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ORIGINAL RESEARCH

Prevalence of Helicobacter Pylori Infection among Children in Pediatric Hospital at Sulaimani City-Kurdistan Region, Iraq

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ABSTRACT

Background: Helicobacter pylori is a gram-negative bacterium that causes gastritis and peptic ulcer disease (PUD) and it is the most common cause of infectious gastritis. Helicobacter pylori is an infection that is typically acquired during childhood. It is widely accepted that the infection may occur early in life and may persist for decades before causing diseases.

Objectives: The study aim was to assess the prevalence of Helicobacter pylori infection in Kurdistan pediatric hospital at Sulaimani city-Kurdistan Region /Iraq.

Methodology: This scientific investigation is a cross-sectional, descriptive, and analytical study based on a prospective collection of data carried out from May to August 2023. Recruitment was probabilistic; A questionnaire sheet was prepared and used to collect personal. Information by a face-to-face interview for each study subject.

Results: Across sectional study included 219 samples, 111 boys and 108 girls, aged 1 to 15 years were evaluated. The mean age of enrolled children was 5.48 years. Stool samples were positive for H pylori in 97 (44.3%) children. There was a significant correlation between a positive H pylori status and a family who shared cutlery (P value = 0.01). The current study shows that no significant association was found between the prevalence of H pylori infection and individuals' ages, gender or socioeconomic levels and the child's parents' education level.

Conclusion: Hp infection is common among children aged 1 to 5 years in Kurdistan Region. Often asymptomatic, it is facilitated and exacerbated by unsanitary conditions and low-level education.

Keywords: Helicobacter pylori, Prevalence, Stool exam, Child, Kurdistan Region, Iraq.

INTRODUCTION

Helicobacter pylori infection is a global public health problem, affecting over 50% of the population worldwide [1, 2]. H. pylori is a Gram-negative microaerophilic bacterium which colonizes the gastric mucosa generally in childhood and can determine chronic active gastritis, peptic ulcer disease, gastric cancer and mucosa-associated lymphoid tissue lymphoma later on during adulthood [3].

Its transmission route is still partially unclear, but the infections occur as a result of direct human-to-human transmission or environmental contamination [4]. The increased number of siblings, the education level of the parents, the water sources and garbage collection are also known to be representing important risk factors for the H. pylori infection among the pediatric population [5].

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Correspondingly Helicobacter pylori (Hp) infection is one of the most common and widespread infections in humans worldwide [6]. In fact, more than half of the global population is infected with Hp [7, 8].

It is a chronic bacterial infection that is the most common in developing countries [6]. The proportion of Hp infection acquired by children varies from 30% to 50%, whereas it reaches a limit of more than 90% at adult age in developing countries [7,9]. Low socioeconomic status is a major risk factor in the acquisition of Hp infection [10]. Many studies have shown that parents' educational status and a large number of siblings were the main enabling factors for Hp infection in children [10, 11]. Other risk factors such as sources of drinking water, type of housing, presence or absence of sewage system and waste management and disposal method were also related to this infection [7].

Transmission from one person to another may be through fecal-oral route or from mouth to mouth [8, 12]. This infection usually goes unnoticed in most affected persons since it is asymptomatic. In children, its manifestations are limited to chronic gastritis (often asymptomatic), and infrequently to a duodenal or sometimes gastric ulcer [7]. It is well known that Hp infection may be associated with the pathogenesis of some gastrointestinal diseases such as type B chronic antral gastritis, gastric or duodenal ulcers, lymphoid tissue lymphoma associated with mucosa and gastric adenocarcinoma [13, 14, and 15].

In addition, possible associations have been reported between Hp infection and some extra-digestive diseases (cardiovascular, dermatological, neurological, immunological, hematological, respiratory, metabolic and endocrine diseases) [16]. Due to its involvement in pathologies such as gastric adenocarcinoma, extra-ganglion lymphoma of marginal areas of mucosa annex lymphoid tissues (MALT), gastric or duodenal ulcer, gastric atrophy, the WHO has classified it in the category of class 1 carcinogens [17, 18].

AIMS OF THE STUDY

In Kurdistan Region, the epidemiology of this disease is still poorly known among children; hence, the relevance of this research work is to determine the prevalence of Helicobacter pylori infection among children aged 1 to 15 years in the city of Sulaimani.

METHODOLOGY

Research Design:

This descriptive cross-sectional study was conducted in Sulaimani Province, Kurdistan Region, Iraq. The study was conducted over the period of 4 months from May to August /2023.

Participants:

Sample size was 219 children, aged 1 to 15 years who attended the Hospital and were evaluated for specific Antigen of H. pylori using stool tests were included, and random sample selection was used for collecting data

Ethical consideration:

The study was approved by the scientific and ethics committees of Jamal Ahmad Rashed Pediatric Hospital research and ethical board accepted the study to be conducted .and written consent was obtained from guardians of recruited subjects.

Procedure:

A questionnaire was completed at the start of the study. H. pylori Antigen data were analyzed.

Stool samples were collected from 219 children with diarrhea attending to Jamal Ahmad Rashed Pediatric Hospital over a period of 4 months from May to August, 2023. Stool sample was taken from each child. H pylori antigen positivity determined using commercial kit (Rapid H. pylori Antigen test card) by Biotech. Only patients who their parents agreed were included in this study.

A questionnaire sheet was prepared and used to collect personal. Information by a face-to-face interview for each study subject. The questionnaire covered age, sex, regular hand washing, water supply (sours of drinking water, parent education

level, sharing cutlery between family, family income, family history with GIT and playing with soil.

Test Principle:

The onsite H. pylori Ag Rapid Test is lateral flow chromatographic immunoassay. The test strip in the cassette device consists of: 1) a burgundy-colored conjugate pad containing anti-H. pylori specific antibody conjugated with colloidal gold (anti-H. pylori conjugate) and 2) a nitrocellulose membrane strip containing a test line (T line) and a control line (C line). The T line is pre-coated with anti-H. pylori antibody, and the C line is percolated with a control line antibody. When an adequate volume of extracted fecal specimen is dispensed into the sample well of the cassette, the specimen migrates by capillary action across the cassette. The H. pylori antigen, if present in the specimen, will bind to the anti-H. pylori conjugate. The immune complex is then captured on the membrane by the pre-coated antibody forming a burgundy-colored T line, indicating an H. pylori Ag Rapid Test positive result. Absence of the T line suggests an H. pylori Ag Rapid Test negative result. The test contains an intern control (C line) which should exhibit a burgundy-colored line of the immune complex of the control antibodies regardless of the color development on the T line. If no control line (C line) develops, the test result is invalid and the specimen must be retested with another device.

Analysis:

Statistical analysis was performed using the statistical software program SPSS 25. The 219 participants' data were converted from ordinal to numerical format and entered into an Excel sheet. SPSS version 25, a commercial bio statistical program, was then used to examine the data. Data analysis and p-value determination were accomplished using the one-way ANOVA and chi-square test; was performed using chi-square test keeping a p-value ≤ 0.05 were deemed statistically significant and accounted for.

RESULTS

Across sectional study included 219 samples, 111 boys and 108 girls were enrolled in the study, aged 1 to 15 years were evaluated. The mean age of enrolled children was 5.48 years.

Stool samples were positive for H pylori in 97 (44.3%) children and 122 (55.7%) of them were had a negative result as shown in (figure1). The current study shows that no significant association was found between the prevalence of H pylori infection and individuals' ages, gender or socioeconomic levels and the child's parents' education level (Table 1).

There was a significant correlation between a positive H pylori status and family member who shared cutlery (P value = 0.01), also the same phenomena could be noticed with those who had Family history of GIT diseases (P value = 0.019), as shown in (Table 2).

Regarding to the rate of H-pylori infection were 55.7% of them were positive and 44.3% of them were male participants as shown in (Figure 2).

DISCUSSION:

Helicobacter pylori infection is a global public health problem, affecting more than half of the world's population. The infection is thought to occur early during childhood but can remain asymptomatic, with long-term clinical sequalae including chronic gastritis, peptic ulcer disease [19].

Regarding the rate of H. pylori infection in the current study which was conducted in Sulaimani city at Jamal Ahmad Rashed Pediatric Hospital, found that the H. pylori infection rate was (44.3%) among children attending at that hospital, which is approximately lower than the average rate of studies done previously in Sulaimani city were 54.9 % in 2020, and 62.7% respectively [20, 21]. The decrease in the infection rates might be due to the improvement of life standards and hygiene in the region. This finding is in line with the results of study done in Erbil at 2022 the results showed that 40.98% patients infected with H. pylori [22].

The overall seroprevalence rate of Helicobacter pylori infection was 51.8% in Rania [23]. In the study done in Duhok, the prevalence of infection was found to be 28% [24]. Geographical variations in the prevalence of H. pylori have been established not only in different countries from different regions of the world, but also within regions of a single country.

On the other hand, the infection rate in the present study was higher than the result of a study conducted in Iraq reported H. pylori seroprevalence of 39.4% [25], In addition, the other studies were done previously having results which range from 7% infected children in the Czech Republic, 19% in Latvia, up to 50% in Portugal [26, 27, and 28], also, greater than that found in the majority of developing countries where around 10% of the pediatric population was shown to be infected with H. pylori [29].

The current study prevalence of H Pylori infection which was in consistent with the result of another neighboring countries such as in Iran 40% of children were positive by the stool test [30], Kuwait which was (49.7%) [31]. Furthermore, the outcome was much smaller than those in nearby countries, such as Turkey 63% [32], In Saudi Arabia, showed that the prevalence rate was found to be around 50% [33]. In addition, the prevalence of (Hp) among Children in the Northern Benin in 2018 was 60.4% [34], and indicated the same occurrence of H pylori as other studies which were done in Asia and the Middle East [35]. Furthermore, the rate in Sudan was 56.3% [36], in Gabon was 62% [37], and in Nigeria had 63.6% [38].

However, the current results are comparable to previous prevalence obtained in the Kasese district where the prevalence of H. pylori was 29.9% [39].

The prevalence of H. pylori infection in other parts of Africa ranged between 40% and nearly 90% [40, 41]. The low prevalence in our study would have been due to the recruitment of participants within a single or similar geographical characteristic. This would mean that some of the factors of transmission of H. pylori infection would be influenced by the environment [42, 43]. Moreover, the observed low prevalence in our study could also be due to the rising usage of antibiotics such as Amoxicillin and Metronidazole in the management of many infections like gastrointestinal disorders, also there is a widespread usage of un prescribed antibiotics in our region. This practice could have led to increased clearance of H. pylori and the resulting lowered prevalence.

Regarding the age of the study participants the rate of H-pylori infection was higher in the age group who were smaller than five years old which is in consistent with a study conducted by Rowland et al. [44], which found young children before the age of 3 years were at risk of H. pylori infection, whereas the risk of infection was very low after 5 years of age.

The current study shows that no significant association was found between the prevalence of H pylori infection and individuals' gender or socioeconomic levels and the child's parents' education level and lower education levels of both father and mother, which is consistent with the study done in Belgium Prevalence of H. pylori did not differ according to gender, age category, and number of household members [45].

Concerning the rate of infection among male was 55.7% and in female was 44.3%, reported a male predominance a finding that was similar to a study done in Babylon province there was (57.5%) of cases for males and the other (42.5%) of cases for females [46]. In contrast with studies done previously in Erbil and Iraq, the H. pylori infection in female was higher than male which were (40%) for male, and (60 %) for female [47], while, the rate was 40.7% in female and in male was 38.2%, respectively [48]. The association of male or female sex with H. pylori infection is debated. A systematic review by Zamani et al [49], found there were no differences in H. pylori infection between males and females. In contrast, Ibrahim and colleagues [50], reported a male predominance. In addition to the two seroprevalence studies from Jordan [51, 52], our study also showed

male predominance, but this observation was not statistically significant.

In our study, the drinking water source was not associated with increased risk of infection with H. pylori, which was also reported by the recent nationwide seroprevalence study from Jordan [51]. These results likely reflect improvements in sanitation and wide accessibility to clean water for drinking [53].

In this study, no correlation was found between mother's education level and H. pylori positivity. In contrast, a study conducted in Russia previously, a strong relationship between mother's education level and H. pylori infection rate was found [54]. In a study conducted in Taiwan, the lower education levels of mothers were associated with higher infection rates [55].

In contrast to this, no relationship was found between education level and H. pylori infection in our study. This might be explained partly by the small sample that was used in that study. Further studies are needed recruiting a large sample size to explore this relationship.

Regarding Cutlery sharing among the family members, the result showed that there was statistically significant relationship between the cutlery sharing and H pylori infection in contrast to a study was conducted among Jordanian children which found that no statistically significant relationship between sharing Cup/Dish/Towel with the H. Pylori infection [56].

In the present study there was a statistically significant association between family history with GIT diseases and H-pylori infection, similar to our findings, a study by Lehmann et al. [57], showed that the rate of H. pylori infection in patients with gastric erosion was significantly higher than those negative for H. pylori ($P < 0.01$).

CONCLUSIONS:

Helicobacter pylori infection remains a public health issue, especially among children, as shown in the study conducted at Jamal Ahmad Rashed Pediatric Hospital in Sulaimani city, which found an infection rate of 44.3%. This rate is significantly close to developed countries. The infection rate shows significant geographical differences, influenced by factors such as antibiotic use, environmental conditions, and socio-economic status.

The study highlighted that children under five years old are more susceptible to H. pylori infection. There was a notable association between cutlery sharing within families and H. pylori infection. Additionally, a family history of GIT diseases was associated with higher infection rates.

RECOMMENDATIONS:

Strategies to improve sanitary facilities, educational status, and socioeconomic status should be implemented to minimize H. pylori infection. Targeted antibiotic policies develop and enforce guidelines to manage the use of antibiotics like Amoxicillin and Metronidazole to prevent the emergence of antibiotic resistance while ensuring effective treatment of H. pylori and other infections. In addition, enhanced public health initiatives must be performed by strengthening public health campaigns focusing on improving hygiene practices, cutlery sharing and living standards to further reduce H. pylori infection rates. Finally, a future study that includes a larger number of children is needed to confirm our results.

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TABLES & Figures:

Table (1): Distribution of H pylori infection and sex, age, drinking water source, Parenteral education level, and Family income correlation among children in pediatric hospital /Sulaimani city-Iraq

Variables		Test result			Statistical analysis
		Negative	Positive	Total	
Sex	Male	57	54	111	P value 0.274
	Female	65	43	108	
	Total	**122**	**97**	**219**	
Drinking water source	Mineral	13	17	30	P value 0.274
	Tap	90	63	153	
	Well	19	17	36	
	Mineral	13	17	30	
	Total	**122**	**97**	**219**	
Parenteral Education level	College	18	17	35	P value 0.284
	Elementary	48	30	78	
	High school	43	32	75	
	None	13	18	31	
	Total	**122**	**97**	**219**	
Age	≤ 5years	76	49	125	P value 0.111
	6-10years	35	41	76	
	>10years	11	7	18	
	Total	**122**	**97**	**219**	
Family income	Good	3	0	3	P value 0.224
	High	4	3	7	
	Low	14	18	32	
	Medium	101	76	177	
	Total	**122**	**97**	**219**	

Table (2): Correlation between H pylori infection and Sharing cutlery between family, Regular hand washing, Family history with GIT diseases, Child Playing with soil among children in pediatric hospital /Sulaimani city-Iraq

Variable	Test result	No	Yes	Total	Statistical analysis
Sharing cutlery between family	Negative	76	46	122	P value 0.019
	positive	45	52	97	
	Total	**121**	**98**	**219**	
Regular hand washing	Negative	28	94	122	P value 0.408
	Positive	27	70	97	
	Total	**55**	**164**	**219**	
Family history with GIT Diseases	Negative	66	56	122	P value 0.019
	Positive	37	60	97	
	Total	**103**	**116**	**219**	
Child Playing with soil	Negative	74	48	122	P value 0.621
	positive	62	35	97	
	Total	**136**	**83**	**219**	

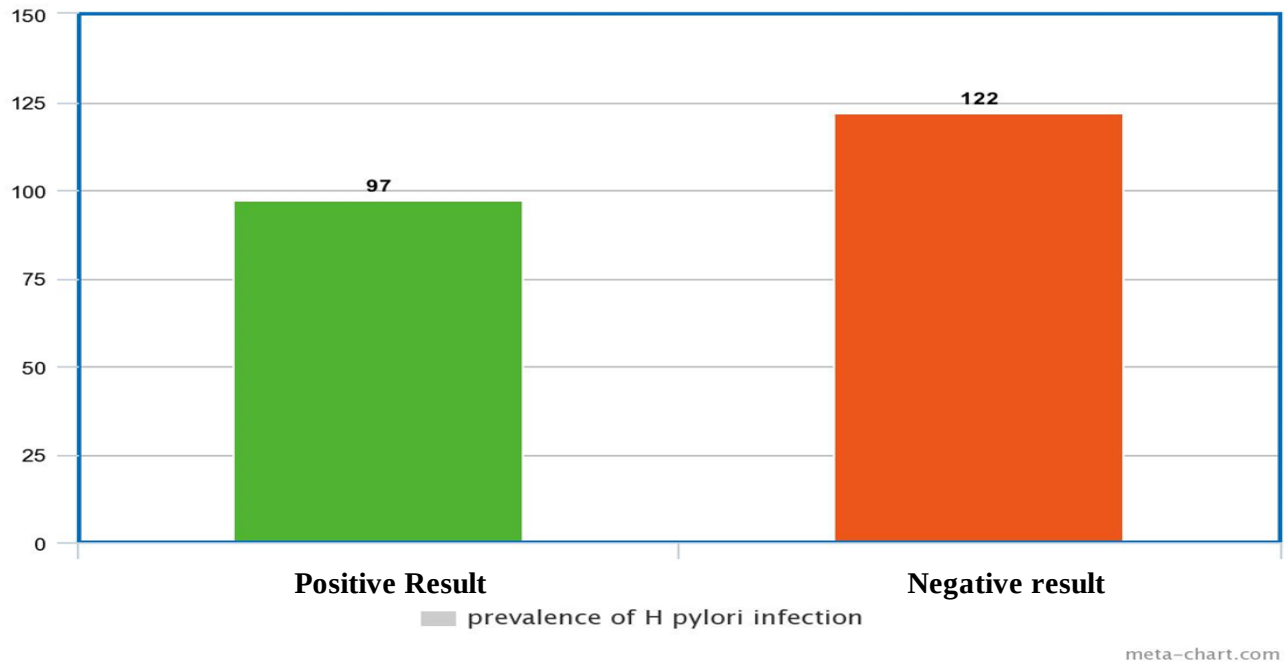

Figure (1): Prevalence of H pylori infection among children in pediatric hospital in Sulaimani city

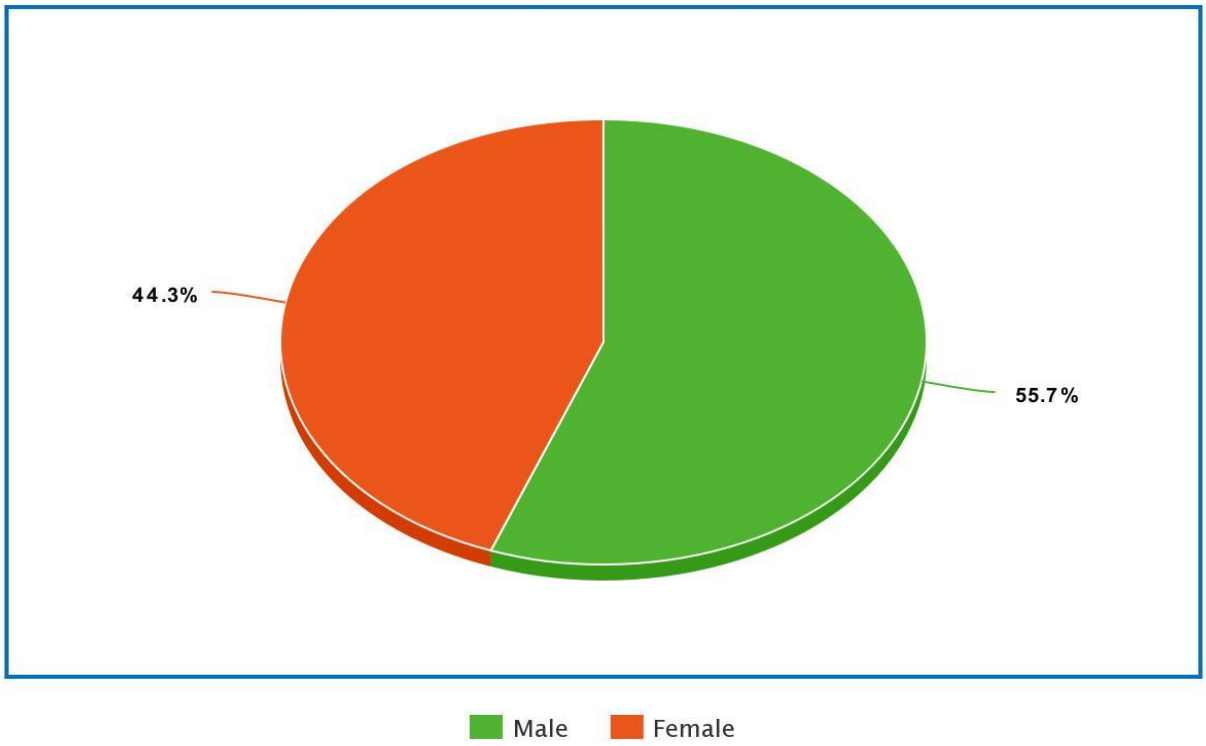

Figure (2): Prevalence of Positive H pylori infection according to sex in Pediatric hospital in Sulaimani city