and follow-up testing. According to the current study, 27.4% of patients suffered negative consequences after *H. pylori* eradication regimens. This is consistent with research conducted in 27 European nations, which discovered that roughly 23% of patients receiving *H. pylori* treatment experienced at least one adverse effect from drugs [14]. In 2021, Hafeez *et al*. showed that 25% of regimen A patients reported side effect symptoms, compared to almost 10% in the present study [15]. This study also discovered that the frequency of adverse effects was higher in regimen B

patients, with marginal significance. Two of regimen B patients quit treatment due to intolerable side effects. This was also observed in a study in which 2.5% of the study population discontinued treatment before completing the intended time [10]. Clarithromycin and metronidazole can both induce gastrointestinal adverse effects, especially when used together. They also produce a metallic taste because they are removed in saliva via diffusion or carrier-mediated transport [16,17]. The optimum *H. pylori* therapy is thought to have a minimum success rate of 90% [12]. In this study, the results showed that the overall *H. pylori* eradication rate was 85.5%, which was somewhat lower than the anticipated aim. The evolution of medication resistance against numerous *H. pylori* treatment regimens is mostly to blame for this drop in efficacy. Several factors contribute to the development of this resistance, including incorrect antibiotic administration, insufficient dosage or duration of treatment, patient noncompliance, and past antibiotic exposure [18,19]. It is worth noting that antibiotics are extensively utilized in our country, even without a prescription. This technique exacerbates the problem of drug resistance by encouraging the misuse and abuse of antibiotics. This overuse not only leads to the development of *H. pylori* resistance but also increases the chance of antibiotic resistance in other bacterial illnesses. Regimen A had greater eradication rates than regimen B in the current investigation, with 93.5% and 74.2% eradication rates, respectively. Azab *et al*. found that levofloxacin-based regimens were better than clarithromycin-based regimens. However, the later trial had lower eradication rates than ours, which is likely due to differences in study design, sample size, and diagnostic methods [20]. The key element contributing to the success of regimen A is the low incidence of levofloxacin resistance, as opposed to the significant levels of clarithromycin resistance reported in regimen B [21-23].

Study limitations

The study has many limitations including small sample size, poor adherence of the patients to the assigned treatment and loss of follow-up after initial investigation and treatment.

Conclusion

Levofloxacin based regimen (regimen A) is more effective than regimen B in eradicating *H-Pylori* infection.

Conflicts of interest

There are no conflicts of interest.

Funding source

The authors did not receive any source of fund.

Data sharing statement

All data are available upon reasonable request to the corresponding author.

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