Impact of an Educational Workshop on Improving Pharmacy Students' Knowledge About *Helicobacter pylori* Infection

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ABSTRACT

Aim: There is limited awareness about *H. pylori* in the community, and if improved, better disease control will be produced. This study aims to assess the level of knowledge among undergraduate pharmacy students regarding *H. pylori* diagnosis and management before and after delivering an educational pharmacy intervention.

Methods: This intervention study was initiated in May 2020, where 72 pharmacy students attended a workshop about *H. pylori* management and diagnosis. Students' knowledge about *H. pylori* infection was determined before and after the workshop. The intervention group attended a focused lecture about *H. pylori* combined with a case diagnosis and management simulation session. The control group self-reviewed a pamphlet related to the topic containing general information about *H. pylori*.

Results: Among the participants (n= 72), 58 (80.6%) had not attended a similar workshop previously. The intervention group demonstrated a significant improvement in their median knowledge score, rising from 9.0 (IQR: 8.0–11.0) pre-workshop to 11.0 (IQR: 10.0–12.0) post-workshop (P-value = 0.001). In contrast, the control group showed no significant change, maintaining a median score of 9.0 (IQR: 8.0–11.0) (P-value = 0.324). Additionally, while both groups had similar baseline knowledge scores, the intervention group achieved a significantly higher score after the workshop (P-value = 0.006).

Conclusion: The educational intervention resulted in a significant improvement in pharmacy students' knowledge about H. pylori. These findings underscore the importance of targeted educational activities in enhancing student preparedness for managing H. pylori cases in clinical practice.

Keywords: *H. pylori*; educational intervention; pharmacy student; knowledge; diagnosis.

1. INTRODUCTION

Helicobacter pylori (*H. pylori*) is recognized as a serious global health concern due to its high prevalence and significant epidemiological impact [1]. In Jordan, approximately 88% of the population tested positive for *H. pylori*, indicating a widespread issue [2]. This bacterium is associated with various diseases, including gastric cancer and other inflammatory conditions, underscoring the need for effective strategies to manage its prevalence and related health consequences [3, 4]. Notably, the Jordanian Ministry of Health has reported that gastric cancer ranks as the ninth most diagnosed cancer, comprising about 2.5% of all cancer cases in the country [5].

Several factors can increase the likelihood of *H. pylori* infection and compromise patient health [6, 7]. These include increased gastric acid production, tobacco smoke, and the use of certain pharmaceuticals, which may create

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an environment conducive to *H. pylori* colonization [6, 7]. While there is some association between dietary habits and chronic *H. pylori* infection [8], the role of micronutrient deficiencies remains less clear [9]. Moreover, contaminated water and inadequately sanitized food sources can harbor high concentrations of this bacterium, emphasizing the need for careful assessment of dietary intake [10].

There is a significant public lack of knowledge regarding *H. pylori*, highlighting the need for effective education and awareness campaigns [11, 12]. Pharmacists, as the most accessible healthcare providers, play a crucial role in educating the community about their medical conditions and the management of infections like *H. pylori* [13, 14]. As future pharmacists, students will be ideally placed to fill these knowledge gaps, utilizing the accessibility and affordability of pharmacy services to educate the community about medical conditions [15]. However, pharmacy students often have inadequate knowledge, leaving them with only a basic understanding of *H. pylori* [16].

Addressing this educational deficit is critical not only for enhancing the competencies of pharmacy students but also for ultimately reducing *H. pylori* infection rates in the community [17]. Given their accessibility, pharmacy students as a future pharmacists are ideally situated to educate the public on the risks associated with *H. pylori* and to promote health campaigns aimed at early detection and management [17, 18]. Continuous education for pharmacists and pharmacy students is essential [19-21]; equipping them with the necessary knowledge and skills for effective patient consultation, early referrals, and appropriate management strategies can significantly impact community health outcomes.

Implementing innovative educational strategies, such as targeted workshops and simulation-based learning, may enhance pharmacy students' understanding of *H. pylori* and improve their practical skills in managing related health issues. These initiatives are expected to foster a new generation of pharmacists who are better prepared to address healthcare challenges. In light of these considerations, this study aims to assess the effectiveness of specially designed educational workshops on pharmacy students' knowledge of *H. pylori* diagnosis and management. By evaluating the outcomes of these educational interventions, we hope to contribute valuable insights into improving pharmacy education and public health initiatives related to *H. pylori.*

2. METHODS

2.1 Study design, setting, and study subjects

This study adopted a pre-post interventional design that was conducted in the faculty of pharmacy at Applied Science Private University (ASU) in Amman-Jordan. Data collection took place in May 2020. During the study period, a convenience sample of pharmacy students from the third, fourth, and fifth year was invited to participate in this study to assess the impact of an educational workshop on their knowledge about *H. pylori* infection management and diagnosis. Students were randomized into two groups. A control group representing the students who will receive minimal education about *H. pylori* similar to what they actually receive in the curriculum, by self-reviewing a previously prepared pamphlet containing only general definitions or limited details about diagnosis and treatment. On the other hand, an intervention group was assigned to receive education for *H. pylori* on a different level. The type of education model followed here was not ordinary. Students had a hybrid experience between direct information exchange, the latest updates in diagnosis technologies, and patient case simulation trials to immerse the students' minds and passion into the education session without disconnecting out of boredom or lack of interest and also to form an impression on how to deal with *H. pylori* cases upon practice.

2.2 Sample size calculation

The sample size was calculated based on the results of a previous study that evaluated the impact of a learning

program in improving nurses' skills in the identification and classification of peptic ulcer disease cases [22]. In that study, the pooled standard deviation for the total skill scores for both the intervention and the control group was 1.51. Setting alpha at 0.05, the power of 80%, and using the following equation [23]:

$N= 2\ \sigma^2\ (Z_{Critical} + Z_{power})^2 /D^2$

Where,

σ is the pooled standard deviation for both groups.

Z critical value is equal to 1.96 for the 0.05 significance level.

Z power value is equal to 0.842 for the 80% statistical power.

D is the minimum expected difference between the two means which was set as 1.

Based on the above equation, the minimum required sample size to obtain a significant difference was calculated as 36 subjects per group.

2.3 Ethical considerations

The study protocol was approved by the Ethics Committee at the ASU (Approval number 2020-PHA-10). The study was conducted following the ethical standards outlined in the World Medical Association Declaration of Helsinki guideline [24]. Students were informed that their participation in the study is voluntary and that their responses will be kept confidential and analyzed only as part of a cohort. Written informed consent was obtained from all participants before the interview.

2.4 Questionnaire Development The study questionnaire was based on literature reviews [25-27], and underwent both content and face validation by three researchers with extensive expertise in this field. Content validation ensured that the questionnaire accurately covered all relevant topics related to *H. pylori* knowledge, while face validation confirmed that the questions were clear, relevant, and appropriate for the target population. The survey was divided into two main parts: (i) questions to determine participants' demographic characteristics, and (ii) questions to assess participants' general knowledge about *H. pylori*. For the knowledge questions, pharmacy students were awarded one point for correct answers and zero points for incorrect answers. Finally, a total knowledge scores out of 13 was calculated for each pharmacy student.

2.5 Data collection prior to the training workshop

Students of the third, fourth, and fifth years were invited to an educational workshop held at the faculty of pharmacy, aimed to increase their knowledge about disease signs, symptoms, and diagnosis methods. Online invitations were sent to students via social media websites in which participants had to state their names to be registered as a participant and be informed about the details of participation and the constituents of the workshop.

All 72 registered students were invited to participate in a one-hour simulated training workshop, they were asked to take their seats, where they found pre-workshop data collection forms placed on the front of each seat. The pre-workshop data collection form (required 15 minutes) consisted of 1) a consent form, where students read the objective of the study and then provide their signature as consent to participate in this study, and 2) a section about demographics and answered general questions about *H. pylori*, 3) also, students answered multiple close-ended questions to assess their general knowledge about *H. pylori* diagnosis and management.

Following the baseline data collection, participants were divided into two groups using a randomization table generated using the Social Science for Statistical Package software (SPSS) version 24 (SPSS Inc., Chicago, IL, USA) which resulted in 36 students assigned to the control group and 36 students assigned to the intervention group.

2.6 The education workshop

The control group students received an informative brochure to read about *H. pylori* epidemiology, signs, symptoms, and diagnosis methods, followed by a period for exchanging any questions that the students might have regarding the contents of the brochure. While the intervention group first received a 30-minute detailed

educational workshop that involve a lecture covering *H. pylori* epidemiology, resistance trends, complications, related comorbidities, old and current diagnostic technologies utilized in practice, and pharmacoeconomic assessment of different treatment regimens prescribed. Secondly, simulation training took part on how to distinguish and diagnose *H. pylori* infection which was presented to the students by the main researcher in this study and the simulator.

2.7 Data collection post the simulated training workshop

After the simulation training was completed, all students proceeded to complete the remaining parts of the survey, which required 15 minutes and included a second assessment of their knowledge about *H. pylori* diagnosis and management.

2.8 Statistical analysis

Data were analyzed using the statistical package for social science (SPSS) version 24 (SPSS Inc., Chicago, IL, USA). The descriptive analysis was done using median and interquartile range (IQR) for continuous variables and frequency (percentage) for categorical variables.

When comparing the difference between the two groups (control vs intervention), Mann Whitney U test was used for the continuous variable and chi-square/Fisher Exact tests for the categorical variables. To ascertain whether the educational intervention has an impact on students' knowledge about *H. pylori* diagnosis and management for both the control and intervention groups, the Wilcoxon signed-rank test was performed to assess the difference in the pre- and post-workshop knowledge score for each group. For statistical analysis, all tests were two-tailed and a P-value of less than 0.05 was considered statistically significant.

3. RESULTS

In this study, 72 pharmacy students volunteered to participate, of whom 57 (79.2%) were females and 15 (20.8%) were males. The median age of the students was 22 years (IQR: 21.0–23.0). Most participants were in their fourth year of study (n = 44, 61.1%). Table 1 presents the demographic characteristics of the study sample. When comparing the demographic characteristics of the control and intervention groups, no significant differences were found in age or gender (P > 0.05). However, a significantly higher proportion of students in the intervention group were in the fifth year (20, 55.6%) compared with the control group (4, 11.4%) (P < 0.001.

Table 1. Demographic characteristics of the study participants (n=72)

Parameter	Total study sample n= 72	Control group n= 36	Intervention group n= 36	P-value
Age (years) Median (IQR), [range]	22 (2.0), [20-29]	21 (1.0). [20-29]	22 (2.0), [20-27]	0.103
Gender, n (%) ○ Males ○ Females	15 (20.8) 57 (79.2)	8 (22.2) 28 (77.8)	7 (19.4) 29 (80.6)	0.772
Academic year, n (%) ○ Third year ○ Fourth year ○ Fifth year	4 (5.6) 44 (61.1) 24 (33.3)	0 (0.0) 32 (88.9) 4 (11.1)	4 (11.1) 12 (33.3) 20 (55.6)	<0.001*

Using Chi-square test for categorical variables, and Mann Whitney for continous variable, * significant at significance level of 0.05

In this study, most of the students have heard of *H. pylori* before taking the workshop (n= 66, 91.7%) and the remaining 8.3% (n= 6) of students have never heard of it before. The majority of participants haven't been involved in any similar workshops that discuss *H. pylori* infection (n=58, 80.6%) while the other 19.4% (n=14) took previous workshops about this topic (Figure 1).

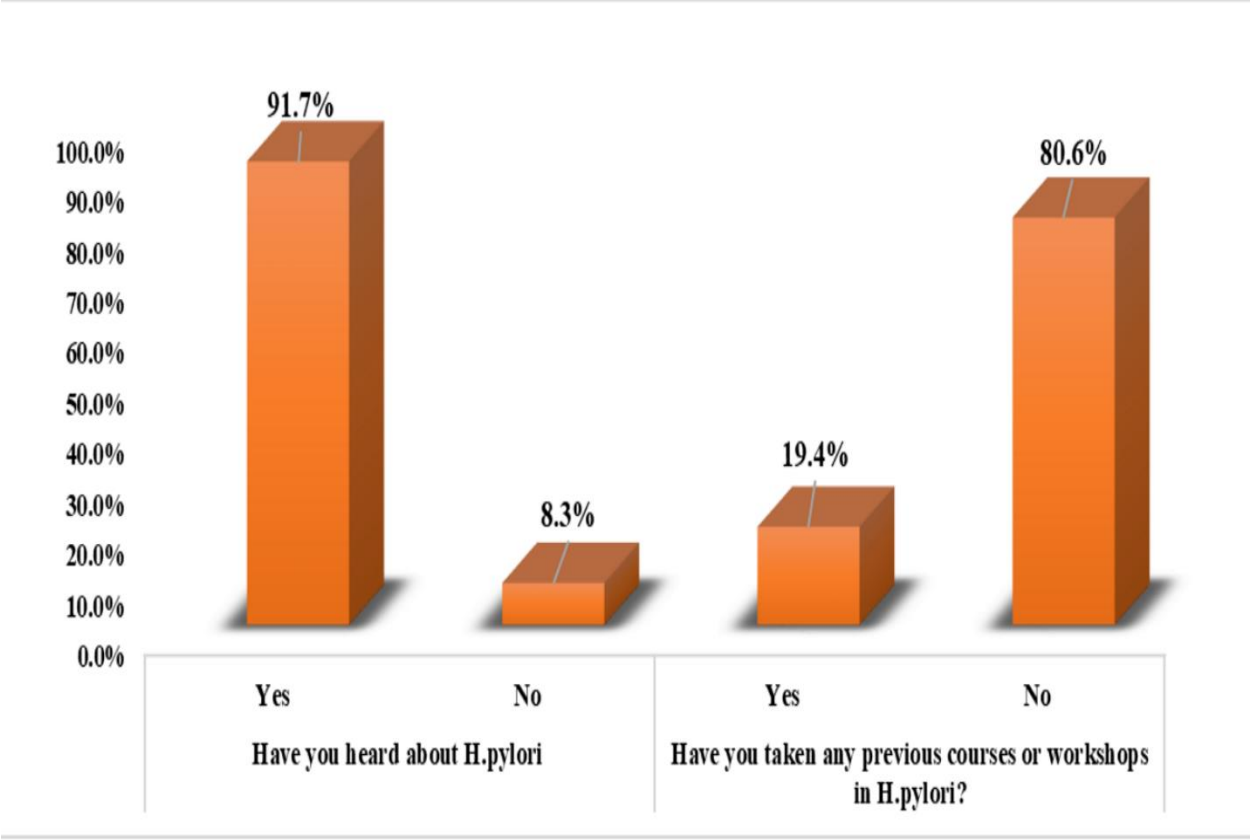

Figure 1. Students' awareness and prior educational exposure to *H. pylori* (n= 72)

After evaluating students' baseline knowledge about *H. pylori* (Table 2), almost half of the students (n=34, 47.2%) realized that the chance of *H. pylori* prevalence increases with time in our community. The majority of students knew that an infection of *H. pylori* can occur at any age (n=64, 88.9%). When asked if there are certain food types associated with getting an infection, 68.1% (n=49) answered correctly and 31.4% (n=23) didn't. When asked about the relationship between *H. pylori* on one hand and good hygienic practice and socioeconomic status on the other hand, 79.2% (n=57) answered correctly. The students were almost equally divided in their answers when asked if *H. pylori* can be contracted via different routes with 48.6% (n=35) agreeing with this statement, and 51.4% (n=37) disagreeing, incorrectly.

Table 2. Assessment of student's baseline knowledge about *H. pylori* (n= 72)

Statement	Correct answer	Number (%) of participants with correct answers			
		Total study sample n= 72	Control group n= 36	Intervention group n= 36	P-value#
Prevalence of *H. pylori* is increasing with time in Jordan	True	34 (47.2)	17 (47.2)	17 (47.2)	1.000
Infection with *H. pylori* can occur at any age	True	64 (88.9)	32 (88.9)	32 (88.9)	1.000
There are certain food types associated with *H. pylori* infection	True	49 (68.1)	24 (66.7)	25 (69.4)	0.800
Good hygiene practice reduces *H. pylori* infection rates	True	57 (79.2)	24 (66.7)	33 (91.7)	0.009*
Socioeconomic status has no association with *H. pylori*	False	57 (79.2)	26 (72.2)	31 (86.1)	0.147
There are different routes of infection for *H. pylori*	True	35 (48.6)	14 (38.9)	21 (58.3)	0.099
There is only one treatment regimen for *H. pylori* infection according to the guidelines	False	56 (77.8)	29 (80.6)	27 (75)	0.571
Therapy plan can last for more than 14 days	True	46 (63.9)	24 (66.7)	22 (61.1)	0.624
Symptoms of infection can include nausea, mucous in stool, reduced appetite, unintentional weight loss	True	66 (91.7)	33 (91.7)	33 (91.7)	1.000
Physicians usually depend on reported symptoms only to prescribe the proper medication	False	46 (63.9)	26 (72.2)	20 (55.6)	0.141
Once the patient is diagnosed and treated, the infection cannot reoccur	False	52 (72.2)	31 (86.1)	21 (58.3)	0.009*
Diagnostic lab tests for *H. pylori* only use stool-based samples	False	44 (61.1)	22 (61.1)	22 (61.1)	1.000
Primary lab tests can be confirmed by other blood-based (serum) tests	True	51 (70.8)	25 (69.4)	26 (72.2)	0.795

Using Chi-square test, * significant at significance level of 0.05

Fifty-six of the students (77.8%) knew that there is more than one treatment regimen for *H. pylori*, and 64.0% (n=46) knew that the treatment regimen can last for more than 14 days. The vast majority of the students recognized some of the possible symptoms of *H. pylori* (n=66, 91.7%). Twenty-six (36.1%) students believed that physicians only depend on reported symptoms from patients to diagnose them, whereas 46 students (63.9%) believed the opposite.

Over two-thirds of the participants knew that once a patient is treated, the infection cannot reoccur and that primary laboratory tests can be confirmed by blood-based (serum) tests (n = 52, 72.2%; n = 51, 70.8%, respectively). Moreover, a substantial proportion of students knew that samples other than stool can be used for screening (n = 44,

61.1%), as shown in Table 2.

Following the educational workshop, the intervention group demonstrated a significant improvement in their understanding of both the prevalence of H. pylori and treatment regimens. Specifically, the proportion of students who acknowledged that the prevalence of H. pylori is increasing over time in Jordan rose from 17 (47.2%) pre-workshop to 32 (88.9%) post-workshop (p-value <0.001). Additionally, students improved their knowledge regarding treatment options, with those recognizing that multiple treatment regimens are available increasing from 27 (75%) to 34 (94.4%) (p-value = 0.039). These results are summarized in Table 3.

Table 3. Comparison between students' correct answers pre-workshop and post-workshop for the intervention group, (n= 36)

Statement	Correct answer	Number (%) of participants with correct answers		P value
		Pre-workshop	Post-workshop	
Prevalence of *H. pylori* is increasing with time in Jordan	True	17 (47.2)	32 (88.9)	<0.001*
Infection with *H. pylori* can occur at any age	True	32 (88.9)	31 (86.1)	1.000
There are certain food types associated with *H.pylori* infection	True	25 (69.4)	31 (86.1)	0.146
Good hygiene practice reduces *H. pylori* infection rates	True	33 (91.7)	36 (100)	NA
Socioeconomic status has no association with *H. pylori*	False	31 (86.1)	26 (72.2)	0.227
There are different routes of infection for *H. pylori*	True	21 (58.3)	30 (83.3)	0.120
There is only one treatment regimen for *H.pylori* infection according to the guidelines	False	27 (75)	34 (94.4)	0.039*
Therapy plan can last for more than 14 days	True	22 (61.1)	22 (61.1)	1.000
Symptoms of infection can include nausea, mucous in stool, reduced appetite, unintentional weight loss	True	33 (91.7)	35 (97.2)	0.625
Physicians usually depend on reported symptoms only to prescribe the proper medication	False	20 (55.6)	24 (66.7)	0.388
Once the patient is diagnosed and treated, the infection cannot reoccur	False	21 (58.3)	23 (63.9)	0.727
Diagnostic lab tests for *H.pylori* only uses stool based samples	False	22 (61.1)	25 (69.4)	0.549
Primary lab tests can be confirmed by other blood based (serum) tests	True	26 (72.2)	27 (75.0)	1.000

* Significant at significance level of 0.05, # using McNemar test, N/A- Not Applicable

When comparing baseline knowledge between the intervention and control groups (Table 4), no significant differences were observed in 11 out of the 13 knowledge statements (P > 0.05). However, a significantly higher proportion of students in the intervention group initially knew that good hygiene practices reduce *H. pylori* infection rates compared with the control group (33, 91.7% vs. 24, 66.7%, respectively; P = 0.009). Conversely, a higher proportion of students in the control group initially recognized that the infection can reoccur even if the patient was previously treated compared with the intervention group (31, 86.1% vs. 21, 58.3%, respectively; P = 0.009).

Table 4. Comparison of the intervention and control groups, concerning their knowledge score, pre and post the intervention

Parameter		Control (n= 36)	Intervention (n= 36)	P-value$
		Median (IQR)	Median (IQR)	
Knowledge score (medina (IQR))	Pre-intervention	9.0 (3.0)	9.0 (3.0)	1.000
	Post-intervention	9.0 (3.0)	11.0 (2.0)	0.006*
P-value#		0.324	0.001	

Using Wilcoxon sign rank test, $ Using Mann Whitney U test, * significant at significance level of 0.05

When comparing the overall knowledge score before and after the workshop for both the control and intervention groups (Table 4), students in the intervention group showed a significant improvement in their median knowledge score from 9.0 (IQR: 8.0–11.0) pre-workshop to 11.0 (IQR: 10.0–12.0) post-workshop (P-value= 0.001). However, there was no significant improvement in the knowledge score of the control group, which had a pre-workshop median knowledge score of 9.0 (IQR: 8.0–11.0) and a post-workshop median score of 9.0 (IQR: 8.0–11.0) (P-value=0.324). When comparing the two groups, there was no significant difference in the median knowledge score prior to the intervention (median = 9.0, IQR: 8.0–11.0 for both groups (P-value= 1.000), while the intervention group showed higher median knowledge score following the workshop compared to the control group (11.0 (IQR: 10.0–12.0) vs 9.0 (IQR: 8.0–11.0), P-value = 0.006).

4. DISCUSSION

There are many studies that addressed the topic of *H. pylori* in areas that focused on new ways to confirm a positive diagnosis or looked deeply into trends of disease spread and prevalence among smaller communities and all the way to a worldwide level[28-30]. However, to our knowledge, this is considered to be one of the first studies assessing undergraduate pharmacy students' knowledge regarding *H. pylori* management and diagnosis specifically before and after receiving an educational workshop.

Putting out more qualified and up-to-par pharmacy students as part of the healthcare provider's team is a goal that every entity in the world aims to achieve. Achieving this goal means better health services for everyone, and this can only be done through the continuous development of educational programs and the ingenuity of ways to deliver knowledge and information to students.

In this study we took the topic of *H. pylori* management and diagnosis; we attempted to utilize it as a model for similar topics to be covered within the curriculum and designed different educational scenarios to assess the impact of such activity and how much difference it can make in the quality of the produced educational outcome for pharmacy students.

Although a small percentage of the students reported

having never heard of this topic before, the majority haven't been involved in any similar workshops that discuss *H. pylori* infection. It is noteworthy that around 58% of participants were knowledgeable about the causative factors of *H. pylori* infection. This percentage is higher than the results of previous study targeting healthcare providers, where only 41.5% of healthcare providers demonstrated knowledge in this area [31]. Student's awareness about food involvement as a consumed carrier for infection was good, as 68% of them were certain about the role of certain food types in association with *H. pylori* infection, which is confirmed in a related study [32]. [31][30][29]Most of the participants knew that *H. pylori* infection can occur at any age (89%) and that it increases with time which supports the results of Hussen et.al [33]. Students in intervention and control groups (72.2%) had realized the association between the chance of developing an infection with *H. pylori* and the socioeconomic status of individuals, which reaffirms the findings of similar studies [34, 35]..

The educational workshop for the intervention group significantly improved knowledge about *H. pylori* management and diagnosis, as evidenced by the increase in overall knowledge scores compared to the control group. This highlights the importance and apparent impact of such activities outside of the traditional educational setting similar to what was reported by several previous studies [36, 37]. The results of this research amplify the importance and need for specially designed, more focused, and reality-simulating educational activities like workshops or other ventures to be utilized and implicated within the high number of courses that students take before graduating.

The results of this study support the proposed hypothesis that implementing well-designed pharmacy education programs on *H. pylori* infection management and diagnosis can positively impact pharmacy students' knowledge. Expanding such educational activities to a broader level and integrating them into multiple courses within the students' curriculum could significantly enhance their ability to address similar issues when they begin professional practice.

Another notable benefit of these programs is their capacity to cover topics that may not have been thoroughly addressed or formally planned by faculty due to time constraints, limited resources, or dense curricula. Such initiatives provide both students and educators with opportunities to broaden their knowledge base, foster creativity, and promote innovative thinking in educational environments where the primary focus is on learning rather than grades.

This study has several limitations that should be acknowledged. First, although participants were randomly assigned to the control and intervention groups, a significant difference in academic year levels was observed between the two groups ($P < 0.001$). This difference may affect the comparability of results, as students in different academic years may have varying levels of prior knowledge and experience related to *H. pylori* management and diagnosis. Also, differences in academic level may still influence students' ability to absorb and apply new information. Future studies should aim to recruit participants from similar academic levels to ensure more valid comparisons. Also, we did not collect detailed demographic information, particularly GPA scores, for both the control and intervention groups, which prevents us from assessing the potential influence of academic performance on the outcomes of the study. Additionally, the impact of the educational intervention was assessed immediately after the workshop, which does not account for long-term retention of knowledge and its application in practice. Longitudinal studies are needed to evaluate the sustainability of the knowledge gained over time. Finally, the sample was drawn from a single faculty, which may limit the generalizability of the findings. Including a more diverse range of participants from multiple faculties could provide a more comprehensive

understanding of pharmacy students' knowledge of *H. pylori*.

Also, future research involving specially designed educational activities needs to be promoted more to extract ideas, innovations, and ways to improve educational experiences and increase our understanding of the current quality of delivered educational programs and what needs to be improved depending on priorities and in a way that goes hand in hand with official regulatory bodies responsible for education on a country level.

In conclusion, this study demonstrates that targeted educational workshops significantly enhance pharmacy students' knowledge of *H. pylori* management and diagnosis. The marked improvement in knowledge scores among the intervention group highlights the effectiveness of incorporating critical health topics into pharmacy curricula. Given the high percentage of students previously unfamiliar with *H. pylori*, the findings highlight the importance of ongoing educational development to prepare future pharmacists for real-world challenges. Future research should focus on the long-term impacts of such interventions to ensure knowledge retention and practical application.

Conflict of interest

The Authors declare that there is no conflict of interest.

Disclosure statement(s)

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أثر ورشة العمل التعليمية على تحسين معرفة طلبة الصيدلة بعدوى بكتيريا الملوية البوابية

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ملخص

الهدف: تُعد المعرفة المحدودة بعدوى بكتيريا الملوية البوابية في المجتمع عاملاً مساهماً في قلة السيطرة على المرض. تهدف هذه الدراسة إلى تقييم مستوى المعرفة لدى طلبة مرحلة البكالوريوس في الصيدلة فيما يخص تشخيص وعلاج عدوى الملوية البوابية، قبل وبعد تنفيذ تدخّل تعليمي صيدلاني.

المنهجية: أُجريت هذه الدراسة التدخلية في شهر أيار/مايو من عام 2020، حيث شارك 72 طالبًا من كلية الصيدلة في ورشة عمل تتعلق بتشخيص وعلاج عدوى الملوية البوابية. تم تقييم معرفة الطلبة حول هذه العدوى قبل وبعد الورشة. تلقى أفراد مجموعة التدخّل محاضرة مركزة عن الملوية البوابية، بالإضافة إلى جلسة محاكاة حول تشخيص الحالة وإدارتها. بينما قامت المجموعة الضابطة بمراجعة كُتيّب يحتوي على معلومات عامة عن الملوية البوابية.

النتائج: بين المشاركين(n = 72) ، أشار 58 منهم (80.6%) إلى أنهم لم يسبق لهم حضور ورشة عمل مماثلة. أظهرت مجموعة التدخّل تحسنًا ملحوظًا في متوسط درجات المعرفة، حيث ارتفع من 9.0 (النطاق الربيعي: 8.0–11.0) قبل الورشة إلى 11.0 (النطاق الربيعي: 10.0–12.0) بعد الورشة (قيمة P = 0.001). في المقابل، لم تُظهر المجموعة الضابطة تغييرًا يُذكر، إذ بقي متوسط الدرجة 9.0 (النطاق الربيعي: 8.0–11.0) قيمة (P = 0.324)، كما أن كلا المجموعتين كانتا تمتلكان مستويات معرفة متقاربة في البداية، إلا أن مجموعة التدخّل سجلت درجات أعلى بشكل ملحوظ بعد الورشة قيمة.(P = 0.006

الاستنتاج: أدّى التدخّل التعليمي إلى تحسّن كبير في معرفة طلبة الصيدلة بعدوى بكتيريا الملوية البوابية. وتُبرز هذه النتائج أهمية الأنشطة التعليمية الموجهة في تعزيز جاهزية الطلبة للتعامل مع حالات عدوى الملوية البوابية ضمن الممارسة السريرية.

الكلمات الدالة: بكتيريا الملوية البوابية؛ تدخّل تعليمي؛ طلبة الصيدلة؛ المعرفة؛ التشخيص.

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