Available online on 15.09.2024 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Copyright © 2024 The Author(s): This is an open-access article distributed under the terms of the CC BY-NC 4.0 which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited

Open Access Full Text Article

Research Article

Assessment of *Helicobacter pylori* Infection and Associated Risk Factors in Asymptomatic Patients Attending Muhoza Health Center

ISHIMWE Alain Prudence *, TUYISHIME Jean de Dieu, UWAMAHORO Consolée, NZEYIMANA Godefroid, MIGABO Hiberte

Ines-Ruhengeri, Faculty of Applied Fundamental Sciences, Department of Biomedical Laboratory Sciences, Rwanda

Article Info:

Article History:

Received 15 Feb 2024
Reviewed 09 April 2024
Accepted 16 August 2024
Published 15 Sept 2024

Cite this article as:

Alain Prudence I, Jean de Dieu T, Consolée U, Godefroid N, Hiberte M, Assessment of *Helicobacter pylori* Infection and Associated Risk Factors in Asymptomatic Patients Attending Muhoza Health Center, Journal of Drug Delivery and Therapeutics. 2024; 14(9):83-87 *DOI: http://dx.doi.org/10.22270/jddt.v14i9.6454*

*Address for Correspondence:

ISHIMWE Alain Prudence, Ines-Ruhengeri, Faculty of Applied Fundamental Sciences, Department of Biomedical Laboratory Sciences, Rwanda.

Abstract

Background: *H. pylori,* is a bacterial pathogen that colonizes the gastric mucous lining and the epithelial tissue of the stomach. *Helicobacter pylori* strains infections can lead to several diseases such as duodenal ulcers, gastric ulcers, adenocarcinoma of the distal stomach, mucosa-associated lymphoid tissue (MALT) lymphoma, diabetes mellitus, cardiovascular disease and autoimmune diseases. The objectives of this study were to assess the prevalence of *H. pylori* infection and risk factors associated with *H. pylori* in asymptomatic participants attending Muhoza health center

Methodology: A cross-sectional study was conducted from 13th September to 13th October. Stool samples from 60 eligible participants were collected in sterile containers and they were immunoserologicaly analysed. Rapid tests were used to detect *H. pylori* antigens. A liquid in the testing kit was mixed with a small portion of the stool. The mixture was poured to the sample hole on the rapid test which displayed results. Data regarding risk factors were collected using questionnaires and were analyzed statistically using SPSS 20.

Results: The prevalence of *H. pylori* infection was 37%. Females were more affected than males, with 25% and 12% respectively. Age, education, source of water and household population were significantly associated with *Helicobacter pylori* with p-values < 0.05. The study was limited since it was one health center based, hence not having large representative population.

Conclusion: Education of the population about prevention of the infection, supply clean, treated water for home usage and drinking, are recommended to the local government authorities in Musanze. Screening for *H. pylori* infection, good adherence on antibiotics against *H. pylori*, hand washing, and proper household settings to reduce crowding issue are recommended. Further researches are recommended for more conclusive results.

Keywords: *H. pylori* infection, risk factors, stomach, asymptomatic.

INTRODUCTION

Helicobacter pylori, is a bacterial pathogen that colonizes the gastric mucous lining and the epithelial tissue of the stomach. The bacterium is known to cause gastric cancer 50% of the world's population is infected by *H. pylori* and the frequent cause of chronic bacterial infection is blamed on *H. pylori1*[1]. Diseases such as duodenal ulcers, gastric ulcers, adenocarcinoma of the distal stomach, mucosa-associated lymphoid tissue (MALT) lymphoma, diabetes mellitus, cardiovascular disease and autoimmune disease can be caused by *H. pylori* [2]. The organism can be transmitted through poor sanitation, which is one of potential risk factors with house flies transmitting the infection mechanically. Use of water contaminated with faeces, use of endoscope tubes and person to person transmission have been reported to predispose people to *Helicobacter Pylori*[3]. *H. pylori* can be diagnosed through invasive and non-invasive techniques such as using stool to detect antigen and serological test to detect antibody. The fact that *Helicobacter pylori* differ genetically, it develops antibiotic resistance to several antibiotics and can survive in acidic environment[4]. Globally *Helicobacter pylori* infection is one of the major public health problems causing chronic gastritis and peptic ulcers, gastric ulcers and associated carcinoma. Despite of the measures taken, *H. pylori* remain a common bacterial pathogen infecting 70–90% of the population in developing countries, and 50% in developed countries[5]. In Rwanda, the overall prevalence of *H. pylori* infection was 77.5% between 2016 and 2018 and 80% of these, had chronic gastritis while 76% had gastric adenocarcinoma cases[6]. Studies regarding *Helicobacter pylori* infection based on stool antigen among asymptomatic patients in Rwanda are scarce to none. Additionally, people may asymptomatically be carrying *H.pylori* infection and this can prevent early treatment before advancement and spreading of the infection. This study was attempted to assess *Helicobacter pylori* infection and associated potential risk factors in asymptomatic patients at Muhoza health center, Rwanda.

METHODS

Study Setting and Design

A cross-sectional study, was carried out at Muhoza health center, in Musanze District, Muhoza sector and was restricted in immunoserology section at Muhoza health center.

Data Collection

The study involved both male and female patients with no history of *Helicobacter pylori* infection who are above 5 years old attending Muhoza health center. 60 study participants who had no symptoms of gastritis, or not having gastric ulcers and/or duodenal ulcers were included. Children below 5 years of age and Patients who were on treatment for ulcers, using drugs like proton pumps inhibitory and antibiotics within the last seven days before the study were excluded. During the study period, patients without gastritis symptoms were given clean, dry, stool containers without any preservatives and instructed to put stool sample for *H. pylori* testing and also not to contaminate the sample. Stool samples from study participants were directly taken to the laboratory to be analysed immunoserologically.

Helicobacter pylori stool antigen detection

The *H.pylori* Ag rapid test cassette (faeces) is lateral flow chromatographic immunoassay based on the principle of the double antibody-sandwich technique. The test cassette consists of 1; a burgundy colored conjugate pad containing *H.pylori* antibodies conjugated with color particle , a nitrocellulose membrane strip containing a test band (T band) and a control band (C band). The T band is pre-coated with non-conjugated *H. pylori* antibodies. When an adequate volume of test specimen is dispensed into the sample well of the cassette, the specimen migrates by capillary action across the cassette. The antigen of *H. pylori* if present in the specimen will bind to the *H. pylori* antibodies conjugates. The immunocomplex is then captured on the membrane by the precoated *H. pylori* antibodies, forming a burgundy colored T band, indicating *H.pylori* antigen positive test results. To serve as a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred. Otherwise, the test is invalid and the specimen must be retested with another device[7].

Testing procedure

A liquid in the testing kit was mixed with a small portion of the stool and once there is a thorough mixture, it was poured to the sample hole on the rapid test. The test device has "T" (Test Line) and "C" (Control Line). Both the Test Line and the Control Line in the result window are not visible before applying any samples. "T" window coated with monoclonal anti-*H. Pylori* formed a line after the addition of the stool specimen[8].

Ethical Considerations

An official approval letter to conduct the study was provided by Muhoza health center Director. An informed consent form was then given to the patients who were willing to participate in the study after receiving explanations about the relevancy of the study. The information of the study participants was only used for academic purpose.

RESULTS

Socio-demographics and socio-economic characteristics of the study participants

Socio-demographic and socio-economic characteristics of the population were established in order to characterize the population (Tab.1). Out of 60 asymptomatic patients attending Muhoza health center the majority were females, with 34 (57%) and the age ranged from 5 to 70. Most study participants were in the age group of [10-20], with 32% and the age group of >50 had the least number of participants with 5%. For education, most participants 23(38%) were in secondary school. Only 4 participants were attending university with 6.60%. Those who were attending kindergarten and primary were 5, 8% and 18, 30% respectively. According to socio-economic level, most participants were in level 1 with 22, (36 %.) A few participants (3) were in 4th socio-economic level with 5%. Profession wise, most of the study participants were farmers (32, 53%). The least number of participants were the students with 6.6%.

Table 1: Socio-demographics and socio-economic characteristics of the study population

Variables		No	%
Gender	Male	26	43%
	Female	34	57%
Age groups	[5-10]	15	25%
	[10-20]	19	32%
	[20-30]	5	8%
	[30-40]	12	20%
	[40-50]	6	10%
	>50	3	5%
Education	No	10	17%
	Kindergarten	5	8%
	Primary	18	30%
	Secondary school	23	38%
	University	4	6.60%
Socio-economic level	1	25	41.60%
	2	19	31.60%
	3	16	26.60%
	4	0	0%
Profession	Farmer	32	53.30%
	Civil servant	8	13.30%
	Private	15	21.60%
	Student	4	6.60%

The prevalence of *H. pylori* infection in asymptomatic patients

In this study, the prevalence of *H. pylori* infection was determined and the overall prevalence was 37% (Fig. 1). The prevalence was further determined in males and females with 25% and 12% respectively.

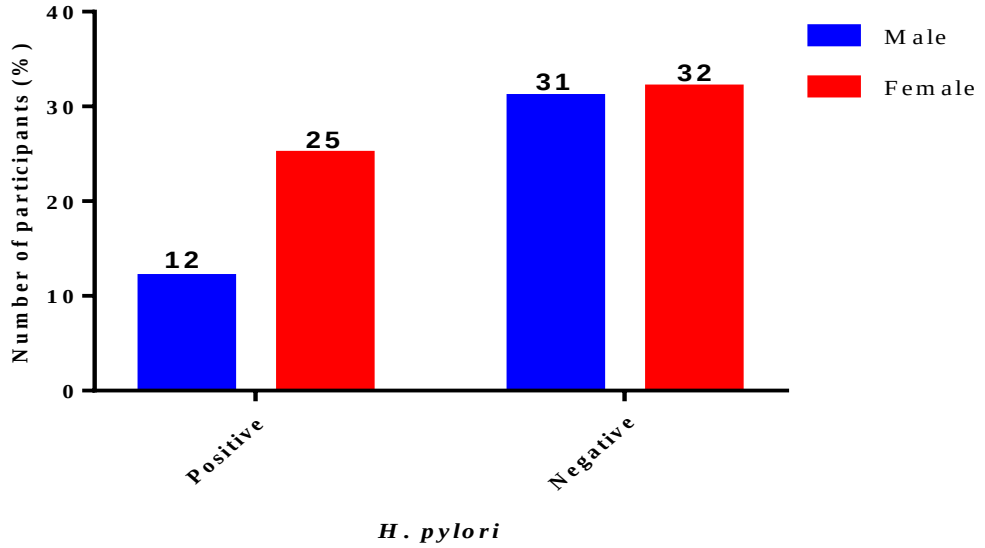


Figure 1: **Prevalence of *H. pylori* among asymptomatic participants**

Risk factors associated with *H. pylori* in asymptomatic participants

Risk factors associated with *Helicobacter pylori* infection were studied among asymptomatic patients at Muhoza health center. The risk factors were further classified into sociodemographic-socioeconomic (Tab.2) and living conditions risk factors (Tab.3).

Table 2: Sociodemographic-socioeconomic risk factors and their association with *Helicobacter pylori* infection

Socio-demographic and -economic risk factors		Number	*H. Pylori* positive (%)	p-value
Gender	Male	26	7(11.7)	
	Female	34	15(25)	0.171
Age groups	[5-10 [	15	6(10)	0.019
	[10-20 [	19	10(16.7)	
	[20-30 [	5	4(6.7)	
	[30-40 [	12	2(3.3)	
	[40-50[	6	0(0)	
	>50	3	0(0)	
Education	No	10	1(1.7)	0.027
	Kindergarten	5	0(0)	
	Primary	18	6(10)	
	Secondary school	23	12(20)	
	University	4	3(5)	
Socioeconomic level	1	25	10(16.7)	0.195
	2	19	9(15)	
	3	16	3(5)	
	4	0	0(0)	
Profession	Farmer	32	13(21.7)	0.195
	Civil servant	8	2(3.3)	
	Private	15	4(6.7)	
	Student	4	3(5)	

Table 3: Living conditions risk factors and their association with *Helicobacter pylori* infection.

Living conditions		Frequency	*H. Pylori* positive (%)	p-value
Hands washing with soap	Always	9	2(22)	0.241
	Often	14	3(21.4)	
	Seldom	11	4(36.3)	
	Never	26	13(50)	
Source of water for home usage and drinking	Tape	21	6(28.5)	0.045
	Rain water tank	6	1(16.6)	
	River	17	11(64.7)	
	Tape Water Tanks	6	4(66.6)	
Living/ have lived with a person with ulcers history	Yes	23	9(39)	0.755
	No	37	13(35)	
House hold population (Persons/home)	1-3	5	3(60)	0.001
	4-5	34	1(3)	
	>6	21	18(86)	

DISCUSSION

H. pylori, is a serious pathogen that colonizes the gastric mucous lining and the epithelial tissue of the stomach leading to a range of several diseases. The prevalence for *H. pylori* infection was low compared to the prevalences 75% and 67.7% prevailed in the studies conducted at University Teaching Hospital of Butare, Rwanda and in Harare, Zimbabwe respectively[9,10]. Difference in prevalences might be due to different study period, study area, study population, environment and testing method used. The above studies used rapid urease test while in the present study, stool antigen test was used. This study showed that the prevalence of *H. pylori* was higher in females than in males with 25% and 12% respectively. This is supported by the study conducted in Nigeria which revealed the higher prevalence in females than in males with 31% and 20% respectively[11]. This could be due to the fact that most females are usually with children who may get infected while coming in contact with infected area and also due to almost constant contact with household items that may be contaminated with *H. Pylori* infection. These findings are in contradiction with the study reported among Nigerian patients with dyspepsia, in Badani[12].

Age was significantly associated with *Helicobacter pylori* infection (p-value 0.019). The most affected age groups were [11-20[and [5-10[. This might be influenced by the fact that children and adolescents are more exposed to contaminated food and drinks. Additionally, these children are school aged, and after commencing school, the poor hygiene and concentration at schools increase the chance of person-to-person transmission of *H. pylori* infection, while adolescents are active travellers and may come in contact with contaminated food in restaurants and shops selling fast foods. These findings are similar to the results reported among asymptomatic patients at surgical outpatients department, in Harare, Zimbabwe[10]. Education was significantly associated with *Helicobacter pylori* infection with p-value 0.027. Secondary school goers were more infected than others, and this is probably due to poor hygiene and concentration at the schools, contributing to transmission of *H. pylori* infection. Similar results were reported in an oilfield Community in Hebei, China[13].

Source of water was significantly associated with *H. pylori* infection (p value 0.045). The highly affected participants were those who used river water. This is because river water can be contaminated with *Helicobacter pylori*, whose active, spiral form of *H. pylori* can survive in river water for at least a week, and coccoid form can survive for a year or more. This is in comparison with the study about *Helicobacter pylori* in the drinking water in Peru[7]. 15 Household population was significantly associated with *H. pylori* infection (p value= 0.001). Higher percentage of the infection was observed in household of above 6 people in the house (30%) while lower percentage of infection (5%) was in households with 1 - 3. This was due to close interpersonal contacts and that family members share a genetic predisposition to *H. pylori*, making them exposed to a common source of infection and share the socio-economic status[12]. Similar findings were observed among children aged 1 to 15 years at holy Innocents children's hospital, Mbarara, south western Uganda[14].

CONCLUSION

The prevalence of *Helicobacter pylori* infection was high among the asymptomatic patients. Only age, education level, source of water and household population were

significantly associated with having the infection. Education of the population about prevention of the infection, clean source of water for drinking and home usage is recommended to the local government authorities in Musanze. Screening for *H. pylori* infection, good adherence on antibiotics against *H. pylori*,proper hand washing, and proper household settings to reduce crowding issue is recommended to the citizens. Carrying out country wide research about *H. pylori* infection would be very useful in order to establish new epidemiologic data.

Acknowledgments

Our gratitude **is e**xtended to Ines Ruhengeri and Ruhengeri Muhoza health center administration for facilitating this study at their health facilities.

Conflict of interest

Authors declare no conflict of interest

Availability of raw data and material

Raw data and information on material should be obtained from the corresponding author upon request.

REFERENCES

1. Kao C. Y., Sheu, B.S., & Wu, J.J. Helicobacter pylori infection: an overview of bacterial virulence factors and pathogenesis. Biomed Journal, 2016;39(1):14-23. https://doi.org/10.1016/j.bj.2015.06.002 PMid:27105595 PMCid:PMC6138426

2. Gunaletchumy, S. P., Seevasant, I., Tan, M. H., Croft, L. J., Mitchell, H. M., & Goh, K. L., Helicobacter pylori genetic diversity and gastro-duodenal diseases. Journal of Infectious Disease, 2014;23(3):74. https://doi.org/10.1038/srep07431 PMid:25503415 PMCid:PMC5377019

3. Fontham, E. T., Ruiz, B., Perez, A., Hunter, F., & Correa, P. Determinants of Helicobacter pylori infection and chronic gastritis. American Journal of Gastroenterology, 2015;90(7):20.

4. Woodward, M., Morrison, C., & McColl, K. An investigation into factors associated with Helicobacter pylori infection. Journal of Clinical Epidemiology, 2020;53(2):175-181. https://doi.org/10.1016/S0895-4356(99)00171-7 PMid:10729690

5. David, Y. G., Lee, Y. C., & Wu, M. S., Rational Helicobacter pylori therapy evidence-based medicine rather than medicine-based evidence. Clinical Gastroenterology and Hepatology, 2014;12(2):77-86. https://doi.org/10.1016/j.cgh.2013.11.021

6. Nizeyimana, T. B., Manirakiza, F., Laga, C. A. Occurrence of Helicobacter pylori in specimens of chronic gastritis and gastric adenocarcinoma patients retrospective study at university teaching hospital. East Africa Health Research Journal, 2012;5(2):59-63. https://doi.org/10.24248/eahrj.v5i2.667 PMid:35036842 PMCid:PMC8751541

7. Hulten, K., Han, S. W., Enroth, H., Klein, P. D., Opekun, A. R., Gilman, R. H., & El-Zaatari, F.A. Helicobacter pylori in the drinking water in Peru. Gastroenterology, 2016;11(1):31-35.

8. Demiray, E., Yılmaz, Ö., Şarkış, C., Soytürk, M., & Şimşek, İ. Comparison of invasive methods and two different stool antigen tests for diagnosis of H. pylori infection in patients with gastric bleeding. World Journal of Gastroenterology, 2013;12(1):42. https://doi.org/10.3748/wjg.v12.i26.4206 PMid:16830376 PMCid:PMC4087375

9. Walker, T.D., Karemera, M., Ngabonziza, F., &Kyamanywa, P. Helicobacter pylori status and associated gastroscopic diagnoses in a tertiary hospital endoscopy population in Rwanda. The Journal of Clinical Investigation, 2014;113(3):32-36. https://doi.org/10.1093/trstmh/tru029 PMid:24598794 PMCid:PMC3989937

10. Simbarashe, G., Mungazi, O., Blessing, C., & Godfrey, I. Prevalence of Helicobacter pylori in asymptomatic patients at surgical outpatient department. Annals of Medicine and Surgery 2018;35(1):153-157. https://doi.org/10.1016/j.amsu.2018.09.040 PMid:30302246 PMCid:PMC6174827

11. Okolona, A. B., Gashau, W., Bwala, S., Adamu, A., & Salawu, F.K. Helicobacter pylori infection in Nigerians with dyspepsia. Ghana Medical Journal, 2013;47(2):79-81.

12. Hooi, K. B., Ali, B. U. & Musa, M. B. Prevalence of Helicobacter pylori infection in gastroduodenal diseases in Nigeria. African journal of Medical and Health Sciences, 2018 ;17(1):41-46. https://doi.org/10.4103/ajmhs.ajmhs_36_17

13. Wang, W., Jiang, W., Zhu, S., Sun, X., Li, P., Liu, K., & Zhang, S. Assessment of prevalence and risk factors of Helicobacter pylori infection in an oilfield Community in Hebei, China. BMC Gastroenterology, 2019 ;19(1):1-8. https://doi.org/10.1186/s12876-019-1108-8 PMid:31726980 PMCid:PMC6857281

14. Phoebe, A., Michael, M., Simon, O., Maurice, N., & Caesar, O. Prevalence and risk factors of Helicobacter pylori infection among children aged 1 to 15 years at holy Innocents children's hospital, Mbarara, south western Uganda. Journal of Tropical Medicine, 2019;10(4):6. https://doi.org/10.1155/2019/9303072 PMid:30984271 PMCid:PMC6431523