

## Original Research Article

# Risk factors of *Helicobacter pylori* infection in children: a cross-sectional study in Chenani

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## ABSTRACT

**Background:** *H. pylori* infections generally occur early in childhood and continue to cause gastric diseases later in life. Epidemiological studies suggest its transmission through fecal to oral and oral to oral routes. Several factors control this transmission including socioeconomic status, quality of drinking water, personal and environmental hygiene, contamination of food, overcrowding and density of population.

**Methods:** A cross-sectional study, involving 100 children aged 1 to 15 years, presenting gastrointestinal complaints was conducted in the department of medicine, district hospital, Udhampur, Jammu, Jammu and Kashmir, India from October 2019 to March 2020. Children with the pathology of central nervous system or with any other known pathology were excluded.

**Results:** Majority of children belonged to the group >6, ≤11 years age (41%), 89% of children were school-going and 78% of participants belonged to the rural areas. Major economic activity of the participants came out to be business and trading (31%), as much as 62% of households were having a size of >4 persons per unit. As many as 24 children were found positive for antigen test upon stool sample examination. The infection rate was significantly higher among children having unsafe source of drinking water (14/24, 58.3%) and poor sanitation facilities (18/24, 66.7%). Overcrowding at home due to bigger household size was found to be a major risk factor among children.

**Conclusions:** The prevalence of *H. pylori* among children was quite high. Major risk factors included sanitation and drinking water facilities at home and at schools.

**Keywords:** *Helicobacter Pylori*, Gastrointestinal complaints, Epidemiological studies

## INTRODUCTION

*H. pylori* being a gram-negative microaerophilic bacterium are an important medical challenge, as it affects more than half the population of the world.<sup>1</sup> *Pylori* infections generally occur early in childhood and continue to cause gastritis, gastric cancer, lymphoma, peptic ulcer disease later in life as well.<sup>2</sup> Infected individuals usually remain asymptomatic for a long period of time, but may present with gastric reflux, abdominal pain, intestinal

bleeding, fevers and weight loss, which if remain untreated may cause gastric ulceration and perforations.<sup>3-5</sup> It tends to have a very high geographic variability too, such that prevalence of *H. pylori* infections among children ranges from 1.8% to 65% in developed nations and even upto 90% in some developing countries.<sup>6,7</sup> Epidemiological studies suggest its transmission through fecal to oral as well as oral to oral routes.<sup>8-11</sup> Several factors control this transmission, especially in developing countries, which includes socioeconomic status, quality of drinking water, personal

and environmental hygiene, contamination of food, overcrowding and density of population.<sup>12-14</sup> Therefore, the primary objective of the present study was to find the prevalence of *H. pylori* infection among children of the remote, mountainous, rural belt of Northern India and also try to determine the risk factors associated with it.

## METHODS

A cross-sectional study, involving 100 children aged below 15 years, but more than 1 year was conducted in the department of medicine, district hospital, Udhampur, Jammu, Jammu and Kashmir, India over a period of six months, from October 2019 to March 2020. The study was duly approved by the institutional ethics committee. Written, informed consent was obtained from parents or guardians of the children. The participants were selected using simple random selection technique.

### Inclusion criteria

Children aged between 1 to 15 years and children presenting with gastrointestinal complaints were included in the study.

### Exclusion criteria

Children below the age of 1 or above 15 years of age and children with the pathology of central nervous system or with any other known pathology were excluded.

A questionnaire was prepared and used among the participating parents/guardians of selected children, to

collect information on their demographical background, type of facilities available in their homes, schools, sources of water for drinking and family history of peptic ulcers.

4 ml of venous blood was drawn from each participant and processed for *H. pylori* antibodies using rapid antigen based immunoassay strips. Stool samples were also taken from those who tested positive with antibody test and subjected to *H. pylori* antigen in human fecal specimen test strip. A positive antigen test performed on the stool specimen finally defined a positive *H. pylori* test for the child. The data was analyzed using Microsoft excel software 2010. Chi square test was performed on the data and corresponding significance values or p values were found. Odds ratio was used to know the association between *H. pylori* sero-positivity and risk factors involved.  $P < 0.05$  was considered statistically significant.

## RESULTS

The mean age (mean $\pm$ SD) of children was 7.16 $\pm$ 3.65 years. Majority of children belonged to the group  $>6$  and  $\leq 11$  years age (41%). 89% of children were school going. 78% of participants belonged to the rural areas with only 24% parents/guardians had university education. Major economic activity of the participants came out to be business and trading (31%), however almost equal number of people were engaged in agriculture, industry and government service. As much as 62% of households were having a size of  $>4$  persons per unit, a significant number of which could be considered as crowded. There was not much significant finding in the ratio of males to females, which was 48:52 (Table 1).

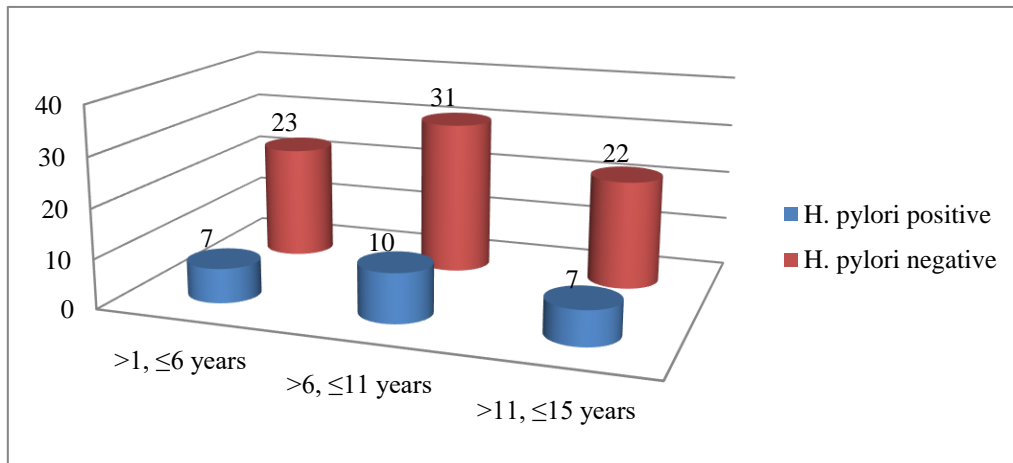
**Table 1: Demographic variables and other characteristics of participants.**

Sr. No.	Variables	Variable details	Numbers	%
1	Gender	Male	48	47
		Female	52	53
2	Age group (in years)	$>1, \leq 6$	30	30
		$>6, \leq 11$	41	41
		$>11, \leq 15$	29	29
3	Background	Urban	22	22
		Rural	78	78
4	Whether school going?	Yes	89	89
		No	11	11
5	Household size (siblings+parents+others living in a house)	$\leq 4$	38	38
		$>4$	62	62
6	Main economic activity	Agriculture	21	21
		Government service	26	26
		Industry	22	22
		Business and trading	31	31
7	Education level of parents	University	24	24
		Secondary	35	35
		Primary/middle	23	23
		No formal education	8	8

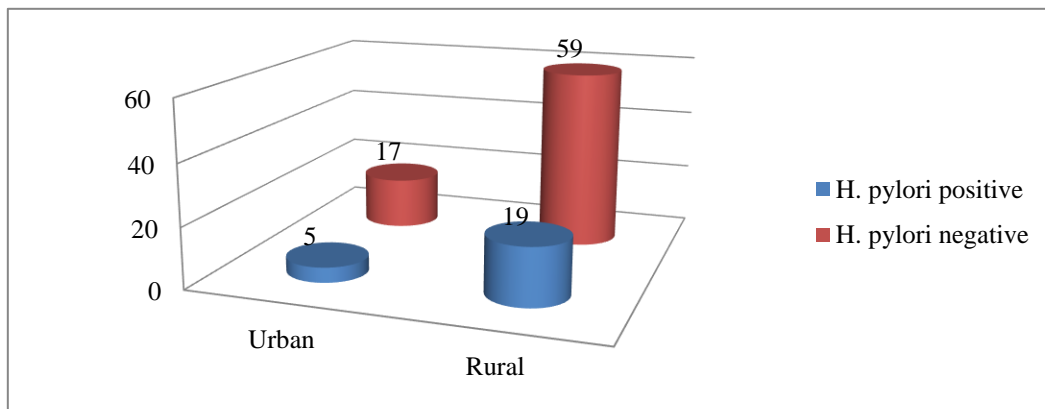
**Table 2: Risk factor involved with *H. pylori* infection.**

Sr. No.	Variables	<i>H. pylori</i> results		P value by Chi test	
		Positive (N=24)	Negative (N=76)		
1	Gender	Male	12	35	0.7355
		Female	12	41	
2	Attendance in school	Yes	22	57	0.0805
		No	2	19	
3	Sanitary facility (toilets) in school	Yes	19	65	0.4588
		No	5	11	
4	Sanitary facility (toilets) at home	Yes	18	69	0.0449*
		No	6	7	
5	Source of drinking water at home	Safe	14	60	0.0447*
		Unsafe	10	16	
6	Source of drinking water in school	Safe	19	68	0.1906
		Unsafe	5	8	
7	Overcrowding at home	Yes	20	42	0.0135*
		No	4	34	
8	Family/parents' history of peptic ulcer	Yes	9	13	0.0355*
		No	15	63	
9	Family/parent's history of other gastric disease	Yes	10	20	0.1525
		No	14	56	

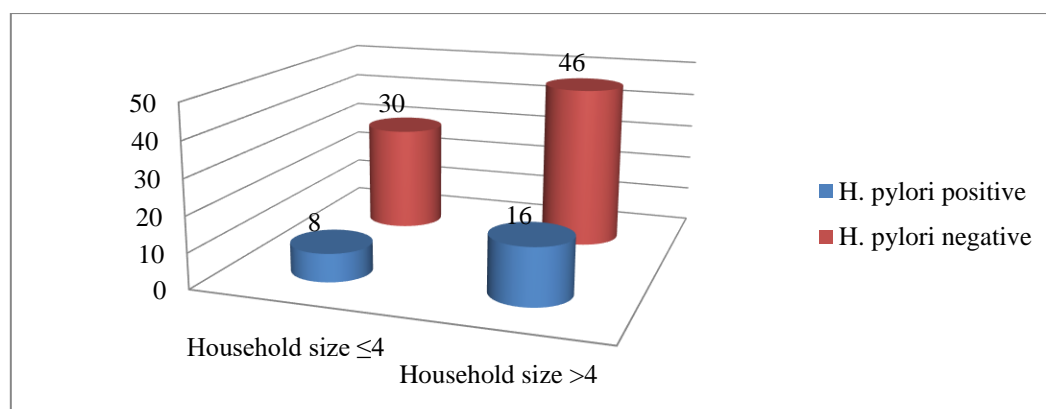
\*p<0.5=significant.



**Figure 1: Distribution of infection in various age groups.**



**Figure 2: Distribution of infection among urban and rural.**



**Figure 3: Distribution of infection in various households.**

As many as 38 of participants were found to be positive for *H. pylori* antibody test. Out of these 38 children, only 24 were found positive for antigen test upon stool sample examination. The number of participants in the present study as well as infection rate was more in the age group of greater than 6 years and upto 11 years of age (Figure 1) (Table 2). Infection rate also showed some relation to the rural background of majority of the participants (Figure 2) (Table 2). The positivity rate was significantly related to the household size as well, the bigger the household, the more chances of *H. pylori* infection (Figure 3) (Table 2). The infection rate was significantly higher among children having unsafe source of drinking water (14/24, 58.3%) at their homes and lacking sanitation facilities (18/24, 66.7%). Overcrowding at homes was generally resulting in more instances of infections. The family history of PUD also seemed to have some relation to this prevalence (Table 2).

## DISCUSSION

In a study conducted in 2019 by Ghilia et al on asymptomatic residents of UAE, where 2 to 15 years old comprised of 36.86% (129/350) of total studied group, a prevalence of 31.78% (41/129) was reported.<sup>15</sup> A study conducted in 2019 by Phoebe et al on children aged 1 to 15 years found a prevalence of 24.3%, which was quite similar to our study as well.<sup>16</sup> However, this prevalence is considerably low as compared to other studies done on children.<sup>17,18</sup> The low prevalence in our study would have been due to the recruitment of participants with a single or similar geographical characteristics. The low prevalence could also be due to the rising usage of antibiotics such as amoxicillin and metronidazole in the infections like gastrointestinal disorders. Studies have often demonstrated that rate of infection increased with age.<sup>19,20</sup> Even in children aged between 1 to 15 years. This could be attributed to increased exposure to sources of infections with the higher age. This also explains the higher rate of infection among school going children. There is similarity of findings among our participants too.

A study by Mahalanabis et al in 1996 in Bangladesh found a steady increase in *H. pylori* infection from age 3 months to 6-9 months and further among older children.<sup>2</sup> Overcrowding at home due to bigger household size was found to be a major risk factor among children. Similarly Miyaji et al also found that overcrowding increased the chances of acquiring *H. pylori* infection among children with increased chances of person to person transmission.<sup>21</sup> Prior studies also suggest that if all exposures are maintained as constant, both girls and boys would be infected equally by *H. pylori*.<sup>22</sup> Our study, however with a constrained sample size, tends to suggest the same. The issue of gender disparity in *H. pylori* infection is an intriguing topic and more research is needed to understand the mechanisms by which gender may influence the acquisition and persistence of infection. As the number of females among the participants was higher, the number of males and females among the positive patients were the same in the present study.

The limitation to the present study was found in its shortfall of data to analyze it as a multivariate model: simultaneously seeing and comparing the variables like school attendance, household size, family/parents' history of PUD, absence of good sanitation and hand-washing facilities at home and in schools, to get to some clinching evidence of sources of infection in the rural areas of Jammu region. Present study was not conducted upon a variety of demographic/geographical set ups could also be a limitation, while discussing in relation to other such studies conducted world-wide.

## CONCLUSION

The prevalence of *H. pylori* among children was quite high. Major risk factors included sanitation and drinking water facilities at home and at schools. More such studies, for a larger geographical area, with more elaborate survey questionnaire can be recommended. Improvement of sanitation facilities at schools and at homes and early diagnoses and treatment could help eradicate *H. pylori* infection from our society.

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