

# A PUBLIC HEALTH PERSPECTIVE ON *HELICOBACTER PYLORI*: PREVALENCE AND RISK BEHAVIORS AMONG UNIVERSITY STUDENTS IN PAKISTAN

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## Abstract

*Helicobacter pylori* is a Gram-negative bacterium that colonizes the gastric mucosa and is strongly associated with chronic gastritis, peptic ulcer disease, and gastric cancer. The World Health Organization classifies *H. pylori* as a Group I carcinogen, affecting nearly half of the global population. This cross-sectional study aimed to assess the prevalence and risk factors of *H. pylori* infection among university students at Shah Abdul Latif University, Khairpur. Using probability-based simple random sampling, 300 hostel students (150 males, 150 females) participated. Data were collected via a structured questionnaire covering demographics, medical history, symptoms, dietary habits, and lifestyle practices. Results indicated that 16% had a family history of peptic ulcer disease, and 21% had a previous *H. pylori* diagnosis. Abdominal pain (68%) and indigestion (47%) were the most common symptoms. Male students exhibited higher risk behaviors, including consumption of unfiltered water, oily and fast foods, unwashed fruits and vegetables, smoking, and alcohol use. The study underscores the need for enhanced hygiene, healthier dietary practices, and awareness programs to reduce *H. pylori* transmission among university students.

## INTRODUCTION

*Helicobacter pylori* is a helical, flagellated, Gram-negative, microaerophilic bacterium that selectively colonizes the human gastric mucosa and can persist for decades if left untreated (Marshall, 2002; Shah et al., 2021). It is among the most successful human pathogens, infecting approximately 4.4 billion individuals worldwide, with nearly 50% of the global population estimated to be seropositive (Öztekın et al., 2021; Shah et al., 2021). Although the prevalence of *H. pylori* infection has declined significantly in developed countries due to improved sanitation, safe drinking water, and enhanced living standards, it remains highly endemic in developing and low-

income regions, particularly in South Asia, including Pakistan.

While the majority of infected individuals remain asymptomatic, persistent colonization by *H. pylori* induces chronic gastric inflammation and contributes significantly to the pathogenesis of several gastrointestinal diseases. The bacterium is a well-established etiological agent of chronic gastritis, peptic ulcer disease, gastric ulcers, and gastric adenocarcinoma. Epidemiological evidence indicates that infected individuals have a 10–20% lifetime risk of developing peptic ulcer disease and a 1–2% risk of distal gastric cancer. As a result, the World Health

Organization (WHO) has classified *H. pylori* as a Group I (definite) carcinogen (Shah et al., 2021).

Transmission of *H. pylori* occurs through both direct and indirect routes. Person-to-person transmission via oral-oral and fecal-oral pathways is considered the predominant mode, especially in overcrowded households. Environmental transmission has also been documented through contaminated water sources, vomitus, feces, gastric regurgitation, and inadequately disinfected upper gastrointestinal endoscopic equipment (Allaker et al., 2002; Leung et al., 1999; Parsonnet et al., 1999; Aljaberi et al., 2023; Jatt et al., 2023; Gambhir et al., 2025). Several risk factors have been consistently associated with *H. pylori* infection, including poor sanitation, unsafe drinking water, overcrowding, low socioeconomic status, large family size, frequent consumption of spicy or heavily seasoned foods, tobacco use (smoking or snuff), and close contact with infected individuals (Ullah et al., 2023).

Pakistan bears a substantial burden of *H. pylori* infection due to widespread socioeconomic and environmental challenges. Numerous studies conducted across different regions of the country have reported prevalence rates exceeding 60%, particularly among dyspeptic patients. Ali et al. (2009) highlighted the high prevalence of gastrointestinal infections in Pakistan and emphasized the role of unsafe water and poor hygiene practices. A large hospital-based study from Karachi reported *H. pylori* positivity in approximately 65% of dyspeptic patients, with strong associations observed with low socioeconomic status, consumption of unhygienic food, and smoking (Humayun et al., 2016). Furthermore, the detection of *H. pylori* DNA in municipal drinking water in Karachi provides compelling evidence of waterborne transmission (Kausar et al., 2012).

Within Sindh province, limited but emerging evidence suggests similarly high infection rates. Studies conducted in interior Sindh have demonstrated a strong association between *H. pylori* infection and dietary habits, particularly frequent consumption of spicy and oily foods. A cross-sectional study from district Khairpur reported a seroprevalence exceeding 66% among individuals consuming spicy foods, highlighting dietary practices

as a significant local risk factor (Shar et al., 2022). Although data specific to Sukkur and surrounding regions remain scarce, available reports indicate poor sanitation infrastructure, reliance on unfiltered drinking water, and limited awareness of hygiene practices, all of which may contribute to sustained transmission, particularly among young adults.

University students constitute a unique high-risk population due to shared living environments, hostel accommodation, irregular eating habits, increased consumption of fast and street-vended foods, and limited attention to food hygiene. Despite these vulnerabilities, epidemiological data on *H. pylori* infection among university students in Sindh especially in Sukkur and Khairpur are limited. Understanding region-specific risk factors is therefore essential for designing targeted awareness campaigns and preventive interventions. Accordingly, the present study aims to assess the prevalence and associated risk factors of *H. pylori* infection among university students at Shah Abdul Latif University, Khairpur, with particular emphasis on dietary habits, hygiene practices, and lifestyle-related behaviors.

## METHODOLOGY

### Study Design

A cross-sectional study was conducted, following the methodology described by Bhayo et al. (2025), to systematically assess the prevalence and risk factors of *Helicobacter pylori* infection among university students.

### Sampling Area

The study was conducted in selected male and female hostels of Shah Abdul Latif University, Khairpur. The sampling sites included Bhattai Boys Hostel, Sachal Boys Hostel, and GM Boys Hostel for male students, as well as Noori Girls Hostel, Benazir Girls Hostel, and Fatima Girls Hostel for female students. These hostels were chosen to ensure adequate representation of both genders and diverse living conditions within the university residential environment.

## Sample Size and Sampling

A non-probability purposive sampling technique was employed to recruit 300 confirmed patients (150 male & 150 female), following the protocol described by Bhatti et al. (2026).

## Data Collection

Data collection was conducted using a standardized, structured questionnaire consisting of 21 items, adapted from previously published studies (Chen et al., 2023; Shaikh et al., 2024; Soomro et al., 2025).

The questionnaire was organized into five sections: (i) personal information, including age, gender, and year of study; (ii) clinical symptoms and medical history, such as abdominal pain, indigestion, and diarrhea; (iii) lifestyle-related factors, including consumption of oily foods, unwashed vegetables, and unfiltered drinking water; (iv) hygiene practices and living conditions, including sharing of utensils, handwashing practices, and living in overcrowded rooms; and (v) additional behavioral factors, including smoking and alcohol consumption.

## RESULTS

A total of 300 students from Shah Abdul Latif University, Khairpur, participated in the study, including 150 male and 150 female students. Participants were enrolled across undergraduate programs, ranging from BS I to BS IV.

### Demographic Characteristics

Demographic analysis showed that 64% of students were aged 21–25 years, 22% were between 16–20 years, and 14% were ≤15 years of age. Regarding residence, 33% of students belonged to urban areas, while a majority (66%) resided in rural regions.

### Clinical Symptoms

As shown in Figure 1, students reported a variety of gastrointestinal symptoms. The most frequently reported symptom was abdominal pain (68%),

followed by indigestion (47%), gastric discomfort/bloating (40%), unexplained weight loss (26%), and diarrhea (23%). A smaller proportion reported black stools (12%), while 2% reported other symptoms (Figure 1).

### Medical and Family History

Among the participants, 16% reported a family history of stomach ulcers. Additionally, 21% had previously been diagnosed with *Helicobacter pylori*, and 4% had undergone endoscopic examination.

### Dietary Habits and Lifestyle Factors

Regarding dietary practices, 97% of students reported consuming spicy or oily food; among them, 26% consumed such foods rarely, while others consumed them weekly or daily. Consumption of undercooked meat or seafood was reported regularly by 16% of students, 21% reported rare consumption, and the remaining students reported never consuming undercooked foods. Lifestyle-related risk factors showed that 14% of students were smokers, while 4% reported alcohol consumption.

### Gender-wise Risk Factors

Table 1 presents a comparison of dietary, hygiene, and lifestyle habits between male and female students. Male students showed a higher prevalence of high-risk behaviors, including consumption of roadside food, unwashed fruits and vegetables, untreated water intake, sharing utensils, poor hand hygiene, smoking, and alcohol consumption. Female students demonstrated comparatively better hygiene and dietary practices. Table 1 indicates that male students were more likely to engage in unhygienic food practices and risky behaviors, suggesting a higher potential risk for *H. pylori* transmission compared to female students.

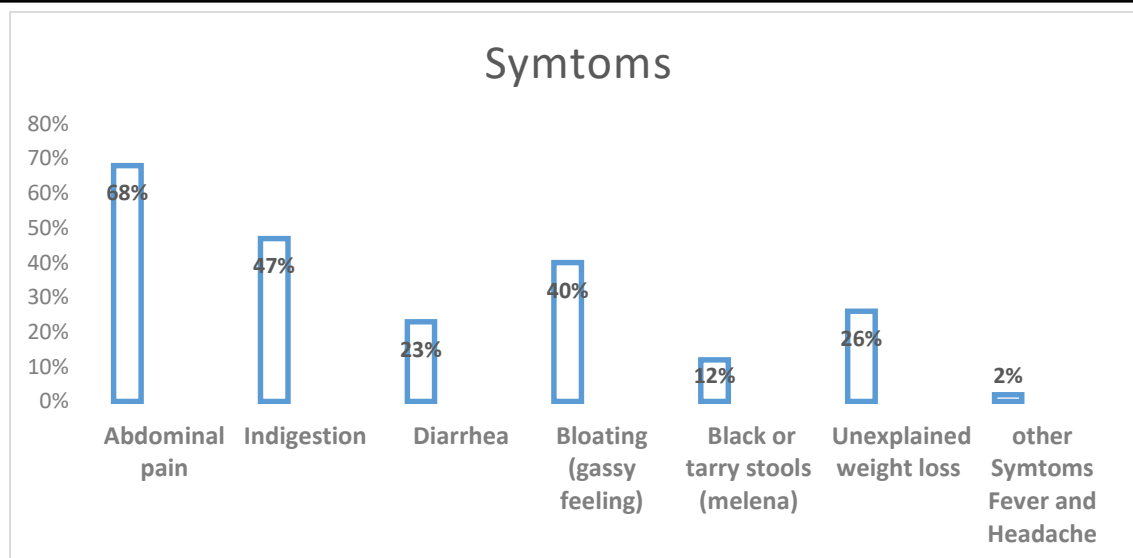


Figure1. Sign and symptoms reported by participants

Table 01 Prevalence (%) of risk factors.

| Habits                                                | Female (%) | Male (%) |
|-------------------------------------------------------|------------|----------|
| Eat oily food                                         | 43         | 49       |
| Eat undercooked meat                                  | 28         | 17       |
| Consume Unwashed vegetables or fruits                 | 20         | 33       |
| Eat at roadside stalls                                | 29         | 47       |
| Eat outside your home (Daily and 3 to 5 times a week) | 18         | 38       |
| Share utensils                                        | 27         | 42       |
| Do not wash hands with soap before a meal             | 02         | 29       |
| Live in a crowded room (More than one person)         | 23         | 37       |
| Untreated water consumption                           | 32         | 44       |
| Smoking                                               | 02         | 12       |
| Alcohol consumes                                      | 00         | 04       |

## DISCUSSION

The present cross-sectional study evaluated demographic characteristics, clinical symptoms, dietary habits, hygiene practices, and lifestyle factors associated with *Helicobacter pylori* risk among hostel-residing students of Shah Abdul Latif University, Khairpur. The findings reveal a considerable prevalence of gastrointestinal symptoms and multiple behavioral risk factors that may contribute to the transmission and persistence of *H. pylori* in a university residential environment.

A high proportion of participants reported gastrointestinal complaints, with abdominal pain (68%) being the most common symptom, followed by indigestion and bloating. These findings are consistent with previous reports indicating that *H. pylori* infection is frequently associated with chronic gastritis, dyspepsia, and epigastric discomfort (Kusters et al., 2006; Suzuki & Mori, 2018). Although only 21% of students had a confirmed diagnosis of *H. pylori*, the high burden of symptoms suggests a likelihood of undiagnosed infection, which is common in developing countries due to

limited access to diagnostic facilities and low health-seeking behavior among young adults (Eusebi et al., 2014).

Dietary practices observed in this study may play a significant role in increasing infection risk. The majority of students reported frequent consumption of spicy or oily foods, roadside food, and undercooked meat, all of which have been linked to gastric mucosal irritation and increased vulnerability to infection (Brown, 2000). Moreover, the consumption of unwashed fruits and vegetables and untreated water reported by many participants supports the role of fecal-oral and oral-oral transmission routes, particularly in settings with compromised sanitation (Bui et al., 2016). These findings are in agreement with studies from other low- and middle-income countries where poor food hygiene and unsafe water sources are major contributors to *H. pylori* prevalence (Kayode et al., 2019).

Gender-wise analysis demonstrated that male students were more likely to engage in high-risk behaviors, including consumption of roadside food, sharing utensils, inadequate hand hygiene, smoking, and alcohol consumption. Similar gender-based differences have been reported in previous studies, which suggest that males may have greater exposure to behavioral and lifestyle risk factors that facilitate *H. pylori* transmission (Eusebi et al., 2014; Kayode et al., 2019). Overcrowded living conditions in hostels further amplify the risk of person-to-person transmission through shared facilities and close contact.

The study also identified a family history of stomach ulcers in a subset of participants, supporting existing evidence that intrafamilial transmission and shared environmental exposures contribute to *H. pylori* persistence (Brown, 2000). The low proportion of students undergoing endoscopy highlights the need for accessible, non-invasive screening methods and awareness programs within university settings.

Overall, the findings emphasize the importance of targeted health education, improved food hygiene practices, safe drinking water, and routine screening programs to reduce *H. pylori* transmission among university students. Addressing these modifiable risk factors may significantly reduce long-term

complications such as peptic ulcer disease and gastric cancer.

## CONCLUSION

This study demonstrates a high prevalence of gastrointestinal symptoms and multiple modifiable risk factors associated with *Helicobacter pylori* among hostel-residing students at Shah Abdul Latif University, Khairpur. Frequent abdominal pain and dyspeptic symptoms indicate possible underdiagnosis of infection in this young population. Common risk factors included unhygienic dietary practices, consumption of roadside and undercooked food, untreated water intake, and poor hand hygiene. Male students showed greater involvement in high-risk behaviors, including sharing utensils, smoking, and alcohol consumption, suggesting increased susceptibility. Overcrowded hostel living conditions may further facilitate transmission. The findings emphasize the importance of health education, improved food hygiene, safe water provision, and routine screening programs in university hostels to reduce *H. pylori* transmission and prevent long-term gastrointestinal complications.

## RECOMMENDATION

Based on the study findings, it is recommended that universities implement regular health education and awareness programs focusing on *Helicobacter pylori* transmission, food hygiene, and safe water consumption. Hostel administrations should ensure access to clean drinking water, proper sanitation facilities, and regular inspection of hostel kitchens and nearby food vendors. Students should be encouraged to practice good personal hygiene, including handwashing with soap before meals and avoiding the sharing of utensils. Periodic screening using non-invasive diagnostic methods should be introduced, particularly for symptomatic students. Additionally, counseling on healthy dietary habits and lifestyle modification, including smoking cessation, may help reduce infection risk and prevent long-term gastrointestinal complications.

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