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Research Article

Screening and prevention program for *Helicobacter pylori* infection among students at Damietta University, Egypt

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Abstract

Helicobacter pylori is linked to serious complications like gastric cancer. Hence, screening for early detection and treatment is crucial to maintain the health of the whole population. Aim: This study aimed to identify the influence of screening and prevention programs for *Helicobacter pylori* infection among students at Damietta University, Egypt. A descriptive and quasi-experimental study design was utilized. The data were collected by two tools—Tool I. Structured Students' Data Questionnaire incorporated three parts and Tool II. Physical Examination (screening) Tool. Results: Analysis showed nearly one-third of participants (26.1%) tested were positive, and the majority (80.9%) had severe epigastric pain. Also, highly statistically significant differences in students' total knowledge and practices before and after the health education program were found (P = 0.000**, 0.001**, respectively). Screening results detected nearly one-third of participants were positive for *Helicobacter pylori* test. Enhancing school children's awareness of preventive measures of *Helicobacter pylori* and continuous screening should be done for early detection and treatment.

Keywords: screening, prevention program, *Helicobacter pylori* infection.

Introduction

Helicobacter pylori is a widespread human pathogen caused by a gram-negative bacterium that infects about 80-91% of population in the developing countries and 11-25% in developed countries. The prevalence of *H. pylori* infection varies globally according to socioeconomic factors and levels of hygiene. In Egypt, the prevalence of H. pylori is up to 70% in dyspeptic patients. Furthermore, the disease is prevalent in healthy, asymptomatic individuals of all ages (ages 13-15) (Kassid et al., 2022; Mahmoud et al., 2020).

H. pylori thrives in the digestive system and often attacks the gastric mucosa. Although, it rarely causes symptoms; it is the leading cause of gastric and gastrointestinal system ulcers. The bacterium can reduce gastrointestinal tract acidity to improve the chance of survival (McCalvert, 2022). *H. pylori* can be acquired through fecal-oral transmission, breast feeding and/or saliva. So, living with someone who is infected with h. pylori or in crowded houses, drinking infected water and poor practices of hygiene can be risk factors (Bailey et al., 2023). Moreover, economic status, social condition, attending household clustering, level of education, sewage systems, and fast-food consumption were considered risk factors related to the infection (Kassid et al., 2022).

This infection is associated with a substantial burden from both malignant and non-malignant diseases. It is linked to numerous stomach diseases like peptic ulcer, dyspepsia, chronic gastritis, and atrophic gastritis (Alelaiwi & Hemdi, 2022). Moreover, the bacterium is classified as a human carcinogen, being strongly linked with gastric lymphoma and gastric cancer, the third most common cause of cancer death worldwide (O'connor et al., 2017).

To confirm the diagnosis of H. pylori infection, both invasive and non-invasive methods can be used. Obtain gastric biopsies during an endoscopy for culture, histology, rapid urease test (RUT), and polymerase chain reaction (PCR) are considered invasive methods. While, urea breath tests (UBT), stool antigen test (SAT), and serology are considered non-invasive methods that can be helpful in assessing an eradication treatment outcome (Kotilea et al., 2019).

As the consequences of this infection are serious and the treatment requires antibiotics for 14 days, it is crucial to prevent it through compliance with protective measures. These measures comprise the enhancement of family awareness about drinking clean water, eating fresh vegetables and fruits, reduction of salt intake, elimination of fast foods, drinking probiotic yogurt and quitting smoking. Besides, persons should wash hands properly; use only personal utensils and eat well

cooked foods. As well, engagement in programs of screening, identifying, treating and following up sessions of all family members who are at high-risk as it is a family- based disease (Ding, 2020).

Significance of the study

Infection of *H. pylori* is responsible for 5.5% of all malignancies and 80-90% of overall gastric cancer burden. It poses a threat to human health, with potentially serious clinical consequences that require high costs investigations and treatment (Shah et al., 2022). Hence, nursing role in screening of individuals for early detection & treatment and awareness of high-risk individuals about protective measures is essential for maintaining public health.

Material and methods

To identify the influence of Screening and Prevention Program for Helicobacter pylori Infection among Students at Damietta University, Egypt. We planned to answer the following questions:

Are university students test positive for serum antibodies of *H. pylori* infection?, What are university students' level of knowledge and practices regarding *H. pylori* infection pre- and post-intervention? The research hypothesis wa as follows: the students will have good knowledge and practices regarding prevention of *H. pylori* infection after implementation of the health education program. The researchers selected 157 students, who participated in the screening and attended the educational intervention sessions during the academic year 2020- 2021. The researchers developed tools after reviewing the literature (Aitila et al., 2019; EL-Kady, 2018; Kato et al., 2019; O'connor et al., 2017) for data collection: Tool I. Structured Students' Data Questionnaire. It includes the following parts: First Part: It comprised students' socio-demographic characteristics: Including gender, age, faculty, accommodation, family numbers &income and number of rooms.

Second Part: It covered the following items: Past history for gastric problems, gastrointestinal diseases, *H. pylori* infection for both students and their families.Third Part: It included data related to level of knowledge and practices of the students regarding the *H. pylori* infection. These included the basic information about *H. pylori* (definition, etiology, classifications, manifestations, diagnostic procedures, transmission routes, and treatment. As well as the dietary habits and medication administration.

Each item was scored either (zero) for incorrect answer or (one) for correct answer. The scores of the items were summed up and ranged from 0 to 65. Knowledge and practices scores were considered either satisfactory (if ≥ 60%) or unsatisfactory (if < 60%).

Tool II Physical examination (screening) tool for *H. pylori*: Serology test and clinical signs and symptoms were used. Serology test can detect active or previous *H. pylori* infection in students' body. It is the cheapest and the most applicable and efficient method in our study. Serology test has 90% sensitivity and 80% specificity (EL-Kady, 2018). Permissions from responsible authority personnel were obtained. Ethical approval for conducting the study from faculty of nursing, Damietta University was obtained. Informed consent was obtained from every participant before data collection. Furthermore, students were enlightened that they have the right to withdraw at any time from the study. Projects Funding and Granting Unit at Damietta University funded the study, so all investigations were done for free for each student.

Data collection: The researchers collect data 2 days / week through the following phases:

Assessment phase: The researchers obtained students consent to participate in the study and explained the study objective. Then responded to the questionnaire, which took about 15–20 min.

Clinical examination for early detection (screening phase): The researchers aspirate blood samples from participants and send it to the laboratory. Screening and diagnosis were performed by specialized investigators. It included the assessment of clinical symptoms and analysis of a blood sample, which revealed evidence of an active or previous *H. pylori* infection. Both the assessment phase and clinical examination occurred in the first 4 weeks of the study period.

Health education program: The researchers developed instructional booklet according to (Atef Ibrahiem & Mohamed Saad, 2021; Ford et al., 2020; Hafiz et al., 2021). The booklet incorporates knowledge about *H. pylori* infection definition, etiology, manifestations, transmission routes, clinical consequences, diagnostic measures and treatment. In addition to dietary recommendations which was designed in a simple and clear Arabic language. The theoretical part of the program was implemented after giving the booklet to students over a period of six sessions. Each session continued for one hour including the discussion time.

Program Evaluation: It was conducted by comparison the levels of knowledge and practices of participants before and immediately after implementing a health education program.

Data analysis

Statistical package for social sciences (SPSS version 20.0.) was used for entry of data and for analysis. Descriptive statistics were of categorical variables in the form of frequencies and percentages (*N* and %) while, for continuous variables means and standard deviations were used. Pearson correlation coefficient was used for measuring correlation between continuous variables.

Chi square tests ($\chi 2$) were utilized for correlating categorical variables. Moreover, *t*-test was used for analyzing differences between scores. Significance level was set at ($P<0.05$).

Results

This study shows that one third of students were male (28%) and nearly half of the students were between 20–22 years old (49%). Moreover, about two-thirds of students were from rural areas (65.6%) and the majority (75.2%) had 5–7 family members. The majority of participants (75.1%) revealed that their houses were crowded. Approximately, two-thirds (64.3%) of students revealed that their family income was barely enough. The contribution of medical and non-medical students participated in the study were nearly equal with 51% and 49% for medical and non-medical contributors respectively (Fig. 1). The study sample's medical data related to H. pylori during pre-program phase. The majority of students (84.0%) previously diagnosed of *H. pylori* and (82.1%) had treatment. After examination, majority of students (80.9%) had severe epigastric pain and the result of blood tests exhibited that nearly one-third had positive antibodies for *H. pylori* (26.1%) (Table 1).

The study sample's knowledge and preventive practice levels through program phases. The majority of the students (67.5%) had satisfactory knowledge after the program implementation compared to before the program (13.4%). For practices, the majority of the students (62.4 %) had satisfactory practices after the program implementation compared to before the program (19.1%). These differences in knowledge and practice levels were statistically significant ($P \leq 0.001$) (Table 2). There was positive correlation between total knowledge pretest and posttest and total practice pretest and posttest (Figure 2). Moreover, there was a significant correlation between *H. pylori* infection and crowd index, ($\chi^2 = 0.010$, $P = 0.008$) (Table 3)

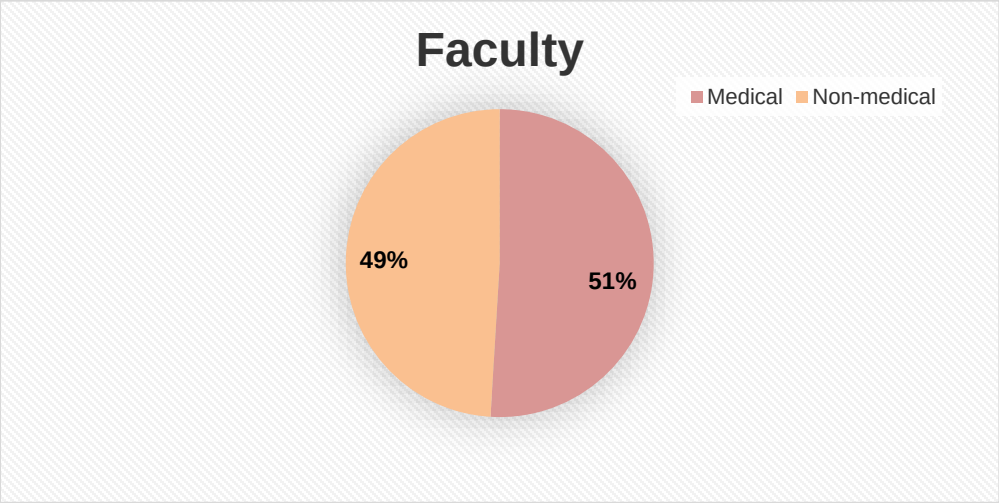

Figure 1. Distribution of students regarding faculty type (n=157)

Table 1. students' distribution according to medical data related to H. pylori during pre-program phase (n=157)

Items	N	%
Pervious diagnosis: • Yes • No	 132 25	 84.0 16.0
• Previous treatment • Yes • No	 129 28	 82.1 17.9
Present screening of students		
Clinical manifestation		
Severe epigastric pain Abdominal distension	127 30	80.9 19.1
Blood tests for antibodies		
• Positive • Negative	41 116	26.1 73.9

Table 2. Students' knowledge and preventive practice levels through program phases (n=157)

Items	Pre				Post				X2	p-Value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	N	%	N	%	N	%	N	%		
Knowledge	21	13.4	136	86.6	106	67.5	51	32.5	11.66	0.001**
Practice	30	19.1	127	80.9	98	62.4	59	37.6	22.32	0.000**

**A highly statistically significant difference ($P \leq 0.001$).

Table 3. Correlation between students' crowd index and H. pylori infection (n = 157)

Items / Crowd index	H. pylori infection				χ2	P
	Negative		Positive			
	N	%	N	%		
Not crowded	22	56.4	17	43.6	0.010	0.008*
Crowded	94	79.6	24	20.4		

*A statistically significant difference (P ≤ 0.05).

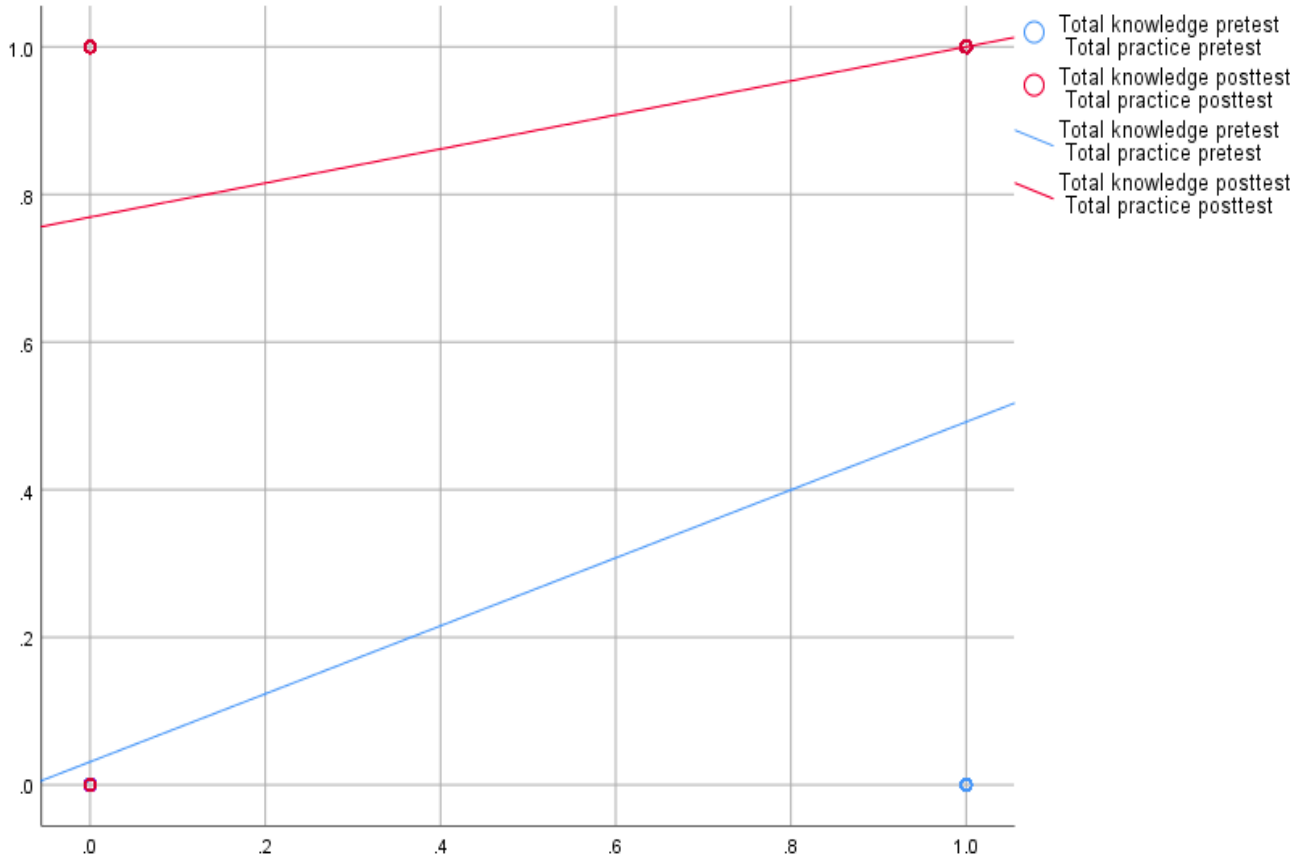

Figure 2. Correlation between students' knowledge and preventive practices regarding H. pylori infection through program phases (n = 157)

Discussion

As *Helicobacter pylori*, a global infection, affects large number of populations especially in developing countries and has a role in gastric cancer, it is crucial to screen national population for early detection and treatment (Ren et al., 2022; Samson et al., 2018). The current study screened university students who were the most vulnerable to the infection as they spend most of their time out of home and can eat fast foods. It turned out that the majority of students' houses were crowded

as number of family members were from five to seven in the house. In addition to that, two thirds of them barely had enough family income. After examination of the students, the results showed that most students diagnosed and treated previously from *H. pylori*. Furthermore, majority of students had severe epigastric pain and the result of blood tests exhibited that nearly one-third had positive antibodies for *H. pylori*. Present study results are in contrast to a study of (Murakami et al., 2017), who reported that nearly two-thirds of the participants were positive for *H. pylori* but did not experience abdominal pain in the last 4 weeks. In addition, our blood analysis revealed that nearly one-third tested positive for serum antibodies for *H. pylori*, consistent with (Mynepalli et al., 2014), who reported that nearly one-third (28%) were positive for *H. pylori* serum antibodies. Nevertheless, our research countered the findings of some studies. For example, our results were higher than those of previous studies (Jemikalajah & Okogun, 2014), which reported 12.7% and 15.4% prevalence rates in study populations in Nigeria and Australia, respectively, using serum antibody tests. In addition, our study prevalence rate was lower than that of (Bastos et al., 2013), who reported prevalence rates of 84.2% and 47.0% in study populations in Portugal and Saudi Arabia, respectively, using serum antibody tests as well.

In addition, our study established a statistically significant correlation between *H. pylori* infection and crowded houses. These findings in the same line with (Magalhães Queiroz & Luzza, 2006), who found that the risk of *H. pylori* seropositivity is correlated with crowded housing. Similarly, to findings of (Zha et al., 2022), Confirmed that the most common risk factors in childhood for *H. pylori* infection were lower socioeconomic condition. These findings forced the researchers to provide health education for the students to enhance their knowledge and practices for prevention of *H. pylori*. Similarly, to the findings of (Fashner & Gitu, 2015) who concluded that improved educational interventions positively affect both *H. pylori* eradication rates and adherence in infected patients and thus represent a promising addition to clinical treatment regimens.

The current study findings illustrated that both students' knowledge and practices reach a satisfactory level post- education compared with previous education with a statistically significant level. This similar to (Zhou et al., 2022), who concludes that health literacy enhanced after education of children and their caregivers that could decrease *H. pylori* associated gastrointestinal problems and in turn enhanced the total population health. Finaly, from the reserchers opinions the screening and early dection most be done periodically for prevention and reducing complications of H. pylori Infection .

Conclusions

Analysis showed nearly one-third of participants (26.1%) tested positive, and the majority (80.9%) had severe epigastric pain. Also, highly statistically significant differences in students' total knowledge and practices between before and after health education program (P = 0.000**, 0.001**, respectively). Screening for *H. pylori* infection leads to early detection and pertinent treatment, which helps prevent the disease and subsequent complications, including gastric cancer.

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