Living conditions and Helicobacter Pylori in adults

Abstract

Introduction: Infection by the bacterium Helicobacter pylori is a public health problem, transmissible, which affects people of all ages. Most of the factors associated with H. pylori infection include poor hygiene practices, poor basic sanitation, and an increased crowning index. However, the role of other associated factors has not yet been fully elucidated. Thus, the objective of this study was to identify factors (lifestyles, dietary factors and hygiene conditions) related to the prevalence of H. pylori infection.

Methods: We carried out an observational cross-sectional study with a community sample of adults from the municipalities of Viseu and Satão. The final sample resulted in 166 adults, aged between 19 and 92 years (mean of 46.96 ± 3.17 years) and the majority women (56.6%). The data were collected through a self-administered questionnaire with questions regarding sociodemographic aspects of the household, habits and lifestyles. H. pylori infection was identified using the 13C-urea breath test. The test was performed in the morning after at least 6 hours of fasting. Statistical analysis was performed using the statistical program SPSS 23.0. The prevalence was expressed in proportions and compared using the chi-square test, with a significance level of 0.05. The associations were calculated using the Odds Ratio (OR), with confidence intervals of 95% (CI 95%).

Results: No association was found between the prevalence of H. pylori infection and the use of tobacco, alcohol, coffee or dietary factors. Regarding the dietary factors analysed, the percentage of H. pylori infection was higher in adults who reported a higher consumption of fried food; a lower consumption of vegetables and fruit; and the consumption of soft drinks. Nonetheless, the differences found were not statistically significant. To what concerns the hygiene conditions, H. pylori infection was significant for the factor of lower frequency of handwashing before going to the bathroom (p=0.02) and well water consumption (p=0.05).

Conclusion: Of the analysed factors, we found a significant association for H. pylori infection with the lower frequency of hand washing before going to the bathroom and the consumption of well water.

Key words: *Helicobacter pylori, risk factors, adults, epidemiology*.

Introduction

H. pylori infection is a chronic and transmissible infectious disease, even though the exact chain of transmission is not fully known yet. It is believed that the human being is practically the only natural reservoir of H. pylori. Research suggests that contact with the bacterium occurs predominantly during childhood and intrafamilial[2,3]. Intrafamilial transmission appears to be the main route for the acquisition of this infection, especially among mothers and children, and among siblings, supporting the hypothesis that close contact is crucial for the transmission of the infection[4,5]. In developing countries, studies report that the hygiene conditions and the surrounding environment influence the transmission of H. pylori[6,7]. Person-to-person transmission through the oral-to-oral or faecal-to-oral routes are considered the most probable, and can be transmitted orally through faecal matter by the ingestion of water contaminated with waste[1]. Thus, factors related to H. pylori infection include a poor socioeconomic status, poor hygiene, inadequate sanitation conditions, overcrowding, consumption of contaminated water and food, and a bacterial infection within the household - poor social conditions, and the fact that, whilst a child, the mother and siblings were infected[1,8]. The improvement of hygiene standards, mainly due to the implementation of basic sanitation, a decrease in the number of close contacts and, possibly, an increase in the consumption of antibiotics, contributed to a gradual variation in the frequency of infection in the different phases of the life cycle. In other words, it now has a higher incidence in the later stages of childhood, adolescence and adulthood[4,9]. Therefore, the identification of the determinants of H. pylori infection in different phases of the life cycle is essential for the development of prevention and control strategies of the infection in populations with high prevalence, and which contribute to maintain the trend that has been observed in countries where the infection is less frequent.

A study from Brazil reported an increase in H. pylori infection associated with a higher number of siblings, schooling since nursery school, and housing with poor conditions and no paved roads - indicating poor living conditions[10]. Poor sanitation conditions and overcrowding may constitute risk factors for H. pylori infection. Likewise, the number of people per room and the number of children in a household were also identified as independent risk factors for H. pylori infection[11]. Another study conducted in Germany indicated a positive association for H. pylori infection for 'more than three children living in the household' (OR = 2.4; p = 0.001), 'more people living

per m^2 than the mean' (OR = 1.4; p=0.03), 'the house is located on the main road' (OR = 1.4; p=0.04) and 'consumption of well water' (OR = 2.3; p=0.05)[12]. However, the functions of many other associated factors are not fully clarified.

Accordingly, the objective of this study was to identify risk factors associated with Helicobacter pylori infection (dietary factors, lifestyles, and hygiene conditions).

Participants and Methods:

We carried out an epidemiological, transversal and analytical study. The sample consisted of 166 adult individuals from the municipalities of Viseu and Satão. The majority of the sample was female (56.6%) with a mean age of 46.96 ± 3.17 years (minimum of 19 years old and maximum of 92 years old). The majority of the sample presented an age of ≤ 50 years (54.8%); was married or lived in a non-marital partnership (64.5%); held a bachelor's or a licentiate's degree (35.2%), and was employed (70.9%).

We collected the data through a self-administered questionnaire, consisting of sociodemographic variables, the household composition and lifestyles (consumption of alcohol, tobacco and coffee). In order to evaluate the presence of H. pylori, we used the 13C-urea breath test, which consists of the exhalation of carbon dioxide in samples before and after the ingestion of urea labelled with non-radioactive carbon-13. Hence, the H. pylori infection was diagnosed when the respiratory test with ^{13}C-urea was positive. The test was performed in the morning, after at least 6 hours of fasting. The samples were then analysed and each result would be classified as positive or negative for the H. pylori gastric infection. The study was submitted and approved by the Ethics Committee of the Higher Education School of Health of the Polytechnic Institute of Viseu. The data collection instrument was voluntarily answered by adults, and the confidentiality and anonymity of the information collected was guaranteed.

After collecting the data, the questionnaires were numbered, stored and processed, using the Statistical Package for Social Sciences (SPSS 23.0 version). The prevalence was expressed in proportions and the Odds Ratio (OR) with a 95% confidence interval (CI) was used to measure the strength of the association between variables. Proportions were compared by the chi-square test. The level of significance was set at 5% ($p < 0.05$).

Results:

The prevalence of H. pylori was 48.8%, higher in females (50.0% vs. 47.2%, p=0.72), in individuals over 40 years of age (51.8% vs. 42.9, p=0.27), with lower academic qualifications (≤ 12th grade 53.3% vs. >12th grade 43.8%, p=0.23), in adults who reported having two or more siblings (53.8% vs. 42.7%, p=0.15), but with no statistical differences for the sociodemographic variables.

Regarding the lifestyle and the presence of H. pylori, Table 1 shows that there was no association between the prevalence of H. pylori infection and the use of tobacco, alcohol or coffee. The prevalence of H. pylori infection is higher in individuals who do not drink alcohol, do not smoke and do not drink coffee. Nevertheless, no statistically significant association was found. Also, among adults who drink coffee, the prevalence for H. pylori infection is higher in those who report drinking 2 or more coffees a day, without any significant differences.

Table 1 - Relationships between the prevalence of H. pylori infection and lifestyles

	No. H. pylori Positive	No. H. pylori negative	Total	Prevalence Hp	OR	p
Alcohol Consumption						
Yes	22	31	53	41,5	0,65 (0,34-1,26)	0,20
No	59	54	113	52,2	1*	
Tobacco Consumption						
Yes	20	31	51	39,2	0,57 (0,29-1,12)	0,10
No	61	54	115	53,0	1*	
No. of cigarettes per day						
≤ 10 cigarettes	14	19	33	42,4	1,33 (0,36-4,83)	0,67
>10 cigarettes	5	9	14	35,7	1*	
Coffee Consumption						
Yes	56	63	119	47,1	0,75 (0,40-1,54)	0,48
No	25	22	47	53,2	1*	
No. of coffees per day						
1	26	36	62	41,9	0,61 (0,30-1,30)	0,21
2 or more	28	24	52	53,8	1*	

The results in Table 2 suggest that the H. pylori infection was higher for individuals who reported they had never or would rarely eat fried food, when compared to adults who reported eating fried food at times or almost every day (OR = 1.04, CI95% 0.56-1.92). It increased for individuals who ate vegetables less frequently (50.0%) in comparison to those who ate them almost every day or every day (48.8%, p = 0.84). In contrast, the prevalence of H. pylori was higher in people who did not drink milk (55.2% vs. 47.4%; p = 0.45), and in adults who reported drinking soft drinks (OR =

1.33, CI95% 0.71-2.49). However, we did not find any dietary factor with a significant association to H. pylori infection.

Table 2 - Association between the prevalence of H. pylori infection and dietary factors

	No. H. pylori Positive	No. H. pylori negative	Total	Prevalence Hp	OR (CI95%)	p
Frequency of eating fried food						
Never / rarely	36	37	73	49,3	1,04 (0,56-1,92)	0,91
Sometimes / almost every day	45	48	93	48,4	1*	
Frequency of eating vegetables						
Rarely / sometimes	25	25	50	50,0	1,07 (0,55-2,08)	0,84
Almost every day / every day	56	60	116	48,3	1*	
Frequency of eating fruit						
Never / sometimes	18	19	37	48,6	0,99 (0,48-2,06)	0,98
Almost every day / every day	63	66	129	48,8	1*	
Consumption of milk						
Yes	65	72	137	47,4	0,73 (0,33-1,64)	0,45
No	16	13	29	55,2	1*	
Consumption of soft drinks						
Yes	53	50	103	51,5	1,33 (0,71-2,49)	0,38
No	28	35	63	44,4	1*	

Most people reported having piped water (n=162; 97.6%), but 4 people (2.4%) reported not having piped water. In relation to the sewage system, most of the sample reported that they have a sewage network (n=159, 95.8% vs. n=7, 4.2%).

When we analysed the relation between the prevalence of H. pylori infection and hygiene conditions (Table 3), we found that individuals who mentioned having washed their hands before going to the bathroom rarely or sometimes, had a lower risk than those who had never done this (OR = 0.40, CI95% 0.18-0.87). Also, the consumption of well water is positively related to H. pylori infection (OR = 2.13, CI95%, 1.00-4.64), although the statistical association is marginal. In relation to all the other variables analysed, we did not find any statistically significant differences.

Table 3 - Prevalence of H. pylori infection and hygiene conditions

	No. H. pylori Positive	No. H. pylori negative	Total	Prevalence Hp	OR	p
Frequency of washing hands before going to the bathroom						
Never	25	16	41	61,0	1*	
Rarely / Sometimes	30	48	78	38,5	0,40 (0,18-0,87)	**0,02**
Almost always / always	26	21	47	55,3	0,79 (0,34-1,86)	0,59
Frequency of washing hands after going to the bathroom						
Never / sometimes	6	9	15	40,0	1*	
Almost always	17	18	35	48,6	1,42 (0,42-4,83)	0,56
Always	58	58	116	50,0	1,50 (0,50-4,49)	0,47
Frequency of washing hands before meals						
Never / rarely	7	8	15	46,7	1*	
Sometimes / almost always	38	34	72	52,8	1,28 (0,42-3,90)	0,66
Always	36	43	79	45,6	0,96 (0,32-2,89)	0,94
Frequency of washing hands before going to sleep						
Never	13	11	24	54,2	1*	
Rarely / sometimes	27	33	60	45,0	0,69 (0,27-1,79)	0,45
Almost always/ always	41	41	82	50,0	0,85 (0,34-2,11)	0,72
Has ever bitten their nails						
Yes	28	25	53	51,5	1,27 (0,66-2,44)	0,48
No	53	60	113	44,4	1*	
Drinks water						
Public network	24	33	57	42,1	0,91 (0,44-1,87)	0,79
Well	29	17	46	63,0	2,13 (1,00-4,64)	**0,05**
Bottled	28	35	63	44,4	1*	

Discussion

In the current study, we intend to identify dietary factors, lifestyles and hygiene conditions associated with H. pylori infection. We did not find any significant differences between H. pylori infection and coffee, alcohol and tobacco consumption. Evidence is also not consensual about the association with these variables. A study carried out in Japan showed that smoking was negatively related to H. pylori infection. Some studies show a positive relationship whilst others have found no relationship between smoking and H. pylori infection[1,13,14]. Other studies have shown an association between H. pylori infection and tobacco consumption, the number of cigarettes per day (suggesting that the risk of H. pylori infection decreased with the daily cigarette consumption)[1]. Regarding alcohol consumption, previous studies have found a relationship between H. pylori infection and alcohol consumption, although most of them did not find a significant association[15,16]. Interestingly, in a cross-sectional study of 447 adults with a positivity evaluation of H. pylori using 13C urease, Brenner found a 21% prevalence of infection and suggested a negative dose-response relation to alcohol consumption (consumption> 75g ethanol/week after adjusting the variables for gender,

age, educational level, nationality and family history of ulcer, OR=0-33 CI95% 0-16-0-68) and a positive dose-response relation for coffee consumption (less than 3 coffees OR=1.49 CI95% 0.71 -3.12 and ≥3 coffees OR=2.49 CI95% 1.23 -5.03) [17].

Regarding hygiene conditions, studies have shown an increase in H. pylori infection associated with a greater number of siblings, housing in a street with unpaved roads and no sanitary conditions, indicating worse living conditions, the use of well water and a higher agglomeration index as risk factors[10,12]. In this study, we observed a borderline association with well water consumption (p=0.05) and an association with washing hands before going to the bathroom (p=0.02).

With regards to dietary factors and the infection, studies have reported that some dietary risks for gastritis are also risk factors for H. pylori[18,19].

Once again, there is evidence that H. pylori is associated with the consumption of contaminated water, but not food. It is thought that person-to-person contact is the most likely mode of transmission, and there is no direct evidence that food is involved in the transmission of H. pylori[20]. This association between food and H. pylori infection will be related not only to the type of diet (healthy, unhealthy), but especially to the consumption of contaminated food, in which this contamination will be higher when consuming contaminated raw vegetables and fruit. In developing countries, the consumption of drinking water and vegetable products contaminated by sewage can be a risk[21]. The consumption of vegetables and fruit, raw and contaminated, (fertilized with faeces) was considered a risk factor for infection as well as the consumption of contaminated water[21-23].

Conclusion

Of the food factors, lifestyles and hygiene conditions, we found a significant association for H. pylori infection with the lower frequency in hand washing before going to the bathroom and the consumption of well water.

Additional research should address the relations observed in representative population samples and aim to gain an understanding of their underlying mechanisms. Thus, the identification of the determinants of H. pylori infection in different phases of the life cycle is essential for the development of prevention strategies that can accelerate the disappearance of the infection in populations with a high prevalence, and that contribute

to maintain the trend that has been observed in countries where the infection is less frequent.

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