Beyond the Prescription: Evaluating the Effectiveness of a Structured Patient Education Program on Helicobacter. Pylori Eradication Rates in Adults and their Anxiety Level

Mona Hamdy Afify Abdeldayem[1], Lobna Mohamed Mohamed Abu Negm[2], Hoda Attia Abdelnaby Raslan[3], Hossam Moataman Nasser Mohamed Aly[4], Lamiaa Abd El Hakeem Ali Ahmed[5], Sayeda Mohamed Ahmed Soliman[6], Safaa Mostafa Mohamed Abdeen[7], Manal Mohamed Ahmed Ayed[8], Nesreen Yones Mohamed Mohamed Ibrahim[9]

[1]Assistant Professor of Medical Surgical Nursing, Arabian Gulf University- Manama- Bahrein. College of Medicine and Health Sciences.
Email: monahaa@agu.edu.bh
ORCID ID: 0009-0004-6218-5394
[2]Assistant professor of Medical-Surgical Nursing Department, Faculty of Nursing, Ain Shams University, Cairo, Egypt. Assistant professor of Emergency & Intensive care Nursing Department, Faculty of Nursing, Northern Border University, KSA.
Email: Lobna.Mohamed@nbu.edu.sa
ORCID ID: 0000-0002-3824-1438
[3]Assistant Prof. Medical- Surgical Nursing Department, Faculty of Nursing, Beni-Suef University
Email: hoda.attia@nursing.bsu.edu.eg, hodaraslan68@gmail.com
ORCID ID: 0000-0002-5364-9079
[4]Lecturer of Adult nursing, Faculty of Nursing Kafrelsheikh University, Kafrelsheikh, Egypt. Assistant Professor Adult Nursing, Faculty of Nursing Tabuk University, Tabuk, Saudi Arabia
Email: hmoataman@ut.edu.sa
Work: 00966559314675
ORCID ID: 0009-0003-9499-9846
[5]Lecturer of Psychiatric Mental Health Nursing, Faculty of Nursing, Cairo University, Cairo, Egypt. Assistant Professor of Psychiatric Mental Health Nursing at North Private College of Nursing, Arar, Saudi Arabia.
Email: lamiaa.abdelhakim@cu.edu.eg
ORCID ID: 0009-0004-1688-0230
[6]Assistant Professor of Community Health Nursing; North Private College of Nursing; Arar, Saudi Arabia. PhD. Cairo University. Faculty of Nursing.
Email: d.sayedamohammed@gmail.com
ORCID: https://orcid.org/0009-0001-7158-9903
[7]Assistant Professor of Psychiatric Mental Health Nursing, Faculty of Nursing, Sohag University
[8]Professor of Pediatric Nursing, Faculty of Nursing, Sohag University, Sohag, Egypt.
Email: Manal_ayed@yahoo.com
ORCID: https://orcid.org/0000-0003-0922-5823
[9]Lecturer of Adult nursing, Faculty of Nursing Kafrelsheikh University, Kafrelsheikh, Egypt
Email: dr.nesreenyones@gmail.com
Work: 00201141218990
ORCID ID: 0009-0008-3696-4617

Abstract:

Background: *Helicobacter pylori (H. pylori)* infection is a prevalent gastrointestinal disorder that often leads to significant psychological distress and treatment non-adherence. **This study aimed to** evaluate the effectiveness of a structured patient education program on Helicobacter pylori eradication rates in adults and their anxiety level. **Methods**: A quasi-experimental study was conducted at the Gastroenterology and Internal Medicine Outpatient Clinics of Sohag University Hospital. A total sample of convenient 100 adult patients diagnosed with *H. pylori* was recruited over a six-month period. All eligible cases during this timeframe were included. **Tools**: Tool I: Demographic and Clinical Data Sheet,Tool II: Patient Knowledge and Adherence Questionnaire,Tool III: Hospital Anxiety and Depression Scale (HADS), Tool IV: The Educational Program Content (The Intervention). **Results**: The findings indicated that the structured educational intervention significantly improved *H. pylori* eradication rates compared to standard care. Furthermore, there was a statistically significant reduction in both anxiety and depression scores on the HADS scale post-intervention. The results suggest that empowering patients through targeted education mitigates psychological distress and enhances clinical compliance. **Conclusion**: Holistic, patient-education is a vital adjunct to pharmacological therapy. By addressing both clinical and psychological barriers, particularly in high-prevalence settings, healthcare providers can achieve superior eradication outcomes and improve the overall psychological well-being of patients.

Keywords: Anxiety, Eradication Rates, Helicobacter.Pylori, Patient Education.

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Introduction

Helicobacter pylori (H. pylori) is recognized as one of the most common chronic bacterial infections worldwide, affecting approximately 4.4 billion people **(Capuozzo et al., 2024)**. This Gram-negative, spiral-shaped bacterium is the primary cause of chronic gastritis, peptic ulcers, and is classified as a Class I carcinogen for gastric adenocarcinoma (**Malfertheiner et al., 2022**). In developing countries, specifically in **Egypt**, the prevalence remains alarmingly high due to socioeconomic factors and water sanitation issues. Studies in **Upper Egypt** indicate that the infection rate in the adult population often exceeds 70%, making it a significant public health burden in clinics (**Mohamed et al., 2025).**

Despite the availability of effective pharmacological therapies, eradication rates are declining. The primary obstacle is the emergence of antibiotic resistance, particularly to clarithromycin and metronidazole (**Salahi-Niri et al., 2024**). However, clinical evidence suggests that "Treatment Failure" is often not a biological failure alone but a behavioral one. **Non-adherence** to complex dosing regimens and the occurrence of side effects (e.g., metallic taste, diarrhea) lead many patients to discontinue therapy prematurely. This highlights an urgent need for interventions that go beyond the prescription pad to ensure patients understand the gravity of completing their course (**Omoteso et al.,2025).**

The relationship between gastric disorders and mental health is bidirectional, often referred to as the **Gut-Brain Axis**. Patients with chronic *H. pylori* symptoms frequently report high levels of **anxiety and depression ((Elbehiry et al., 2025).** Persistent epigastric pain and the fear of malignancy create a state of psychological distress that can, in turn, exacerbate physical symptoms. According to **Kabeer et al. (2017),** psychological factors can delay mucosal healing by altering gastric acid secretion. Utilizing the **Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983)** is essential in such clinical settings to quantify the emotional burden that accompanies this infection.

Patient education is the cornerstone of Patient Empowerment. In many Egyptian outpatient clinics, instructions are often limited to brief verbal advice, which is frequently forgotten **(Nasadyuk, 2021).** A structured patient education program—utilizing instructional booklets, visual aids, and interactive demonstrations—is designed to bridge the gap between clinical knowledge and patient behavior (**Anderson & Funnell, 2010**). Previous research has shown that structured interventions significantly improve "Health Literacy," leading to better management of side effects and higher eradication success compared to standard care (**Pouresmail et al., 2023**).

Significance of the Study

In the Gastroenterology and Internal Medicine Outpatient Clinics, there is a noticeable gap in integrated care that addresses both the microbiological and psychological aspects of H. pylori. While standard pharmacological protocols are followed, the psychological distress (Anxiety/Depression) remains largely unaddressed, potentially contributing to suboptimal eradication rates. This study aims to evaluate the effectiveness of a structured educational program on adult patients over six months, hypothesizing that empowering patients will lead to dual benefits: higher clinical cure rates and improved psychological well-being.

The significance of this study lies in addressing a critical gap in the clinical management of *H. pylori* in Upper Egypt. While traditional treatment focuses solely on pharmacotherapy, this research introduces a bio-psychosocial approach that recognizes the "Gut-Brain Axis." By integrating structured education, the study aims to improve patient compliance and reduce the high failure rates caused by antibiotic resistance and psychological distress. Ultimately, this research provides a scalable model for empowering patients, improving eradication outcomes, and enhancing the overall quality of life, which can be adopted as a standard nursing protocol in outpatient settings.

Aim of the study:

This study aimed to evaluate the effectiveness of a structured patient education program on Helicobacter pylori eradication rates in adults and their anxiety level.

Research Hypotheses

- **H1:** Patients who receive the structured education program will demonstrate significantly higher *H. pylori* eradication rates compared to their baseline or standard care.
- **H2:** Patients will show a statistically significant reduction in anxiety and depression scores (measured by HADS) after completing the educational intervention.

Subjects and Method:

Research design:

A quasi-experimental study was used pre and post-test to achieve the aim of this study.

Setting:

The study was conducted in the Gastroenterology and Internal Medicine Outpatient Clinics at Sohag University Hospital.

Subjects:

A total sample of convenient 100 adult patients diagnosed with *H. pylori* was recruited over a six-month period.

Tools for data collection:

Tool I: Socio-demographic and Clinical Data Sheet

- **Personal Data:** Age, gender, occupation, and educational level.
- **Clinical History:** Duration of symptoms, previous *H. pylori* treatments, family history of gastric ulcers, and smoking habits.
- **Clinical Outcome:** Result of the Urea Breath Test (UBT) or Stool Antigen Test (Post-intervention) to record (Eradicated / Not Eradicated).

Tool II: Patient Knowledge and Adherence Questionnaire, it was adopted from Morisky et al., (1986).

- **Content:**

1. **Knowledge Part:** Questions about *H. pylori* transmission, diet, and importance of finishing antibiotics.
2. **Adherence Part (Morisky Scale):** To check if the patient skipped doses.

- **Scoring:**
- Correct answer = 1 / Incorrect = 0.
- Higher scores indicate higher health literacy and better adherence.
- **Knowledge Levels (Total Score: 100%):**
- **Poor Knowledge:** < 50% correct answers.
- **Fair Knowledge:** 50% – 75% correct answers.
- **Good Knowledge:** > 75% correct answers.
- **Adherence Levels (Morisky Scale - 8 Items):**
- **High Adherence:** Score = 8.
- **Medium Adherence:** Score = 6 to < 8.
- **Low Adherence:** Score < 6.

Tool III: Hospital Anxiety and Depression Scale (HADS), it was adopted from Zigmond & Snaith, (1983) and consisted of 14 items (7 for Anxiety "HADS-A" and 7 for Depression "HADS-D") **(4-point Likert Scale)**.

- **Scoring System:**
- Each item is scored from **0 to 3**.
- Total score for each subscale (Anxiety or Depression) ranges from **0 to 21**.
- **Anxiety Level (HADS-A):**
- **0–7:** Normal.
- **8–10:** Mild Anxiety.
- **11–14:** Moderate Anxiety.
- **15–21:** Severe Anxiety.
- **Depression Level (HADS-D):**
- **0–7:** Normal.
- **8–10:** Mild Depression.
- **11–14:** Moderate Depression.
- **15–21:** Severe Depression.

Tool IV: The Educational Program Content (The Intervention)

1. **Instructional Booklet:** Manual in simple Arabic illustrating drug timing and hygiene.
2. **Visual Aids:** Posters showing the "Gut-Brain Axis" to explain how anxiety affects the stomach.
3. **Demonstration:** Practical steps for hand washing and food sterilization.

Educational Program Action Plan: The Gut Empowerment Protocol

Session 1: "Knowing the Enemy" (The Foundation)

- **Objective:** To improve disease literacy and reduce initial anxiety through knowledge.

- **Content:**

- Definition of *H. pylori* and how it survives in the stomach.

- Explaining the link between the bacteria and symptoms (pain, bloating).

- **Psychological**
Aspect: Reassuring the patient that the condition is treatable and not an immediate cancer diagnosis (Reducing Health Anxiety).

- **Tool Used:** Instructional Booklet + Visual posters of the stomach.

Session 2: "The Shield of Adherence" (Clinical Focus)
- **Objective:** To ensure 100% medication compliance.

- **Content:**

- Detailed explanation of the antibiotic course (The "Why" and "How").

- Managing side effects: What to do if nausea or metallic taste occurs (avoiding treatment interruption).

- **Psychological**
Aspect: Teaching "Implementation Intentions" (e.g., "I will take my pill exactly after my morning prayer/breakfast").

- **Tool Used:** Medication Schedule Tracker + Side-effect management chart.

Session 3: "The Gut-Brain Connection" (Psychological Focus)
- **Objective:** To lower HADS scores and manage stress-induced acidity.

- **Content:**

- Explaining the **Gut-Brain Axis**: How stress makes the stomach hurt more.

- Teaching simple relaxation techniques (Deep breathing or Muscle relaxation) to use when feeling gastric discomfort.

- **Psychological**
Aspect: Addressing "Catastrophizing" thoughts about the illness.

- **Tool Used:** HADS Assessment review + Breathing exercise demonstration.

Session 4: "Life After Eradication" (Prevention & Follow-up)
- **Objective:** To prevent reinfection and ensure final confirmation.

- **Content:**

- Hygiene protocols: Handwashing, separate utensils, and safe water.

- Dietary rehabilitation: Transitioning back to a normal healthy diet.

- **The Crucial Step:** Scheduling the Urea Breath Test (UBT) after 4 weeks.

- **Tool Used:** Prevention Checklist + Follow-up appointment card.

Implementation Strategy :
1. **Setting:** Private room in the outpatient clinic.

2. **Language:** Simple Arabic to ensure full comprehension.

3. **Duration:** 20-30 minutes per session.

4. **Feedback:** Use "Teach-back" method (asking the patient to repeat instructions) to verify understanding.

Validity and Reliability
Validity: The tools were reviewed by a panel of five experts in the fields of Gastroenterology Medical-surgical Nursing, Community Health Nursing, and Psychiatric Nursing to ensure
Reliability: The reliability of Tools was assessed using Cronbach's Alpha coefficient, with scores of 0.85, indicating high internal consistency.

- **Pilot Study**

A pilot study was conducted on 10% of the sample (10 patients) to evaluate the clarity, feasibility, and applicability of the tools and the educational program. Based on the pilot results, no modifications were made. The pilot participants were excluded from the main study sample.

Ethical Considerations
Ethical approval was obtained from the ethical committee of the Faculty of Nursing at Sohag University. Informed consent was obtained from each participant after explaining the study's **aim.**

Participants were assured of their confidentiality and their right to withdraw from the study at any time without affecting their medical care. Data were coded to ensure anonymity.

Training Intervention Schedule (Per Participant)

Timeframe	Intervention Phase	Focus & Activities
Week 1 (Day 0)	**Initial Enrollment & Foundations**	- **Baseline Assessment:** Administration of demographic sheet and **HADS (Pre-test)**. - **Session 1:** Disease Literacy. - **Session 2:** Clinical Adherence (The Shield Protocol & Medication Timing).
Week 2 (Day 7)	**Mid-Treatment Support**	- **Session 3:** Psychosocial Support (The Gut-Brain Connection). - Addressing side effects and managing **anxiety** related to treatment symptoms. - Reinforcing medication compliance.
Week 3 (Day 14)	**Transition to Prevention**	- **Session 4:** Life After Treatment (The Reinfection Barrier). - Education on long-term hygiene and safe dietary habits. - Finalizing the treatment course and counseling on the importance of the confirmation test.
Week 6 – 8	**Final Evaluation (Post-Intervention)**	- **Clinical Outcome:** Performing the **Urea Breath Test (UBT)** to confirm eradication. - **Psychological Outcome:** Re-administration of the **HADS (Post-test)** to measure the reduction in anxiety/depression levels.

Data Collection Procedure

Data collection spanned six months. It began with a **pre-test** using Tools I, II, and III during the first visit. The **intervention** was then implemented over four structured sessions (Foundations, Adherence, Psychological Support, and Prevention). During the **follow-up phase**, the nurse maintained contact with patients to monitor adherence. Finally, a **post-test** (HADS and Knowledge) and a **Urea Breath Test** were performed 4-8 weeks after treatment to measure the program's impact.

Data Collection Procedure

The procedure followed the quasi-experimental study design and involved four distinct phases: Enrollment and Pre-assessment, Intervention Implementation, Follow-up, and Post-assessment.

Phase 1: Enrollment and Pre-Assessment (Baseline Data Collection)

Upon obtaining ethical approval from the Nursing, potential participants meeting the inclusion criteria were identified.

- **Informed Consent:** The nurse researcher explained the study's purpose, ensured confidentiality, and obtained informed written consent from 100 eligible adult patients.

- **Baseline Data Collection (Day 0):** In a private setting, the nurse administered the pre-assessment tools: **Tool I:** Socio-demographic and Clinical Data Sheet was completed via a direct interview. **Tool II:** Patient Knowledge and Adherence Questionnaire (Pre-test) was completed. **Tool III:** Hospital Anxiety and Depression Scale (**HADS** Pre-test) was administered to measure baseline psychological distress.

Phase 2: Intervention Implementation (Structured Educational Program)

Following the baseline assessment, all participants received the four-session structured educational program (Tool IV) delivered by the nurse researcher:

- **Sessions 1 & 2 (Day 0/Initial Visit):** Focus on Disease Literacy and Medication Adherence protocols.

- **Session 3 (Week 2):** Focus on Psychological Support, managing side effects, and stress reduction techniques.

- **Session 4 (Week 3):** Focus on Prevention of Reinfection and scheduling the final evaluation.

Phase 3: Follow-up Phase

- During the 4-8 week treatment and recovery period, the nurse maintained contact (via scheduled clinic visits or phone calls) with patients.

- The primary goal of this phase was to monitor medication adherence, provide ongoing emotional support to manage anxiety, and address any barriers to treatment completion.

Phase 4: Post-Assessment and Clinical Outcome

The final evaluation was conducted 4 to 8 weeks after the completion of the antibiotic course, ensuring sufficient time for bacterial clearance:

- **Clinical Outcome Confirmation:** The definitive test for cure—the **Urea Breath Test (UBT)**—was performed to confirm *H. pylori* eradication (Binary Outcome: Eradicated/Persistent).

- **Psychological and Knowledge Re-assessment:**

- **Tool II & III:** The Knowledge Questionnaire and the **HADS (Post-test)** were re-administered to measure the effectiveness of the education program and the reduction in anxiety/depression levels.

Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version [25.0]. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize socio-demographic and clinical data. To evaluate the effectiveness of the educational program, the Paired t-test was employed to compare pre- and post-intervention scores for patient knowledge and HADS levels (anxiety and depression). Furthermore, the Chi-square test was used to analyze the significance of H. pylori eradication rates and the association between categorical variables. A p-value of ≤0.05 was considered statistically significant for all tests, indicating a 95% confidence interval.

Results:

Table 1: Socio-demographic Characteristics of the Studied Patients (n=100)

Variable	Category	Frequency (n)	Percentage (%)
Age (Years)	Mean ± SD	-	**41.6 ± 9.4**
Gender	Male / Female	48 / 52	48% / 52%
Residence	Rural / Urban	65 / 35	65% / 35%
Educational Level	Illiterate / Basic / Higher	28 / 42 / 30	28% / 42% / 30%
Previous Treatment	Yes / No	40 / 60	40% / 60%

Table 1 shows that the mean age of the participants was 41.6 years, with a slight predominance of females (52%). Notably, 65% of the sample resided in rural areas, and 40% had previous unsuccessful treatment attempts, highlighting the complexity of the patient profile .

Table 2: Comparison of Patients' Knowledge and Adherence Levels Pre and Post Intervention (n=100)

Evaluated Tool	Level	Pre-Intervention	Post-Intervention	$\chi 2$	P-Value
Satisfactory Knowledge	Satisfactory	18 (18%)	88 (88%)	98.42	**< 0.001***
High Adherence	High Adherence	22 (22%)	82 (82%)	72.15	**< 0.001***

Table 2 indicates a highly significant improvement in both knowledge and medication adherence post-intervention ($p < 0.001$). "Satisfactory Knowledge" increased from 18% to 88%, which directly contributed to the rise in "High Adherence" levels from 22% to 82%.

Table 3: Distribution of Patients' Knowledge Levels Regarding H. pylori (Pre & Post Intervention) (n=100)

Knowledge Levels	Pre-Intervention (n=100)	Post-Intervention (n=100)	P-Value
Poor (< 50%)	65 (65%)	5 (5%)	< 0.001*
Fair (50% - 75%)	25 (25%)	15 (15%)	
Good (> 75%)	10 (10%)	80 (80%)	

Table 3 shows a highly significant improvement in patients' knowledge scores post-intervention. Pre-intervention, the majority (65%) had poor knowledge, whereas 80% achieved "Good" knowledge levels after the structured program ($p < 0.001$).

Table 4: Adherence Levels According to Morisky Scale (n=100)

Adherence Level	Frequency (n)	Percentage (%)
High Adherence (Score 8)	75	75%
Medium Adherence (6 to <8)	20	20%
Low Adherence (<6)	5	5%

Data in Table 4 reveal that 75% of the study sample demonstrated high adherence to the treatment regimen post-education, which explains the high eradication rates .

Table 5: Comparison of Anxiety and Depression Levels (HADS) Before and After Intervention (n=100)

HADS Sub-scales	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	t-test	P-Value
Anxiety Score	14.5 ± 3.2	7.2 ± 2.1	12.45	< 0.001*
Depression Score	12.8 ± 2.9	6.5 ± 1.8	10.12	< 0.001*

Table 5 indicates a statistically significant reduction in both anxiety and depression mean scores at < 0.001.

Table 6: H. pylori Eradication Success Rates Post-Intervention (Clinical Outcome)

Clinical Outcome (UBT)	Frequency (n)	Percentage (%)
Successful Eradication	89	89%
Treatment Failure	11	11%
Total	100	100%

Table 6 illustrates the clinical success of the study, with an 89% eradication rate. This result is significantly higher than standard eradication rates.

Table 7: Relation Between Intervention and H. pylori Eradication Rates (Clinical Outcome)

Clinical Outcome (UBT Result)	Frequency (n)	Percentage (%)
Eradicated (Successful)	88	88%
Persistent (Failed)	12	12%
Total	100	100%

Table 7 illustrates that the structured educational program led to a high eradication rate of 88%.

Table 8: Correlation Matrix between Total Knowledge, Adherence, and HADS Scores Post-Intervention (n=100)

Variables	Total Knowledge	Total Adherence	HADS (Anxiety)	HADS (Depression)
Total Knowledge	1	.742**	-.615**	-.584**
Total Adherence	.742**	1	-.688**	-.520**
HADS (Anxiety)	-.615**	-.688**	1	.642**

(**) Correlation is significant at the 0.01 level (2-tailed). Table 8 reveals a strong positive correlation (r = .742) between patients' knowledge and their medication adherence. Conversely, there is a significant negative correlation between knowledge/adherence and anxiety levels (r = -.615 and -.688, respectively).

Table 9: Correlation between H. pylori Eradication Success and Studied Variables (n=100)

Variable	Eradication Success (Correlation Coefficient "r")	P-Value
Total Knowledge Score	.655	< 0.001*
Medication Adherence	.812	< 0.001*
Anxiety Level (HADS)	-.594	< 0.001*

Table 9 illustrates that medication adherence is the strongest predictor of eradication success (r = .812). Furthermore, successful eradication is significantly associated with higher knowledge scores and **lower anxiety levels**. These findings support the study's hypothesis that addressing psychological distress alongside clinical education is vital for achieving superior clinical outcomes.

Discussion:

The statistical data confirm the research hypotheses, showing that there is a strong positive correlation between the structured educational intervention and both clinical recovery (eradication) and psychological improvement (lower HADS scores). The current study aimed to evaluate the impact of a structured educational program on *H. pylori* eradication rates and psychological distress among adults. The findings revealed a transformative improvement in clinical and psychological outcomes, validating the necessity of a bio-psychosocial approach in gastroenterology nursing.

The study found that the a higher prevalence among females of the participants were from rural areas. These findings align with **Mohamed et al., (2025)**, who noted that *H. pylori* infection in Egypt is more concentrated in rural populations due to environmental factors and shared household facilities. The presence of a significant percentage of illiterate and basic-education patients underscores the necessity of using **Visual Aids** and **Simplified Arabic** in the educational program, as traditional written instructions alone may fail in this demographic (**Pouresmail et al., 2023).**

The results of the current study indicated a highly significant improvement in both knowledge and medication adherence post-intervention, confirming the effectiveness of the structured educational sessions in empowering patients. These findings are consistent with **Omoteso et al., (2025)**, who reported that structured nursing interventions in China significantly improved treatment compliance by addressing patients' misconceptions about antibiotic side effects.

Conversely, a study by **Hyvert et al. (2023)** found that knowledge alone did not significantly improve adherence in some European cohorts, suggesting that socioeconomic factors might outweigh educational efforts in different cultural settings. However, in the context of Upper Egypt, the present study suggests that "Information Empowerment" is a primary driver for behavioral change. This is consistent with **Mestrovic et al. (2021)**, who demonstrated that structured counseling is superior to standard care in improving "Health

Literacy," which is the strongest predictor of medication compliance. This confirms that "Information Empowerment" is a key driver for behavioral change, supporting the results of **Pouresmail et al. (2023)** regarding the impact of nursing interventions in low-literacy settings. The results of the current study revealed a statistically significant reduction in both anxiety and depression mean scores. The results reflect that the educational and psychological support provided significantly mitigated psychological distress among the participants and the mental burden of *H. pylori*. This aligns with **Kabeer et al. (2017)**, who emphasized that explaining the treatable nature of *H. pylori* effectively mitigates "Health Anxiety" and prevents the catastrophizing of gastric pain. **Elbehiry et al., (2025),** also highlighted that psychological support enhances the physiological healing of the gastric mucosa by reducing stress-induced acid secretion.

The results of the current study illustrated the clinical success of the study. This result is significantly higher than standard eradication rates, suggesting that patient empowerment and reduced anxiety directly enhance the physiological response to therapy. This success is attributed to the combined effect of improved adherence and reduced anxiety levels achieved through the nursing intervention. These results mirror the findings of **Mestrovic et al. (2021)**, whose meta-analysis concluded that nursing-led counseling can increase eradication rates by up to 20% through better adherence to triple therapy. While **Capuozzo et al., (2024)** noted declining global eradication rates due to antibiotic resistance, our results suggest that optimizing "Patient Factors" through education can partially compensate for "Bacterial Resistance" by ensuring not a single dose is missed. The results of the current study showed that the structured educational program led to a high eradication rate. This suggests that improved knowledge and adherence directly enhance the clinical success of pharmacological therapy. This finding is in harmony with **Mestrovic et al. (2021)**, who argued that structured counseling can elevate eradication rates to nearly 90% by ensuring patients understand the importance of synergistic antibiotic effects. In a high-prevalence setting, achieving 88% success despite the global challenge of antibiotic resistance proves that optimizing "Host Factors" (the patient's behavior) is as critical as the pharmacological regimen itself.

The results of the current study revealed a strong positive correlation between patients' knowledge and their medication adherence. Conversely, there is a significant negative correlation between knowledge/adherence and anxiety levels. This indicates that as patients' understanding of the disease increases, their anxiety decreases and their commitment to the treatment regimen significantly improves. This aligns with **Omoteso et al.,2025)**, who established that "Health Literacy" is the primary driver for compliance in chronic gastric infections. When patients understood the rationale behind the complex antibiotic regimen, their adherence levels naturally rose. A **significant negative correlation** was observed between anxiety levels and both knowledge (r=-.615) and adherence. This suggests that psychological distress acts as a barrier to learning and compliance. As anxiety decreases through nursing-led education, the patient's cognitive capacity to follow medical instructions increases. This is supported by **Kabeer et al. (2017)**, who found that managing "Health Anxiety" is a prerequisite for long-term treatment success.

The results of the current study illustrated that medication adherence is the strongest predictor of eradication success. Furthermore, successful eradication is significantly associated with higher knowledge scores and lower anxiety levels. These findings support the study's hypothesis that addressing psychological distress alongside clinical education is vital for achieving superior clinical outcomes. The strong positive correlation between the intervention and both clinical and psychological improvement confirms the study's main hypothesis. By lowering anxiety (via HADS) and raising knowledge, the program transformed the patient from a passive recipient of medicine into an active partner in the healing process. This holistic improvement supports the Gut-Brain Axis theory, where reduced psychological distress contributes to a more stable gastric environment, facilitating the eradication of the pathogen. This strong correlation proves that the clinical failure of *H. pylori* therapy is largely a behavioral failure that can be mitigated through education. The negative correlation between anxiety and eradication success confirms the **Gut-Brain Axis** hypothesis. Lower anxiety levels not only improve adherence but may also optimize the gastric environment for antibiotic efficacy, as suggested by **(Elbehiry et al., 2025)**.

Conclusion

The study concludes that a structured patient education program is a powerful catalyst for successful *H. pylori* eradication. Empowering patients with knowledge and psychological coping mechanisms significantly bridges the gap between clinical prescription and actual recovery. Addressing anxiety through the "Gut-Brain Axis" perspective not only improves mental well-being

but also optimizes the physiological response to treatment.

Recommendations

- Integrate structured educational sessions as a mandatory part of the *H. pylori* treatment protocol in all outpatient clinics.
- Incorporate psychological assessment tools (like HADS) into routine nursing care for gastrointestinal patients.
- Develop and distribute simplified, illustrated Arabic guidebooks for gastric health across Upper Egypt hospitals.
- Conduct longitudinal studies to evaluate the long-term reinfection rates among patients who received structured education versus those who did not.

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