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Prevalence and Risk Factors of Helicobacter Pylori Infection in Adolescents and Young Adults in Saudi Arabi: A Systematic Review

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ABSTRACT

Objectives: To explore the prevalence and risk factors of H. Pylori among adolescents and young adults in Saudi Arabia.. **Methods:** PubMed, SCOPUS, Web of Science, and Science Direct were systematically searched for relevant literature. Rayyan QRCI was employed throughout this comprehensive process. **Results:** We included eight studies with a total of 6402 patients, and 3604 (56.3%) were males. The reported prevalence of H. pylori infection ranged from 23.6% to 51.5%, with a total of 2537 (39.6%). Age above 10 years, male gender, low income, more than eight persons in the household, bed-sharing, and two affected parents, low education, chronically ill patients (especially anemia), family history of peptic disease, consuming desalinated municipal water, smoking, fast food, and abnormal BMI were associated with a risk of H. pylori infection. **Conclusion:** The prevalence of H. pylori infection was relatively high among Saudi adolescents, children, and young adults. This is further evidenced by many immigrant populations being from high-prevalence nations. Environmental, familial, and socioeconomic variables remain the primary risk factors. These findings emphasize how crucial it is to identify population-specific risk factors as H. pylori reservoirs, as doing so will enable the development of effective preventative measures that will lower the prevalence of H. pylori infection in the most vulnerable groups.

Keywords: *H. Pylori; Prevalence; Risk factors; Saudi Arabia; Systematic review.*

Introduction

H. pylori, also known as Helicobacter pylori, is typically acquired in childhood. Adults may develop stomach adenocarcinoma and mucosa-associated lymphoid tissue lymphoma as a result of its long-term persistence [1]. As a result, H. pylori is one of the most significant and common infectious drivers of cancer globally, accounting for 8 out of 10 stomach cancer cases in adults [2]. A number of factors have been identified as contributing to the variations in the prevalence of H. pylori infection. These include advanced age, poor hygiene, a large number of family members, the presence of a mother, a sibling, or siblings with H. pylori infection, sharing a room or bed, drinking untreated or unboiled water, and low socioeconomic status [3-7].

The elevated H. pylori prevalence in pediatric patients was also thought to be caused by prenatal transfer from infected mothers or transmission following delivery [8]. However, the majority of investigations demonstrated that this mode of transmission is improbable because the placentas of pregnant women who tested positive for this infection did not contain any H. pylori DNA [9]. Despite a follow-up until the age of three months, no infant born to infected mothers tested positive for this illness, according to a more recent study that evaluated the H. pylori status in mother-newborn couples [10].

Based on the usual lack of symptoms in minor age groups, it is challenging to adequately quantify the incidence of this infection. So, only 5 percent of the children who are infected go on to develop gastritis, ulcer illness, or other gastrointestinal problems connected to H. pylori, like growth retardation, iron-resistant iron deficient anemia, or thrombocytopenia [6,11]. A 2017 study, one of the few with this objective, found that 33% of children worldwide had this condition, but it did not examine regional, national, or subregional variations [12]. On the other hand, it was shown that the incidence in adults varied greatly amongst populations, ranging from 24% to 73%, with a global pooled prevalence of about 50% [13]. We put out the following theories in light of the fact that the virus is typically contracted in childhood and that prevalence varies greatly: (1) In low-prevalence locations, kid infection rates may be low; (2) In spite of childhood infection rates being higher, eradication regimens are incredibly effective and can eradicate the illness entirely until maturity.

Study objectives:

This review's primary objective is to study the prevalence and risk factors of H. Pylori among adolescents and young adults in Saudi Arabia.

Methodology

This systematic review was conducted in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards [14].

Study Design and Duration

January 2024 marked the start of this systematic review.

Search strategy

To discover the pertinent literature, a thorough search was conducted across four main databases: PubMed, SCOPUS, Web of Science, and Science Direct. We limited our search to English and considered each database's specific needs. The following keywords were transformed into PubMed Mesh terms and used to locate the pertinent studies; "Helicobacter pylori," "H. Pylori," "Children," "Young adults," "Prevalence," and "Risk factors." The Boolean operators "OR," "AND," and "NOT," matched the required keywords. Publications with full English text, available free articles, and human trials were among the search results.

Selection criteria

We considered the following criteria for inclusion in this review:

- Studies that summarized the prevalence and risk factors of H. Pylori among adolescents and young adults in Saudi Arabia.
- Children, adolescents, and young adults were included.
- Only human subjects.
- English language.
- Free accessible articles.

Data extraction

The output of the search method was verified twice with Rayyan (QCRI) [15]. The researchers assessed the titles and abstracts' relevance by adding inclusion/exclusion criteria to the combined search results. The reviewers carefully examined each paper that satisfied the inclusion requirements. The writers discussed conflict resolution techniques. The approved study was uploaded using an already-created data extraction form. The authors extracted data about the study titles, authors, study year, city, participants, gender, prevalence, and risk factors. A separate sheet was created for the risk of bias assessment.

Strategy for data synthesis

A qualitative evaluation of the research components and conclusions was provided by creating summary tables utilizing data from pertinent studies. The most effective method for using the data from the included study articles was selected once the data for the systematic review had been collected.

Risk of bias assessment

The quality of the included studies was assessed using the ROBINS-I risk of bias assessment technique for non-randomized trials of treatments [16]. The seven evaluated themes were confounding, participant selection for the study, intervention classification, deviance from intended interventions, missing data, outcome assessment, and choice of the reported result.

Results

Search results

A total of 288 study articles resulted from the systematic search, and 88 duplicates were deleted. Title and abstract screening were conducted on 200 studies, and 168 were excluded. 32 reports were sought for retrieval, and 2 articles were retrieved.

Finally, 30 studies were screened for full-text assessment; 12 were excluded for wrong study outcomes, 8 for the wrong population type, and 2 articles were letters to the editors. Eight eligible study articles were included in this systematic review. A summary of the study selection process is presented in **Figure 1.**

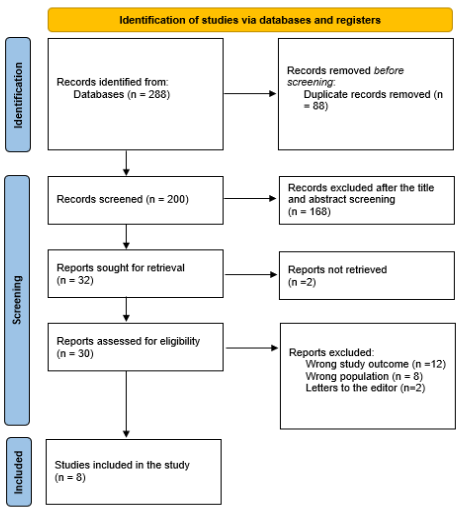

Figure (1): PRISMA flowchart summarizes the study selection process.

Characteristics of the included studies

Table (1) presents the sociodemographic characteristics of the included study articles. Our results included eight studies with a total of 6402 patients, and 3604 (56.3%) were males. Seven studies were cross-sectional studies [18-24], and one was prospective in nature [17]. Three studies were conducted in Jeddah [17, 19, 22], two in Riyadh [18, 21], one in Makkah [20], one in Taif [24], and one in Al-Qaseem, Madinah, and Aseer [23].

Table (2) presents the clinical characteristics. The reported prevalence of H. pylori infection ranged from 23.6% [19] and 51.5% [22], with a total of 2537 (39.6%). Age above 10 years, male gender, low income, more than eight persons in the household, bed-sharing, and two affected parents, low education, chronically ill patients (especially anemia), family history of peptic disease, consuming desalinated municipal water, smoking, fast food, and abnormal BMI were associated with a risk of H. pylori infection [17-24].

Table (1): Sociodemographic characteristics of the included participants.

Study	Study design	City	Participants	Mean age	Gender (Males)
Hasosah, 2019 [17]	Prospective cohort	Jeddah	303	7.5	149 (49.2)
Al-Hussaini et al., 2019 [18]	Cross-sectional	Riyadh	3551	11.25±2.6	1717 (48.4%)
Jaber, 2006 [19]	Cross-sectional	Jeddah	543	1 to ≥10	335 (61.7%)
Telmesani, 2009 [20]	Cross-sectional	Makkah	316	10 to 15	316 (100%)

Almadi et al., 2007 [21]	Cross-sectional	Riyadh	120	18-28	73 (61%)
Habib et al., 2014 [22]	Cross-sectional	Jeddah	132	14.3±1.4	132 (100%)
Al Faleh et al., 2010 [23]	Cross-sectional	Al-Qaseem, Madinah, and Aseer	1157	16-18	602 (52)
Hassan et al., 1998 [24]	Cross-sectional	Taif	280	NM	280 (100%)

Table (2): Clinical characteristics and outcomes of the included studies.

Study	Prevalence of H. pylori infection	Main outcomes	ROBIN-I
Hasosah, 2019 [17]	151 (49.8)	Age above 10 years, an income of <5000 SR, more than eight persons in the household, bed-sharing, and two affected parents were associated with risk of H. pylori infection.	High
Al-Hussaini et al., 2019 [18]	1413 (40%)	Significantly linked with H. pylori seropositivity were male gender, older age, central and southern parts of Riyadh, lower SES levels, and family members older than 10. A subanalysis of the SES indicators showed that participants with higher incomes and higher education levels had significantly lower odds of having H. pylori seropositivity, while parents with less than a high school education, monthly family incomes under $2500 US dollars, and living in a traditional home with limited space were risk factors for H. pylori seropositivity.	Moderate
Jaber, 2006 [19]	128 (23.6%)	An increase in the risk of H. pylori among chronically diseased children was observed and increased significantly in chronic anemia and neurological impairment.	High
Telmesani, 2009 [20]	86 (27.4%)	The younger age group was found to have a higher prevalence. The students who experienced recurring stomach pain had a significant prevalence of H. pylori.	Moderate
Almadi et al., 2007 [21]	42 (35%)	Compared to medical students born in Western countries (2 out of 14, 14%), there was a higher prevalence of HP among those born in the Middle East (40 out of 106, 37%).	Moderate

Habib et al., 2014 [22]	68 (51.5)	H. pylori-infected students had considerably stronger relationships with the presence of a family history of peptic disease, consuming desalinated municipal water, poorer income, and dining outside the house than uninfected students.	Moderate
Al Faleh et al., 2010 [23]	544 (47%)	The variables that were independently associated with H. pylori were being female and living in the Madinah region.	High
Hassan et al., 1998 [24]	105 (37.5)	The prevalence of H. pylori was statistically positively correlated with larger families, poorer family income, smoking, fast food consumption often, latency, and abnormal body mass index (BMI).	Moderate

Discussion

According to a new analysis incorporating data from 62 nations, almost 50% of the global populace remains infected with H. pylori [25]. This implies that there were roughly 4.4 billion people with H, based on estimates of regional prevalence. Global H. pylori infection in 2015, with significant variations in the prevalence of H. pylori between nations and geographical areas. Asia (54.7%), Latin America and the Caribbean (63.4%), and Africa (79.1%) have the greatest prevalence rates. Conversely, H. The least amount of pylori is found in Oceania (24.4%) and Northern America (37.1%). The prevalence of H. pylori has been falling in highly industrialized Western countries around the turn of the twenty-first century, whereas it has plateaued at a high level in emerging and recently industrialized countries. The increasing disparity in prevalence has significant implications for the global prevalence of H. pylori-related disorders in the future, such as stomach cancer and peptic ulcers [26].

In this review, the reported prevalence of H. pylori infection ranged from 23.6% [19] to 51.5% [22], with a total of 2537 (39.6%) in Saudi children and adolescents. This is higher than a previous systematic review and meta-analysis conducted by **Zabala *et al.*,** who reported that in healthy children between 2011 and 2016, the total seroprevalence rate in children was determined to be 33% [95% confidence interval (CI) 27–38] [27]. The same study found that infection rates in healthy children under the age of five were still between 20 and 40% in high-income countries and between 30% and 50% in upper-middle-income countries after reviewing data from seven cohort studies. This suggests that the country of birth influences the prevalence of infections. Cross-sectional research have shown that higher infection rates (40%) are primarily seen in low- or low-to-middle-income areas (or in nations with extreme income inequality). Nonetheless, significant differences in prevalence can be observed amongst nations with comparable living conditions [27].

The majority of H. pylori infections are now known to occur in childhood, namely in the first five years of life, and they are strongly impacted by the location and particular living circumstances. Numerous studies indicate that oral-oral or fecal-oral pathways are the primary means of H. pylori transfer from person to person. The degree of contamination is largely influenced by environmental and family variables, with a living environment's lack of cleanliness and hygiene having a more severe effect. These conditions are known to promote the growth of H. pylori, particularly in developing nations. However, the primary risk factor for H. pylori infection in children, whether in developing or industrialized nations, is familial socioeconomic status [26, 28].

We found that age above 10 years, male gender, low income, more than eight persons in the household, bed-sharing, and two affected parents, low education, chronically ill patients (especially anemia), family history of peptic disease, consuming desalinated municipal water, smoking, fast food, and abnormal BMI were associated with a risk of H. pylori infection [17-24]. According to recent research, water sources were no longer thought to have a negative impact on H. pylori infection [29], highlighting local advancements in sanitation and easy access to clean water sources [30]. The most significant risk factors for H. pylori in Saudi Arabian children are, therefore, lower income and educational attainment, crowded housing, living in a rural area, using tanks as water sources, drinking alcohol, smoking actively, consuming spicy foods or raw vegetables, as well as unhygienic living conditions and poor sanitation [18, 31]. According to a study conducted in Nepal, drinking tea could considerably reduce the amount of H. pylori that colonizes the stomach [32]. It was also demonstrated that dietary practices limited the colonization of H. pylori, with the finding that eating more than twice a day dramatically decreased colonization [32].

There are significant regional differences in the prevalence of H. pylori infection, and determining the mechanisms influencing these differences is crucial. In order to accurately determine the risk factor contribution within each geographic area, further research should be done on the variations in environmental factors, diagnostic techniques, eradication regimens, and host-related characteristics. Therefore, the identification of important risk factors may serve as the cornerstone for efficient and long-term eradication, particularly in places where the prevalence of H. pylori infection is higher. This would further reduce the incidence of gastric cancer globally. In order to create more precise diagnosis techniques and efficient treatment plans, future viewpoints should concentrate more on evaluating the host's genetic vulnerability and immunological response to the illness. Given that false-negative results for H. pylori infection are frequently seen in young patients, the difficulties associated with diagnosing this illness have a significant detrimental effect on its long-term persistence. Because intrusive treatments are typically declined by the parents or are challenging to conduct on small children, these challenges are therefore either attributable to the procedure itself or to the relatively lower sensitivity and specificity of noninvasive testing, which are preferred in this age group. Future approaches to the diagnosis and treatment of pediatric H. pylori infection should focus on personalized medicine in order to reduce the risk of potentially fatal consequences associated with this infection in adulthood, including gastric cancer and other, more contentious conditions like stroke.

Conclusion

The prevalence of H. pylori infection was relatively high among Saudi adolescents, children, and young adults. H. pylori infection prevalence is still high in the majority of developing nations despite recent data suggesting that it is trending downward in most of those nations. This is further evidenced by the fact that a large portion of immigrant populations are from high-prevalence nations. Environmental, familial, and socioeconomic variables continue to be the primary risk factors. These findings emphasize how crucial it is to identify population-specific risk factors as H. pylori reservoirs, as doing so will enable the development of effective preventative measures that will lower the prevalence of H. pylori infection in the most vulnerable groups.

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