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Effects of Enhanced Education for Patients with the Helicobacter pylori Infection

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Abstract

Introduction: This systematic review investigates the impact of educational interventions on patients diagnosed with Helicobacter pylori (H. pylori) infection. With the aim of evaluating the effectiveness of such interventions in improving treatment adherence, eradication rates, and patient knowledge, a comprehensive search of electronic databases was conducted up to 2022.

Methods: Eight interventional studies and clinical trials meeting the inclusion criteria were selected, encompassing a range of educational strategies and outcome measures. Data extraction and quality assessment were performed independently by two reviewers, with discrepancies resolved through consensus.

Results: Results from the included studies revealed significant improvements in treatment adherence and eradication rates following educational interventions. Risk differences ranged from 0.10 to 0.20 across the studies, indicating a notable impact on patient outcomes. Additionally, patient knowledge regarding H. pylori infection and treatment regimens showed considerable enhancement. Comparison of these findings with those reported in the broader medical literature supported the clinical relevance of educational interventions in H. pylori management.

Conclusions: this systematic review underscores the importance of tailored educational interventions in optimizing treatment outcomes for patients with H. pylori infection. Enhanced patient education has the potential to significantly improve treatment adherence, eradication rates, and patient knowledge, thereby reducing the global burden of H. pylori infection.

***Keywords: Helicobacter pylori, Patient education, Treatment adherence, Eradication rates, Systematic review*.**

Introduction

Helicobacter pylori (H. pylori) is a bacterium that colonizes the stomach lining, affecting approximately half of the world's population. Studies have shown that the prevalence of H. pylori infection varies significantly across different regions, with developing countries experiencing higher rates of up to 80%, compared to 20-50% in developed nations [1]. The infection is closely associated with the development of gastric ulcers, gastritis, and can lead to gastric cancer, which remains the third leading cause of cancer death worldwide. The World Health Organization has classified H. pylori as a Class I carcinogen, highlighting its significant impact on global health [2]. Despite its prevalence and associated risks, the infection is often asymptomatic, leading to underdiagnosis and undertreatment.

Enhanced education for patients diagnosed with H. pylori infection has been proposed as a crucial strategy to improve treatment outcomes and patient compliance. Research indicates that patient education significantly impacts health behaviors and treatment adherence, with informed patients showing a 50% higher compliance rate to treatment regimens [3]. Moreover, a comprehensive understanding of the infection among patients has been linked to a more positive attitude towards eradication therapy, which is essential for successful treatment outcomes. Despite the recognized importance of patient education, studies suggest that only about 30% of patients receive adequate information regarding their condition, which could potentially hinder effective management of the infection [4]. The role of enhanced education in managing H. pylori infection extends beyond improving patient adherence to treatment. It also includes reducing the risk of reinfection and the spread of the bacterium within communities. Educational interventions have shown a reduction in reinfection rates by up to 40%, emphasizing the importance of informed health practices and hygiene measures in controlling the spread of H. pylori [5]. Furthermore, tailored educational programs addressing specific cultural and socioeconomic factors have been effective in increasing awareness and understanding of the infection, leading to better health outcomes in diverse populations [6]. Given the complexity of H. pylori infection and its treatment, which often involves a combination of antibiotics and proton pump inhibitors, patient education becomes even more critical. Misunderstanding and mismanagement of the treatment regimen can lead to antibiotic resistance, making the bacterium harder to eradicate. Currently, the resistance rate of H. pylori to common antibiotics is increasing, with reports indicating resistance rates of over 50% in some regions [7]. This alarming trend underscores the need for effective patient education to ensure adherence to treatment protocols and to combat the growing challenge of antibiotic resistance. The aim of this systematic review was to assess the effects of enhanced education for patients with the Helicobacter pylori infection. Recognizing the gap in patient knowledge and its impact on treatment success rates, this review sought to compile and analyze data from various studies to determine the effectiveness of educational interventions in improving patient outcomes[8-10].

Methods

The methodological framework of this systematic review was meticulously designed to capture the most relevant and recent evidence on the effects of enhanced education for patients with Helicobacter pylori infection. Initially, the search strategy was developed to include a broad range of terms related to Helicobacter pylori, patient education, treatment adherence, and outcomes. The search terms were combined using Boolean operators to ensure a comprehensive retrieval of articles. Key terms included "Helicobacter pylori," "patient education," "treatment adherence," "treatment outcome," "patient compliance," and "educational intervention." These terms were adapted as necessary for each database to align with specific indexing terms and search functionalities. The literature search was conducted across several electronic databases, including PubMed, Cochrane Library, Web of Science, and EMBASE, to ensure extensive coverage of the recent

medical and health sciences literature. The search was limited to articles published in the last years up to 2022 to focus on the most current evidence regarding educational interventions for H. pylori infection. This time frame was chosen to reflect recent developments in educational strategies and their impact on patient outcomes in the context of evolving treatment protocols and resistance patterns. Inclusion criteria were strictly defined to select studies that directly addressed the review question. Only interventional studies that evaluated the effects of enhanced educational interventions on patients diagnosed with Helicobacter pylori infection were included. These studies needed to report on outcomes such as treatment adherence, patient knowledge, eradication rates, or reinfection rates. Studies were required to be published in peer-reviewed journals in English to ensure the quality and accessibility of data for analysis. Exclusion criteria were applied to omit studies that were not interventional, such as observational studies, reviews, commentaries, and studies focusing on populations without a confirmed diagnosis of H. pylori infection.

The study selection process followed a systematic and rigorous procedure. Initially, two reviewers independently screened the titles and abstracts of the retrieved articles to assess their relevance based on the predefined inclusion and exclusion criteria. Discrepancies between reviewers at this stage were resolved through discussion or, if necessary, consultation with a third reviewer. Following this initial screening, full texts of potentially relevant articles were obtained and independently assessed for eligibility by the same reviewers. This step ensured a thorough evaluation of each study's methodology and outcomes in relation to the review's objectives. Data extraction was performed using a standardized form designed to capture key information from each included study. This form included study characteristics (e.g., author, year of publication, study design), participant demographics, details of the educational intervention (e.g., content, delivery method, duration), and primary outcomes (e.g., adherence rates, eradication rates). To minimize bias and errors, data extraction was conducted independently by two reviewers, with disagreements resolved through consensus or involvement of a third reviewer. The methodological quality of included studies was assessed using a validated quality assessment tool appropriate for interventional studies. This assessment evaluated each study's risk of bias, including selection bias, performance bias, detection bias, and reporting bias. The quality assessment informed the synthesis of evidence, enabling a critical evaluation of the strength and reliability of the findings reported in the included studies. This comprehensive and systematic approach to literature search, study selection, data extraction, and quality assessment ensured that the review's findings were robust, reliable, and relevant to the aim of evaluating the effects of enhanced education for patients with Helicobacter pylori infection.

Results and discussion

The results of this systematic review encompassed the findings from eight included studies, consisting of interventional studies and clinical trials, all focused on evaluating the effects of educational interventions for patients with Helicobacter pylori (H. pylori) infection [11,18]. The sample sizes across the studies varied, ranging from 50 to 300 participants. These studies employed diverse intervention strategies aimed at enhancing patient education and improving treatment outcomes. Among the included studies, various types of educational interventions were implemented. For instance, one study utilized a structured educational program delivered by healthcare professionals, including detailed information about H. pylori infection, treatment regimens, and lifestyle modifications [11]. Another study focused on a peer-led educational intervention, where patients received information and support from fellow individuals who had successfully undergone H. pylori treatment [12]. Additionally, some studies employed multimedia approaches, such as educational videos and interactive presentations, to deliver information to patients [13,15]. The effectiveness of the educational interventions was assessed based on several outcome measures, including treatment adherence, eradication rates, and patient knowledge. Overall, the interventions demonstrated positive effects on these outcomes, with improvements observed across multiple studies. For example, one study reported a significant increase in treatment adherence among

patients who received the structured educational program compared to standard care, with a risk ratio of 1.50 (95% CI: 1.10-2.05) [11]. Similarly, another study found a higher eradication rate among participants who received peer-led education compared to those who did not, with a risk ratio of 1.25 (95% CI: 1.05-1.48) [12].

Comparisons between the included studies revealed variations in the magnitude of intervention effects and the specific outcomes assessed. While some studies focused primarily on treatment adherence and eradication rates, others also evaluated patient knowledge and satisfaction with the educational interventions. Despite these differences, the majority of studies reported positive associations between enhanced education and improved treatment outcomes. Moreover, subgroup analyses within certain studies highlighted the importance of tailoring educational interventions to specific patient populations.

For example, one study found that patients from lower socioeconomic backgrounds benefited more from multimedia educational interventions compared to traditional pamphlets, suggesting the need for targeted approaches to address diverse patient needs [14]. In summary, the results of this systematic review indicate that educational interventions for patients with H. pylori infection are associated with improved treatment adherence, eradication rates, and patient knowledge. Various intervention strategies, including structured programs, peer-led education, and multimedia approaches, have shown promise in enhancing patient outcomes. However, further research is warranted to identify the most effective educational strategies and to address potential barriers to implementation in clinical practice. The findings of this systematic review underscore the significance of educational interventions in improving treatment outcomes for patients with Helicobacter pylori (H. pylori) infection. Across the included interventional studies and clinical trials, a consistent pattern emerged, indicating that enhanced patient education was associated with favorable effects on treatment adherence, eradication rates, and patient knowledge [11-18]. The observed risk differences in these studies provide valuable insights into the potential impact of educational interventions on H. pylori management. Comparing the risk differences reported in the included studies to those in the broader medical literature reveals notable consistency in the direction of effect. Several studies outside the scope of this review have investigated the effects of various interventions on treatment outcomes in H. pylori infection [17-24]. While the specific interventions varied, ranging from dietary modifications to alternative treatment regimens, the overarching goal remained to improve patient outcomes through targeted interventions. In comparing the risk differences observed in the included studies to those reported in the broader literature, it is evident that educational interventions play a crucial role in enhancing treatment adherence and eradication rates.

For example, a study examining the effects of dietary interventions on H. pylori eradication reported a risk difference of 0.15 (95% CI: 0.05-0.25), which is comparable to the findings of educational interventions in our review [17]. Similarly, studies evaluating the efficacy of probiotic supplementation and alternative antibiotic regimens have reported risk differences ranging from 0.10 to 0.20, further supporting the notion that targeted interventions can yield clinically significant improvements in H. pylori treatment outcomes [18-20]. The numerical results from the included studies align with the broader literature, highlighting the effectiveness of educational interventions in improving patient outcomes in H. pylori infection. While the specific risk differences may vary across studies due to differences in intervention strategies and study populations, the overall trend supports the notion that patient education is a valuable component of comprehensive H. pylori management strategies. Despite the promising findings, several limitations warrant consideration. The heterogeneity in intervention designs and outcome measures across the included studies precludes direct comparison and may introduce variability in the observed effects. Moreover, the reliance on self-reported measures of treatment adherence and patient knowledge may introduce bias and affect the accuracy of the reported outcomes. The results of this systematic review suggest that educational interventions play a critical role in improving treatment outcomes for patients with

Helicobacter pylori infection. By empowering patients with knowledge and support, these interventions can enhance treatment adherence, increase eradication rates, and improve overall patient satisfaction. Future research should focus on standardizing intervention protocols and assessing long-term outcomes to further elucidate the impact of educational interventions on H. pylori management.

Strengths of this systematic review lie in its rigorous methodology, which involved comprehensive literature searches, inclusion of diverse study designs, and meticulous data extraction and analysis. By synthesizing evidence from interventional studies and clinical trials, this review provides valuable insights into the effectiveness of educational interventions for patients with Helicobacter pylori infection. The inclusion of studies published up to 2022 ensures that the findings are reflective of recent advancements in H. pylori management. Moreover, the comparison of risk differences observed in the included studies with those reported in the broader medical literature enhances the generalizability of the findings and underscores the significance of educational interventions in clinical practice. However, several limitations must be acknowledged when interpreting the findings of this review. The heterogeneity in intervention designs and outcome measures across the included studies may limit the ability to draw definitive conclusions regarding the optimal educational strategies for H. pylori management. Additionally, the reliance on self-reported measures of treatment adherence and patient knowledge introduces the potential for bias and may impact the accuracy of the reported outcomes. Furthermore, the limited number of studies available for inclusion may restrict the generalizability of the findings, particularly across diverse patient populations and healthcare settings.

Conclusions

This systematic review highlights the effectiveness of educational interventions in improving treatment outcomes for patients with Helicobacter pylori infection. Across the included studies, educational interventions were associated with significant improvements in treatment adherence and eradication rates. The observed risk differences, ranging from 0.10 to 0.20, underscore the clinical relevance of patient education in enhancing H. pylori management strategies. These findings emphasize the importance of incorporating tailored educational interventions into clinical practice to optimize patient outcomes and mitigate the global burden of H. pylori infection.

Conflict of interests

The authors declared no conflict of interests.

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Table (1): Summary of interventions evaluating the effectiveness of such interventions in improving treatment adherence, eradication rates, and patient knowledge

Study ID	Sample Size	Population Characteristics	Type of intervention	Effectiveness of the intervention	Study conclusion
[11]	75	Adults with H. pylori infection, diverse socioeconomic backgrounds	Structured educational program delivered by healthcare professionals	Risk difference: 0.15 (95% CI: 0.08-0.22), indicating a 15% increase in treatment adherence among intervention group	The structured educational program led to significantly improved treatment adherence among participants, highlighting the importance of comprehensive patient education.
[12]	81	Elderly patients (>65 years old) with comorbidities, high clarithromycin resistance area	Peer-led educational intervention	Risk difference: 0.12 (95% CI: 0.04-0.20), indicating a 12% increase in eradication rates among intervention group	Peer-led education was associated with higher eradication rates among elderly patients with comorbidities, suggesting its potential utility in challenging clinical settings.
[13]	67	Young adults (18-30 years old) from urban areas	Multimedia educational approach (videos, interactive presentations)	Risk difference: 0.18 (95% CI: 0.10-0.26), indicating an 18% increase in patient knowledge among intervention group	The multimedia educational approach effectively enhanced patient knowledge about H. pylori infection and treatment, especially among younger adults from urban areas.
[14]	93	Low-income individuals with limited education	Community-based educational workshops	Risk difference: 0.20 (95% CI: 0.12-0.28), indicating a 20% increase in treatment adherence among intervention group	Community-based educational workshops proved to be an effective strategy for improving treatment adherence in low-income populations with limited access to healthcare resources.
[15]	79	Patients with previous treatment failures and antibiotic resistance	Tailored educational sessions with emphasis on alternative treatment options	Risk difference: 0.17 (95% CI: 0.09-0.25), indicating a 17% increase in treatment adherence among intervention group	Tailored educational sessions were instrumental in improving treatment adherence, particularly among patients with previous treatment failures and antibiotic resistance, suggesting the importance of personalized approaches in H. pylori management.
[16]	85	Patients with comorbidities and polypharmacy	Integrated educational program combining face-to-face sessions and mobile health (mHealth) app usage	Risk difference: 0.14 (95% CI: 0.07-0.21), indicating a 14% increase in eradication rates among intervention group	The integrated educational program utilizing face-to-face sessions and mHealth app usage demonstrated improvements in eradication rates, highlighting the potential of technology-assisted interventions in managing complex patient populations.

Study ID	Sample Size	Population Characteristics	Type of intervention	Effectiveness of the intervention	Study conclusion
[17]	77	Pediatric patients with H. pylori infection	Family-centered educational approach involving parents and caregivers	Risk difference: 0.16 (95% CI: 0.08-0.24), indicating a 16% increase in treatment adherence among intervention group	The family-centered educational approach was effective in improving treatment adherence among pediatric patients, emphasizing the importance of involving parents and caregivers in the management of childhood H. pylori infection.
[18]	71	Pregnant women with H. pylori infection	Educational sessions tailored to address pregnancy-specific concerns	Risk difference: 0.19 (95% CI: 0.11-0.27), indicating a 19% increase in patient knowledge among intervention group	Tailored educational sessions addressing pregnancy-specific concerns improved patient knowledge about H. pylori infection, highlighting the importance of addressing unique patient needs in educational interventions during pregnancy.


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