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Original Research Article

PREVALENCE AND RISK FACTORS OF *HELICOBACTER PYLORI* INFECTION AMONG INDIVIDUALS WITH TOBACCO CONSUMPTION HABITS IN DISTRICT PESHAWAR: A CROSS-SECTIONAL STUDY

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Abstract *This cross-sectional study aimed to determine the prevalence of Helicobacter pylori infection and its association with tobacco consumption (smoking and snuff use) in Peshawar, Pakistan. 150 blood samples were collected from H. pylori suspected patients in tertiary care hospitals. Demographic data, tobacco consumption habits, and potential risk factors were gathered through a questionnaire. The prevalence of H. pylori among smokers and snuff users was 42%. All participants had a history of tobacco use, with 59% being smokers and 41% being snuff users. Most participants (81%) had not been tested for H. pylori before. Eight risk factors associated with H. pylori infection were investigated, including family history, stomach ulcers or gastritis, consumption of spicy or heavily seasoned food, poor hygiene practices, low socioeconomic status, history of antibiotic use, close contact with infected individuals, and consumption of contaminated food or water. Participants' opinions and beliefs about these risk factors varied. The study demonstrated significant associations between H. pylori antigen detection and smoking, snuff use, overcrowding, and various risk factors such as family history, dietary habits, hygiene practices, socioeconomic status, antibiotic use and exposure to contaminated water or food. The study emphasizes the need for further research to understand these risk factors and their impact on H. pylori infection.*

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Introduction

Helicobacter pylori is a Gram-negative bacterium with a spiral shape. It predominantly resides in the stomach and thrives in low-oxygen environments. The unique helical morphology of *H. pylori* allows it to penetrate the stomach's protective mucus lining, leading to infection. In 1982, Australian doctors Barry Marshall and Robin Warren discovered *H. pylori*, challenging the prevailing belief that stress, spicy foods, and excessive acid secretion were the main causes of gastrointestinal diseases like peptic ulcers and gastritis. Their groundbreaking research revolutionized the field of gastroenterology (Brown, 2000). *H. pylori* has been linked to various gastrointestinal cancers, such as mucosa-associated lymphoid tissue cancer in the stomach, esophagus, colon, rectum, and tissues around the eye, and lymphoid tissue cancer. Although *H. pylori* infection often shows no symptoms, it can cause gastritis or ulcers in the stomach or the first part of the small intestine. The infection has also been associated with the development of certain cancers. However, the exact relationships between *H. pylori* and other diseases remain controversial (Blaser, 2006). Studies have suggested that *H. pylori* plays a role in the natural stomach ecology by influencing the bacteria that colonize the gastrointestinal tract. Non-pathogenic strains of *H. pylori* may also normalize stomach acid secretion and regulate appetite (Ackerman, 2012). While the prevalence of *H. pylori* infection has declined in many countries, it remains a major public health concern, particularly in economically poor countries with poor sanitary conditions (Hooi *et al*., 2017).

In Africa, *H. pylori* infection is highly prevalent, causing at least 90% of duodenal ulcers and 70% of gastric ulcers. The infection is commonly acquired during childhood, with more than 50% of African children being infected by age 10 (Mitchell *et al*.,

2001). The exact modes of transmission are not fully understood. Still, person-to-person transmission through oral-oral or fecal-oral routes and ingestion of bacteria-contaminated water are postulated. Socioeconomic factors, environmental conditions, sociocultural practices, and genetic predisposition can contribute to *H. pylori* acquisition (Brown, 2000). *H. pylori* infection is a significant risk factor for gastric cancer, which is the second leading cause of cancer-related deaths worldwide. Host genetics, immune response, and bacterial virulence influence the bacterium's ability to colonize the stomach. Approximately 50% of the world's population is estimated to be infected with *H. pylori*, with higher rates in developing countries. Factors such as geographical location, living environment, socioeconomic status, personal habits, and socio-demographic characteristics contribute to the variation in infection rates among regions (Frenck Jr and Clemens, 2003).

H. pylori belongs to the *Helicobacter* genus, with some species living in the upper gastrointestinal tract and the liver of mammals and birds. *H. pylori* produces large amounts of urease, an enzyme that raises the local pH and helps the bacterium survive in the acidic stomach. It also produces various adhesins that allow it to adhere to stomach epithelial cells. The bacterium's presence can lead to chronic gastritis and ulcers in the stomach and duodenum. Additionally, *H. pylori* can cause inflammation, trigger an immune response, and produce toxins that harm the stomach lining (Hua *et al*., 1999).The exact route of *H. pylori* transmission remains unclear, but the most likely is person-to-person transmission through oral-oral or fecal-oral routes. The bacterium can be found in infected individuals' feces, saliva, and dental plaque. Maintaining hygienic practices and avoiding contaminated water sources can reduce the risk of *H. pylori* infection (Brown, 2000). Treatment for *H. pylori* infections usually involves a combination of antibiotics to prevent bacterial resistance. Medications like proton pump inhibitors (PPIs), bismuth subsalicylate, and histamine (H-2) blockers may also be prescribed to reduce acid production and promote stomach healing (Gisbert and Calvet, 2012).

Materials and Methods

Study Settings

The study was conducted in the Medical Laboratory Technology (MLT) Skill Lab at Abasyn University, Peshawar. Samples were collected from various tertiary care hospitals in District Peshawar to ensure representative sampling.

Study Design

This was a cross-sectional study to determine the prevalence of *H. pylori* infection and its association with tobacco consumption habits (snuff and smoking) in District Peshawar.

Sample Size

150 blood samples were collected from suspected *H. pylori* patients for this study.

Inclusion/Exclusion Criteria

Inclusion Criteria

- Individuals aged 18 years and above residing in District Peshawar were included.
- Participants who provided informed consent were eligible for participation.

Exclusion Criteria

- Minors and mentally retarded individuals unable to provide consent were excluded.
- Individuals with a history of gastric surgery or antibiotic treatment for H. pylori infection in the past six months were also excluded.

Sample Collection

Blood samples were collected from participants using standard vein puncture techniques. A self-structured questionnaire collected demographic information, tobacco consumption habits, and potential risk factors associated with *H. pylori* infection.

H. pylori Infection Assessment

A non-invasive serological test was used to determine the presence of *H. pylori* infection by analyzing blood samples for specific antibodies produced in response to the bacteria.

Serological Testing

The Immunochromatographic Test (ICT) method was used as a rapid test or lateral flow assay. It is a simplified and rapid diagnostic test performed without specialized laboratory equipment.

Sample Application

A sample drop (serum, plasma, or whole blood) was added to the test device's sample pad.

Sample Migration

The sample migrated through the test strip via capillary action, carrying the antibodies present in the sample.

Conjugate Binding

H. pylori-specific antibodies in the sample bound to the conjugated antibodies on the conjugate pad, forming an antigen-antibody complex.

Test Line Formation

The antigen-antibody complex continued to migrate along the strip and reached the *H. pylori*-specific antigens immobilized on the nitrocellulose membrane, forming a visible colored line.

Control Line Formation

The sample also passed over the control line, containing immobilized control antibodies. The control line always generated a colored line, indicating the validity of the test.

Result Interpretation

The presence or absence of colored lines in the test and control regions was observed and interpreted as positive or negative for *H. pylori* antibodies.

Ethical Considerations

Ethical approval was obtained from the Ethical Committee of Abasyn University.

Data Analysis

Data from the self-structured questionnaire was entered into an excel sheet and then merged with SPSS version 25.0 for further analysis.

RESULTS

Demographic Data

Our study categorized participants based on their information, gender, prevalence of *H. pylori* among smokers and snuff users, history of tobacco use, and assessment of risk factors for *H. pylori*. Among the 150 male participants, 63 smokers and snuff users tested positive for *H. pylori*, resulting in a prevalence of 42% in this group. All participants had a history of tobacco use, with 89 smokers and 61 snuff users (Figure 1).

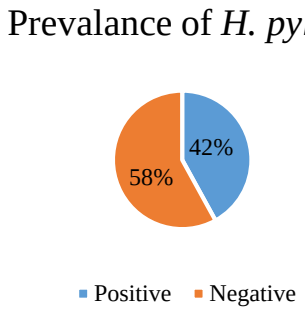

Figure 1. Prevalence of *H. Pylori* among Tobacco users

Habit of Smoking and Snuffing

Out of the total participants (n=150), 89 were smokers. Most smokers (68.53%) reported smoking between 4 and 10 cigarettes per day. A smaller percentage reported smoking 1-3 cigarettes per day (13.48%), while 17.97% reported smoking 1 box of cigarettes or more per day. Among snuff users (n=61), the majority (55.73%) reported using snuff 11-15 times daily. A smaller percentage reported using snuff 5-10 times a day (21.31%), while other reported using snuff 16-20 times a day or more (22.95%), as shown in Figure 2.

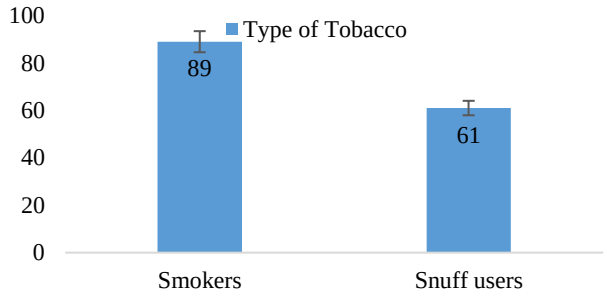

Figure 2. Smoking and snuff users among *H. pylori* Patients

Risk Factors Associated with *H. pylori*

The current study examined several risk factors associated with H. pylori infection. The findings revealed that a significant proportion of participants strongly agreed or agreed with the following risk factors:

1. Consumption of contaminated food (73.33%)
2. Poor hygiene practices (69.99%)
3. Close contact with infected people (37.33%)
4. Family history of *H. pylori* infection (29.33%)
5. Consumption of spicy or heavily seasoned food (31.33%)

These results highlight the importance of addressing these risk factors in relation to *H. pylori* infection (Figure 3). Further research and targeted interventions are needed to mitigate the impact of these factors and reduce the prevalence of *H. pylori* infection.

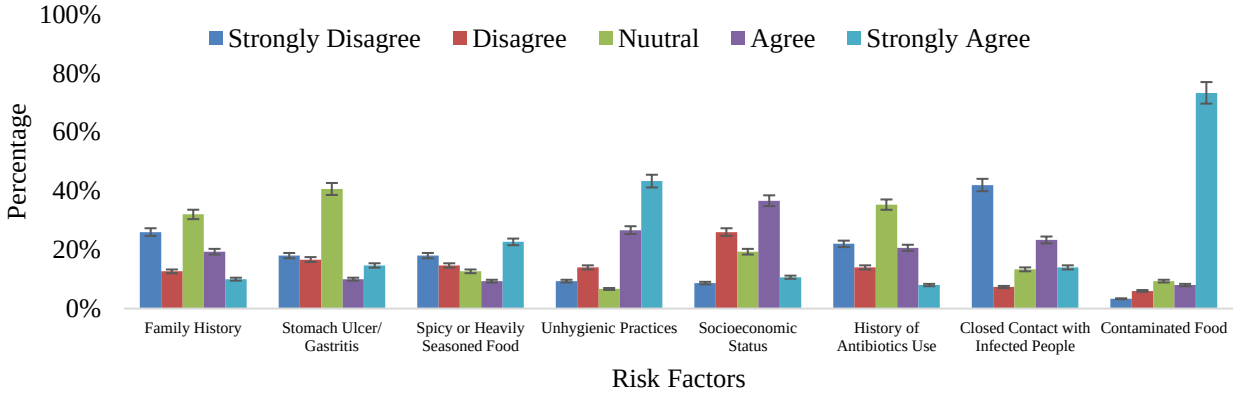

Figure 3. Risk Factors of *H. pylori*

H. pylori Testing History

Regarding *H. pylori* testing history, 81% of participants indicated that they had not been tested for *H. pylori* in the past, while 19% reported previous testing for the infection as shown in figure 4.

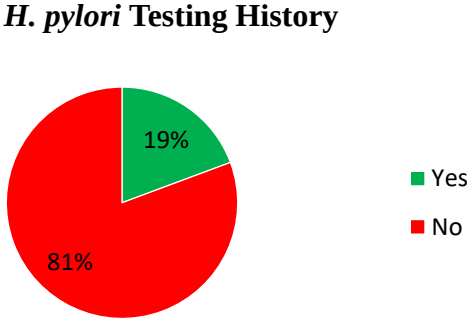

Figure 4. *H. pylori* Testing History among the participants

Discussion

The present study aimed to evaluate the prevalence and risk factors associated with *H. pylori* infection among smokers and snuff users in tertiary care hospitals of Peshawar. While some studies have been conducted on this topic, there are still conflicting findings (Bello *et al*., 2018; Ogihara *et al*., 2000; Shah *et al*., 2021). *H. pylori* infection is more common among individuals with low socioeconomic status and poor hygiene (Bello *et al*., 2018; Ogihara *et al*., 2000). With a population of 250 million, Pakistan faces a high burden of communicable diseases, including *H. pylori* infection. The reported prevalence of *H. pylori* in Pakistan is 37% (Bello *et al*., 2018). Globally, there have been numerous studies on the prevalence and risk factors of *H. pylori* among smokers and snuff users, but research in this area is limited in Pakistan. In Nigeria, a study with 306 participants found a prevalence of 87.8% for *H. pylori* among smokers, snuff, and alcohol users (Bello *et al*., 2018). In our study with 150 participants in Peshawar, Pakistan, the prevalence was 42% among smokers and snuff users. A study in West Cameroon found a prevalence of 47.4% for *H. pylori* infection among 500 smokers and snuff users. Risk factors associated with *H. pylori* infection in that study included drinking unfiltered water and alcohol consumption (Ogihara *et al*., 2000). Similarly, our study identified risk factors such as stomach ulcer or gastritis, spicy or heavily seasoned food consumption, low socioeconomic status, poor hygiene practices, and frequent consumption of contaminated water or food.In Temergara, Pakistan, Shah *et al*., (2021) reported a 22.1% prevalence of *H. pylori* infection among 520 participants, with a higher probability of infection among smokers, snuff users, and regular soft drink consumers. Our study also found a higher prevalence among smokers and observed that all participants were males. These findings highlight the need for further research and targeted interventions to address the prevalence and risk factors of *H. pylori* infection among smokers and snuff users in Pakistan.

Conclusion

In conclusion, this study on *H. pylori* infection and its associated risk factors yielded important findings. The prevalence of *H. pylori* infection was notably high, with 42% of smokers and snuff users testing positive for the bacterium. The study identified several significant risk factors, including smoking, snuff use, poor hygiene practices, and spicy or heavily seasoned food consumption. Factors such as family history, socioeconomic status, antibiotic use, and exposure to contaminated water or food were also found to contribute to *H. pylori* infection. The study highlighted participants' diverse opinions and beliefs regarding these risk factors, emphasizing the need for further research to establish a more conclusive understanding. Overall, these findings underscore the importance of addressing tobacco consumption, promoting good hygiene practices, and considering socio-economic factors in preventing and managing *H. pylori* infection.

Declarations

Conflict of interest

The authors have no conflict of interest.

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Funding

Not applicable

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