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Effect of pharmacist counseling on patient medication compliance and *Helicobacter Pylori* eradication among Jordanian outpatients

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ABSTRACT – Background – To examine the impact of pharmacist counseling and follow-up on patient's medication compliance and *Helicobacter Pylori* (*H. pylori*) eradication and evaluate the efficiency of an eradication regimen consisting of Clarithromycin 500 mg, Amoxicillin 1 g, and Lansoprazole 30 mg, twice daily for 14 days. **Methods –** Two hundred patients undergoing endoscopy and positive rapid urease tests were included in the present study. Patients were randomly divided into two groups: an intervention group (n=100) and a control group (n=100). The intervention patients obtained their medications from the hospital pharmacist and received sufficient counseling and follow-up. On the other hand, the control patients received their medications from another hospital pharmacist and went through the routine hospital procedure without good counseling and follow-up. **Results –** The intervention resulted in a statistically significant improvement in outpatient compliance with medication (45.0% vs 27.5%; $P<0.05$) and eradication of *H. pylori* (28.5% vs 42.5%; $P<0.05$) among those patients. **Conclusion –** This study reflects the importance of pharmacist counseling and patient compliance to medication, as the patients who received pharmacist counseling exhibited perfect compliance to medication, which led to the successful eradication of *H. pylori*.

Keywords – *Helicobacter Pylori*; pharmacist counseling; medication compliance.

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INTRODUCTION

Various gastrointestinal diseases like chronic gastritis, peptic ulcer, stomach adenocarcinoma[1], mucosa-associated lymphoid tissue, gastric lymphoma, and non-ulcer dyspepsia were related to *Helicobacter Pylori* (*H. pylori*) bacteria[2]. Furthermore, several studies have shown that various extra-gastrointestinal diseases are associated with *H. pylori* bacteria, like chronic spontaneous urticarial (also known as chronic idiopathic urticaria), ischemic heart disease, rosacea, and asthma[3].

H. pylori bacterial infection has attracted the attention of healthcare professionals and researchers worldwide. In Jordan, the prevalence of this infection is 82%, with a 2% annual increase. Meanwhile, a study reported that an eradication percentage of 61.4% was achieved in Jordan by using the standard triple therapy (Clarithromycin 500 mg, Amoxicillin 1 g, and Lansoprazole 30 mg, two times daily)[4].

Patient compliance with the treatment plan for *H. pylori* infection has a high impact on the failure or success of treatment of the patients who are sensitive to antibiotics and on the later development of antibiotic resistance[5]. An eradication percentage of 96.0% was recorded in the patients who took more than 60.0% of their prescribed medication, compared with an eradication percentage of 69.0% in the patients who took less than 60.0% of their prescribed medication[4].

Pharmacists profoundly influence patients' compliance with medication through the provision of proper counseling. However, counseling ought to be synchronized with the therapy prescribed, as the patients require a comprehensive explanation that covers the rationale behind the treatment and the probable side effects of the drug, which they may encounter during the therapyv[6,7]. The growing prevalence of *H. pylori* was associated with low eradication percentages, which raised the demand for investigating the effect of pharmacist counseling on the patient's compliance with medication and the rate of eradication of *H. pylori*[7,8]. The present study is the first to be implemented in Jordan to improve patient compliance with medication and eradication of *H. pylori* infection[9].

METHODS

Study site

This study was carried out at King Abdullah University Hospital (KAUH) in Ramtha (Irbid, Jordan). It was implemented on outpatients infected with the *H. pylori* bacteria and were visiting the Endoscopy and Gastroenterology Clinic in this hospital.

Study design

This study is a quantitative, controlled, randomized study. The patient's demographic characteristics and health conditions were obtained from their medical records. The outpatients visiting the Endoscopy and Gastroenterology Clinic in KAUH were categorized into a control group and an intervention group. The patients of both groups were prescribed a fourteen-day *H. pylori* treatment regimen. The hospital pharmacists joined an educational program on *H. pylori* infection and treatment. The control group patients did not receive such counseling.

Sample

The sample of this study was all adult outpatients who had an endoscopy and positive rapid urease tests in the Endoscopy and Gastroenterology Clinic in KAUH and were infected with the *H. pylori* bacteria and met the selection criteria.

The selection of sample patients was founded on specific inclusion and exclusion criteria.

The inclusion criteria were what follows:

1. Patient infected with the *H. pylori* bacteria
2. A patient who understands and speaks Arabic, owing to that the sample patients are Jordanians
3. A patient who ranges in age from 20 to 70 years during the data collection period.

The exclusion criteria, however, were the following:

1. Patient hypersensitive to combination therapy component or judged clinically inappropriate for eradication therapy
2. A patient who did not wish to participate in the study
3. A patient having mental and physical disabilities
4. Patient who consumed antibiotics 14 days earlier to have an endoscopy.

Each patient was asked if she/he was interested in participating in this study or not. The patients willing to participate in the study were provided with copies of a Consent Form to sign. Then, every patient who filled and signed the Consent Form was enrolled.

Ethical approval for implementing this study was acquired from the Faculty of Pharmacy Postgraduate Academic Committee (JAPS) in Universiti Teknologi Mara (UiTM). after this approval, the study was implemented and endorsed by KAUH.

Method

The patients who joined this study were organized into a control group and an intervention group of 100, each using the single-blind, parallel randomization method. The patients of both groups were prescribed a fourteen-day treatment plan of 30 mg Lansoprazole, 1 g Amoxicillin, and 500 mg Clarithromycin twice daily.

Patient groups

Patients of the intervention group who took medicine from the hospital pharmacy were provided with uniform counseling about their illness, the importance of the success of the treatment, the necessity of compliance to the treatment plan and medication, and the potential side effects of the involved medicines. Pharmacists provided this counseling in KAUH, who had joined an educational program on *H. pylori* infection and treatment. Furthermore, every intervention group patient was given an information leaflet in Arabic that described the involved medicines and pinpointed the advantage of eradicating *H. pylori* besides an compliance diary chart. Patients of the intervention group were followed up by the main researcher three days after the start of the therapy to give them additional counseling on the importance of compliance to the treatment and to address any questions about the treatment. However, patients of the control group passed through a routine procedure of dispensing the medication by a hospital pharmacist who received no education or training on *H. pylori* infection and treatment.

Assessment of *H. pylori* infection

One month after finishing the treatment, the patients were notified to come to KAUH to deliver stool samples for antigen tests to assess the *H. pylori* infection status and evaluate the success of the treatment.

Assessment of patient's compliance to medication

The patient's medication compliance was evaluated after the *H. pylori* treatment program was completed. The researchers counted the remaining pills with every patient to determine the number of doses that were missed. This step aimed at ensuring the accuracy of pill counting by the patients to ensure that no tablet miscounting occurred. Additionally, the diary charts were taken back from the intervention group patients and compared with the results of pill counting.

Evaluation of the clinical outcomes

The patient's response to the *H. pylori* treatment program was evaluated using a modified version of the Gastrointestinal Symptom Rating Scale (GSRS)[10]. This scale addresses four potential outcomes: severe symptoms, moderate symptoms, mild symptoms, and no symptoms. These outcomes are allotted scores of 1, 2, 3, and 4, respectively. The patients of the two groups were then interviewed on the endoscopy day and a month later to the end of the *H. pylori* treatment by the same person, and forms of the GSRS were filled. The GSRS proved to be a reliable and valid scale for evaluating the pain intensity and tracing the non-pain symptoms. The reliability of the Arabic version of this scale was tested using Reliability Analysis. This analysis uncovered that this scale has a Cronbach's Alpha Coefficient of 0.84, which indicates high instrument reliability.

Statistical analysis

The research data were first coded to protect the privacy of the patients and the confidentiality of those data before their analysis. Afterward, those data were analyzed using version 20 of the Statistical Package for Social Sciences (SPSS) program. The significance level (α) was 0.05. The chi-squared test was employed to compare the groups in values of non-continuous variables. Any differences that proved to be significant in this test were subdued to binary logistic regression analysis to define the

factors that influence patients' compliance to medication and the percentage of *H. pylori* eradication. The paired-sample *t*-test was employed to compare the severities of the dyspeptic symptoms a month later to finish the *H. pylori* treatment plan with their severities by the beginning of the study.

RESULTS

Patients' characteristics

Patients' basic demographic characteristics are summarized in TABLE 1. While the control group included more men (55) than women (45), representation of the three age groups in this group was almost the same, where 33 outpatients belonged to the 20–36 year and 37–52-year age groups and 34 outpatients belonged to the 53–70-year age group. In other respects, almost one-quarter of the control patients (26; 26.0%) were single while the rest (74; 74.0%) were married. Moreover, more control outpatients were non-smokers (54.0%) than smokers (46; 46.0%). Regarding the level of education, TABLE 1 demonstrates that slightly less than half the control outpatients (44; 44.0%) received higher than high school education while the remaining patients received high-school education at best. However, statistical testing disclosed that no statistically significant differences in numbers (P>0.05) existed between the various groups of characteristics under consideration (gender, age, level of education, marital status, and smoking status).

As regards the intervention sample outpatients, it is seen in TABLE 1 that the sample included only very slightly less men (48; 48.0%) than women (52). Representation of the three age groups in this group was almost equal, where 33 intervention outpatients belonged to the 20–36 year and 53–70-year age groups and 34 outpatients belonged to the 37–52-year age group. Furthermore, about one-third of the intervention patients (35; 35.0%) were singles while the other patients (65; 65.0%) were married. Additionally, more outpatients in this group were non-smokers (63) than smokers (37). Regarding level of education, TABLE 1 shows that more than half the intervention outpatients (57; 57.0%) received higher than high school education while the other patients (43; 43.0%) received high-school education at best. However, statistical testing disclosed that no statistically significant differences in numbers (P>0.05) existed between the various groups of characteristics under consideration (gender, age, level of education, marital status, and smoking status). Furthermore, it unveiled that no statistically significant differences in numbers (P>0.05) existed between the control and the intervention group patients in the demographic characteristics under consideration.

TABLE 1. Patients' basic characteristics.

Characteristic	Group		*P*[a]
	Control (n=100)	Intervention (n=100)	
Sex, n (%)			
Male	55 (55.0)	48 (48.0)	0.322[a]
Female	45 (45.0)	52 (52.0)	
Age, n (%)			
20–36	33 (33.0)	33 (33.0)	
37–52	33 (33.0)	34 (34.0)	0.985[a]
53–70	34 (34.0)	33 (33.0)	
Marital status, n (%)			
Single	26 (26.0)	35 (35.0)	0.167[a]
Married	74 (74.0)	65 (65.0)	
Smoking status, n (%)			
Never	54 (54.0)	63 (63.0)	0.196[a]
Smoker	46 (46.0)	37 (37.0)	
Education level, n (%)			
≤ High school	56 (56.0)	57 (57.0)	0.887[a]
> High school	44 (44.0)	34 (34.0)	

[a]Pearson's chi-squared test.

H. pylori status and recovery percentage

TABLE 2 points out that the overall percentage of recovery from *H. pylori* infection that was achieved using the combination therapy (1 g Amoxicillin, 500 mg Clarithromycin, and 30 mg Lansoprazole, twice daily for 14 successive days) was 71% (n=142). Forty-three control outpatients (21.5%) and 15 intervention outpatients (7.5%) had failed to recover from the

TABLE 2. *Helicobacter Pylori (H. pylori)* status and recovery percentage.

H. pylori infection status	Control group (n=100)	Intervention group (n=100)	*P*
Failed *H. pylori* eradication, n (%)	43 (43.0)	15 (15.0)	0.000[a]
Successful *H. pylori* eradication, n (%)	57 (57.0)	85 (85.0)	
Overall successful *H. pylori* eradication			142 (71.0%)

[a]Pearson's chi-squared test.

H. pylori infection (TABLE 2). In other respects, a significantly (*P*=0.000) higher number of intervention group patients (85; 42.5%) than control group patients (57; 28.5%) recovered from *H. pylori*. This finding suggests that the employed combination therapy resulted in significant improvement in recovery from *H. pylori* infection.

Counseling and patients' compliance to medication

The analysis outcomes provided in TABLE 3 indicate that pharmacist counseling improved patient's compliance to medication significantly (*P*=0.000). However, strength of association of compliance with counseling was weak (Phi =0.382). A significant (*P*=0.000) difference in compliance to medication was found between patients who received counseling and those who did not receive it, where the proportions of control group patients with poor compliance and perfect compliance were 22.0% and 27.0%, respectively. In contrast, the corresponding ratios among the intervention group patients were 5.5% and 45.5%, respectively.

TABLE 3. Association of patient's compliance to medication with pharmacist counseling.

Variable	Poor compliance (Score ≤60%)	Perfect compliance (Score ≥90%)	Phi	*P*[a]
Pharmacist counseling, n (%)			0.382	0.000[a]
Yes	11 (5.5)	91 (45.5)		
No	44 (22.0)	54 (27.0)		

[a]Pearson's chi-squared test.

Counseling and recovery percentage

Patients who received pharmacist counseling had a significantly (*P*=0.000) higher percentage of recovery from *H. pylori* infection than those who did not. Outcomes of statistical analysis (TABLE 4) disclose that 87 of the 100 patients who received pharmacist counseling exhibited successful *H. pylori* eradication. This number (87) corresponds to 87.0% of the intervention group patients (n=100) and 43.5% of the overall number of sample patients (n=200). Only 15 of the patients who received pharmacist counseling failed recovery from the *H. pylori* infection. Stated otherwise, about 15.0% of the intervention group patients (43.5% of the overall number of sample outpatients) did not recover from *H. pylori* infection, presumably due to less than due compliance to medication.

TABLE 4. Association of *H. pylori* eradication with pharmacist counseling.

Variable	Failed eradication	Successful eradication	Phi	*P*[a]
Pharmacist counseling, n (%)			0.321	0.000[a]
Yes	15 (7.5)	87 (43.5)		
No	43 (21.5)	55 (27.5)		

[a]Pearson's Chi-squared test.

On the other hand, 55 of the patients who had not received pharmacist counseling recovered from *H. pylori* infection (TABLE 4). Meantime, 43 (21.5%) of the patients who had not received pharmacist counseling have failed to recover from the *H. pylori* infection. The results (TABLE 4) also reveal that strength of association of recovery from *H. pylori* infection with pharmacist counseling is weak (Phi =0.321).

Clinical outcomes

Alongside the stool antigen test, an assessment of dyspeptic symptoms (vomiting, nausea, heartburn, epigastric pain, and wounds (TABLE 5)) was used as a second measure of recovery from *H. pylori* infection for confirmation purpose. Severity of those symptoms in the patients with *H. pylori* infection in the groups were assessed in two periods; before start of the *H. pylori* therapy program and a month next to end of the treatment. In accordance with expectations, scores of severities of individual dyspeptic symptoms were significantly (*P*=0.000) lower a month later to end of the treatment among the successfully treated *H. pylori* patients who received pharmacist counseling than among those who did not (TABLE 5). However, no significant differences in the severity scores of the dyspeptic symptoms in the patients who did not recover from *H. pylori* infection between the two times under study, except for nausea and vomiting, where the numbers of outpatients suffering from them were significantly lower (*P*<0.05) 1 month after the treatment than by the beginning of the study (TABLE 5). Epigastric pain persisted in 99.3% of the successfully treated *H. pylori* patients earlier to start of the treatment program. This percentage dropped to 19% after treatment. On the other hand, epigastric pain existed in 100% of the *H.*

TABLE 5. Assessment of Dyspeptic Symptoms

Dyspeptic symptom	Eradicated *H. pylori* (n=142)			Persistent *H. pylori* (n=58)		
	Time		*P*[a]	Time		*P*
	0	1		0	1	
Epigastric pain			0.000[a]			1.000[a]
Nil	1	115		0	0	
Mild	10	26		1	6	
Moderate	68	1		19	12	
Severe	63	0		38	40	
% with symptom	99.3%	19.0%		100.0%	100.0%	
Heartburn			0.000[a]			0.670[a]
Nil	0	122		10	10	
Mild	7	20		2	8	
Moderate	62	0		9	10	
Severe	73	0		37	30	
% with symptom	100.0%	14.0%		82.8%	82.8%	
Nausea			0.000 [a]			0.013[a]
Nil	9	134		2	19	
Mild	55	8		16	16	
Moderate	70	0		28	13	
Severe	8	0		12	10	
% with symptom	93.7%	5.6%		70.6%	67.2%	
Vomiting			0.000[a]			0.000[a]
Nil	58	142		26	55	
Mild	75	0		21	3	
Moderate	8	0		10	0	
Severe	1	0		1	0	
% with symptom	59.2%	0.0%		55.1%	5.2%	
Wind			0.000[a]			1.000[a]
Nil	10	103		7	7	
Mild	27	37		9	16	
Moderate	75	2		33	15	
Severe	30	0		9	20	
% with symptom	93.0%	27.5%		87.9%	87.9%	

[a]Paired-sample, *t*-test.

pylori patients who did not recover after treatment. 1 month later to treatment, this percentage experienced no change because of endurance of the infection (TABLE 5).

Medication compliance predictors

Binary logistic regression analysis was performed to identify factors which influence patient's compliance by taking the *H. pylori* treatment pills. The regression outputs (TABLE 6) point out that education level, age, gender, smoking status, marital status, and pharmacist counseling were not significant explanatory variables as regards patient's commitment to medication as indicated by the treatment pill count. The results underline that the female patients are less likely to perfectly adhere to medication than the male patients. Moreover, patients in the age group of 37–52 years are more likely to perfectly adhere to medication than patients of the other age groups (TABLE 6). In addition, this study finds that married patients adhere to medication better than the single patients.

Furthermore, the smoker patients adhere less perfectly to medication than the non-smokers ones. Additionally, patients with undergraduate and postgraduate education adhere to medication less perfectly than the patients with elementary, preparatory,

TABLE 6. Predictors of compliance to medication.

Variable	Frequency (n=200)	Poor compliance (n=55; 27.5%)	Perfect compliance (n=145; 72.5%)	Odds ratio and the 95%CI	*P*[a]
Sex					
Male	103 (51.5)	29 (14.5)	74 (37.0)	Reference[(1)]	0.416[a]
Female	97 (48.5)	26 (13.0)	71 (35.5)	1.5 (0.5–2.0)	
Age group					
20–36	66 (33.0)	23 (11.5)	43 (21.5)	Reference[(1)]	0.618[a]
37–52	67 (33.5)	14 (7.0)	53 (26.5)	1.3 (0.8–2.0)	
53–70	67 (33.5)	18 (9.0)	49 (24.5)	1.7 (1.0–2.3)	
Marital status					
Single	61 (30.5)	19 (9.5)	42 (21.0)	Reference[(1)]	0.460[a]
Married	139 (69.5)	36 (18.0)	103 (51.5)	1.5 (1.0–2.0)	
Smoking status					
Never	117 (58.5)	29 (14.5)	88 (44.0)	Reference (1)	0.682[a]
Smoker	83 (41.5)	26 (13.0)	57 (28.5)	0.8 (0.5 – 1.5)	
Education level					
≤ High school	113 (56.5)	33 (16.5)	80 (40.0)	Reference[(1)]	0.861[a]
> High school	87 (43.5)	22 (11.0)	65 (32.5)	1.0 (0.7–1.9)	
Pharmacist counseling					
No	98 (49.0)	44 (22.0)	54 (27.0)	Reference[(1)]	0.225[a]
Yes	102 (51.0)	11 (5.5)	91 (45.5)	1.9 (0.7–2.5)	

[a]Binary logistic regression analysis.

and secondary (i.e., high) school education. However, prevalence of perfect compliance to medication was much lower amongst patients who did not receive pharmacist counseling than the patients who did (TABLE 6).

Recovery percentage predictors

Binary logistic regression analysis was carried out to uncover the factors which influence patient's recovery from *H. pylori* infection. TABLE 7 shows that there exist statistically significant relationships between recovery from *H. pylori* and patient's age and compliance to the medication pills. The patients aged 20–36 years who exhibited perfect compliance to taking the due pills were more likely to recover from *H. pylori* than patients of other ages. However, patient's marital status, gender, education level, smoking status, and pharmacist counseling were not statistically significant explanatory variables with respect to recovery from the *H. pylori* infection.

The analysis results (TABLE 7) also show that the female patients are less likely to have successful *H. pylori* eradication than the male patients. Similarly, patients in the age group of 53–70 years were more likely to recover from *H. pylori* than the patients who ranged in age from 20 years to 36 years. Likewise, married patients had higher chance of recovery from *H. pylori* infection than the single ones. The smoker patients, however, had lower chance for recovery than the non-smoker patients. The same applies to the patients with undergraduate and postgraduate education, who were less likely to recover from infection with *H. pylori* than the patients who have elementary, preparatory, and high school education. But none of these observed differences was statistically significant ($P>0.05$). However, frequency of recovery from infection with *H. pylori* was lower among the patients who did not have pharmacist counseling than among the patients who did (TABLE 7).

DISCUSSION

Findings of the present study demonstrate that there are noteworthy variations in percentages of recovery from *H. pylori* infection after receiving the standard triple therapy, which is a result of many reasons, most important of which is patient's compliance to medication. Recovery from *H. pylori* infection correlated significantly with the patient's compliance to medication, which was proxied in the present

TABLE 7. Predictors of recovery from *H. pylori*.

Variable	Frequency (n=200)	Failed eradication (n=28; 29.0%)	Successful eradication (n=142; 71.0%)	Odds ratio and the 95%CI	*P*[a]
Sex					
Male	103 (51.5)	30 (15.0)	73 (36.5)	Reference[1]	0.482[a]
Female	97 (48.5)	28 (14.0)	69 (34.5)	2.68 (0.17–4.2)	
Age group					
20–36	66 (33.0)	26 (13.0)	40 (20.0)	Reference[1]	
37–52	67 (33.5)	16 (8.0)	51 (25.5)	6.0 (0.66–9.4)	0.030[a]
53–70	67 (33.5)	16 (8.0)	51 (25.5)	10.1 (1.6–15.5)	
Marital status					
Single	61 (30.5)	21 (10.5)	40 (20.0)	Reference[1]	0.922[a]
Married	139 (69.5)	37 (18.5)	102 (51.0)	0.94 (0.15–1.5)	
Smoking status					
Never	117 (58.5)	30 (15.0)	87 (43.5)	Reference[1]	0.437[a]
Smoker	83 (41.5)	28 (14.0)	55 (27.5)	3.1 (0.18-4.5)	
Education level					
≤ High school	113 (56.5)	34 (17.0)	79 (39.5)	Reference[1]	0.820[a]
> High school	87 (43.5)	24 (12.0)	63 (31.5)	1.3 (0.2–2.5)	
Pharmacist counseling					
No	98 (49.0)	43 (21.5)	55 (27.5)	Reference[1]	0.130[a]
Yes	102 (51.0)	15 (7.5)	87 (43.5)	0.04 (0.01–0.1)	
Compliance to pills					
Poor compliance	55 (27.5)	49 (24.5)	6 (3.0)	Reference[1]	0.003[a]
Perfect compliance	145 (72.5)	9 (4.5)	136 (68.0)	3.8 (1.6–5.9)	

[a]Binary logistic regression analysis.

study by count of the pills which each sample outpatient took during the therapy period, where 68.0% of the recovering patients were patients who abided perfectly by the prescribed medication. Only 6.0% of the patients who exhibited poor compliance to the medication recovered from the infection *H. pylori* infection. This finding pinpoints the positive impact of compliance to medication on *H. pylori* eradication. The overall percentage of adhering outpatients reported in this study, which is 72.5%, corresponding to the proportion of patients who consumed more than 60% of the medication, is low. On the other hand, the percentage of the patients with complete compliance by medication was lower in the control group than in the intervention group.

Logistic regression uncovered that patient's compliance to medication is a significant predictor of recovery from *H. pylori* infection. This finding is consistent with findings of study that found significant influence of abiding by medication on eradication of the infection *H. pylori* infection due to that about 93% of the sample patients who adhered perfectly to medication recovered from *H. pylori* infection. In contrast, only 26.1% of the patients with poor compliance recovered from this infection[10]. Another study of *H. pylori*-infected patients found that 96.0% of those patients who consumed 60.0% or more of the medication did actually recover whereas merely 69.0% of those patients who consumed less than 60.0% of medication recovered[11]. Within this context, several studies have reported significant positive effect of compliance to medication on the health outcomes of treatments of various chronic diseases[8,12].

The current study also found significant association between recovery from *H. pylori* infection and pharmacist counseling. Patients who received pharmacist counseling expressed improved compliance to medication and high recovery percentages. Furthermore, a significant drop in *H. pylori* eradication percentages was observed among the patients who had pharmacist counseling. This ensures importance of the pharmacist counseling in achieving an improvement in patient's compliance to treatment and, consequently, the health outcomes. This improvement

in the treatment outcomes can be ascribed to direct positive influence of intervention and follow-up by the pharmacist on awareness of patient of her/his health condition and of the necessity of compliance by the prescribed medications.

The present study finds that pharmacist counseling made the sample *H. pylori* patients more assured and committed to medication by defeating common hurdles to compliance and, thereupon, practicing adequate level of compliance. Moreover, it helped the patient make her/his medication essential part of her/his daily practice. The benefits of this good compliance were noticed after 30 days of the counseling and the follow-up as 43.5% of patients who got counseling did recover from infection. Contrarily, merely 27.5% of patients not receiving counseling did recover. These findings are similar to findings of a number of the previous studies of effect of pharmacist counseling on compliance to medication and the associated health outcomes[13,14].

One of the findings of the present study is that pharmacist counseling is not a significant predictor of patient's compliance to medication and eradication of the *H. pylori* infection. Even with varying pharmaceutical interventions, patients were much motivated and patients of the two groups did, in effect, complete this study. However, a possibility holds that counseling was not consistent all throughout; pharmacists who performed preliminary counseling could have made bias during the counseling. In other respects, the researchers conducted the follow-up by themselves because pharmacists had no adequate time for follow-up. This might have led to researcher's bias. But albeit counseling could not predict patient's compliance by treatment and, in consequence, to recovery of *H. pylori* infection, significantly adequate patient knowledge, which was consequence of counseling, was a significant predictor of compliance to medication and to *H. pylori* eradication. In effect, without pharmacist counseling, the patients could not have developed satisfactory knowledge of the disease and relevant treatment and medicines. Moreover, in Jordan, the clinical pharmacist's role of is, till now, confined to delivering medication with no formal entitlement to providing counseling.

Two of the limitations of this study were the small sample size and length of the study. This study was confined to one healthcare center, KAUH. These limitations may, hence, influence the generalizability of the findings. However, it is worth highlighting that various published studies reported that pharmacist counseling was not significant in predicting a patient's compliance by medication and health outcomes[15-20]. In other respects, this study, which is the first of its sort in Jordan, contributes to leveraging the patient's knowledge of infection with the *H. pylori* bacteria and its treatment.

CONCLUSION

This study underscores the importance of the pharmacist counseling in improving patients' compliance to medication and eradicating the *H. pylori* infection. In addition, the outcomes of this study suggest that pharmacist counseling and follow-up should be practiced in the regular clinical procedures.

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Authors' contribution

Shoiab AA contributed to this study through data collection, statistical analysis, and manuscript writing. Alsarhan A contributed to patients' monitoring and data collection, and compiling. Khashroum AO contributed to manuscript writing, review, and editing. The 3 authors contributed to the research idea formulation and study design and all authors cooperated in organizing the research findings and in presenting and discussing them.

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RESUMO – Contexto – Analisar o impacto do aconselhamento e acompanhamento farmacêutico na adesão medicamentosa do paciente e na erradicação do *Helicobacter Pylori* (*H. pylori*) e avaliar a eficiência de um regime de erradicação composto por Claritromicina 500 mg, Amoxicilina 1 g e Lansoprazol 30 mg, duas vezes ao dia por 14 dias. **Métodos** – Duzentos pacientes submetidos à endoscopia e testes rápidos de urease positivos foram incluídos no presente estudo. Os pacientes foram divididos aleatoriamente em dois grupos: um grupo intervenção (n=100) e um grupo controle (n=100). Os pacientes de intervenção obtiveram seus medicamentos do farmacêutico do hospital e receberam aconselhamento e acompanhamento suficientes. Por outro lado, os pacientes do grupo controle receberam seus medicamentos de outro farmacêutico hospitalar e passaram pelo procedimento hospitalar de rotina sem um bom aconselhamento e acompanhamento. **Resultados –** A intervenção do farmacêutico resultou em melhora estatisticamente significativa na adesão ambulatorial à medicação (45,0% vs 27,5%; *P*<0,05) e na erradicação de *H. pylori* (28,5% vs 42,5%; *P*<0,05) entre esses pacientes. **Conclusão** – Este estudo reflete a importância do aconselhamento farmacêutico e da adesão do paciente à medicação, uma vez que os pacientes que receberam aconselhamento farmacêutico apresentaram perfeita adesão à medicação, o que levou à erradicação bem-sucedida da *H. pylori*.

Palavras-chave – *Helicobacter Pylori*; aconselhamento farmacêutico; adesão à medicação.

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