Sero-prevalence and associated factors of *Helicobacter pylori* infection among adult patients with dyspepsia attending the gastroenterology unit in a tertiary hospital in Mwanza, Tanzania.

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Abstract

Background: Prevalence of *H.pylori* infection varies greatly between populations in different countries. This study was conducted to determine the magnitude of *H.pylori* among adult patients with dyspepsia attending the gastroenterology unit at Bugando medical centre.

Methods: A cross sectional study involving 202 dyspeptic patients was conducted between June and July 2014. A Standardized data collection tool was used to collect socio-demographic characteristics. *H.pylori* antibodies were detected using rapid immunochromatographic tests according to manufacturer's instructions.

Results: The median age of study population was 42 (IQR: 33-54). Females 105 (51.9%) formed majority of the population studied. Of 202 participants; 119 (58.9%) were from rural areas. Seroprevalence of *H.pylori* infection was found to be 79/202 (39.1%, 95% CI: 32.3 -45.7). As the age increased the risk of having *H.pylori* infection also increased (OR: 1.02 95% CI: 1-1.04, P=0.02). On multivariate logistic regression analysis untreated drinking water was found to predict *H.pylori* seropositivity (OR: 2.33, CI: 1.09-4.96, p=0.028).

Conclusion: The seroprevalence of *H.pylori* among dyspeptic patients is high in this setting. Therefore the community in Mwanza should be educated on the use of safe drinking water in order to minimize *H. pylori* infections.

Keywords: *H.pylori,* dyspepsia, Tanzania.

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Background

Helicobacter pylori is one of the major public health problems worldwide. More than half of the world's population is infected and humans are considered to be the only reservoirs[1]. *H.pylori* infections can lead to gastritis, peptic ulcer, gastric carcinoma and mucosal associated lymphoid tissue (MALT) lymphoma[2]. Majority of the infected individuals are asymptomatic; nevertheless a small percentage tends to develop manifestations of peptic ulcer diseases later in life[1].

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H.pylori is commonly transmitted by fecal oral route through contaminated water and food[3]. Lack of proper sanitation, basic hygiene, poor diets and overcrowding have been found to play a significant role in *H.pylori* infection[4]. *H.pylori* infection is common throughout the world, the seroprevalence as high as >90% has been reported in many developing countries compared to 1.2-48.8% in developed countries[5]. In Africa the seroprevalence has been found to range between 19.26% and 92%[6,7] while in Tanzania the prevalence range from 65% -79% among dyspeptic patients[7,8]. A wide variation in the seroprevalence of *H.pylori* infection within and between different populations has been observed. Despite these variations

there is no single study in Mwanza to show the magnitude of previous *H. pylori* infections. This study was done for the first time in Mwanza, Tanzania to investigate the magnitude and factors associated with previous *H.pylori* infection.

Materials and methods

Study design and settings

This was a cross-sectional hospital based study conducted at gastroenterology unit at the Bugando Medical Centre (BMC) between June and July 2014 to investigate the magnitude of *H.pylori* infection. The study included all dyspeptic patients who consented to participate in the study. BMC is a tertiary, consultant and teaching hospital serving a population of about 13 million in the Lake zone of Tanzania.

Sample size and sampling

The sample size was determined by using Kish Leslie formula; a proportion of 22.5% was used[9]. The minimum sample size obtained was 188. Dyspeptic adult patients with no active bleeding were serially enrolled until the sample size was reached.

Data collection

A standardized structured data collection tool was used to collect associated factors such as demographic and general characteristics. Dyspepsia was defined as difficult, or disturbed digestion, which may be accompanied by symptoms such as epigastric pain, nausea, vomiting, bloating and heartburn[10]. In this study illiterate and primary school level was defined as low education while secondary school and tertiary level were defined as high education. Treated drinking water was defined as water from the city supply or commercial available bottled water.

To determine *H.pylori* specific IgG antibodies about 4-5ml of blood sample was drawn from participants and placed in a plain vacutainer tubes (BD, UK). Specimens were taken to BMC laboratory where sera were extracted. *H.pylori* IgG antibodies were detected using rapid immunochromatographic kits (Flexsure-HP, SmithKline Diagnostics, Inc USA). The test has specificity and sensitivity of 95% and 96% respectively[11].

Data analysis

Data was entered in the computer using excel software and analysed using STATA version 11(STATA Corp LP, USA). The main outcome in this study was being *H.pylori* IgG antibody positive. Categorical variables such as sex, residence, source of drinking water, education level, water treatment, and hand washing before eating were summarized as proportions while age was summarized as median with interquartile range (IQR). Univariate and multivariate logistic regression analysis were done to determine factors predicting *H.pylori* infection. Factors with p- values less than 0.05 were considered statistically significant at 95% confidence interval (CI).

Ethical considerations

The study was approved by the joint CUHAS/BMC research ethics and review committee and permission was obtained from gastroenterology unit administration. Written informed consent was sought from each participant prior to enrolment in the study.

Results

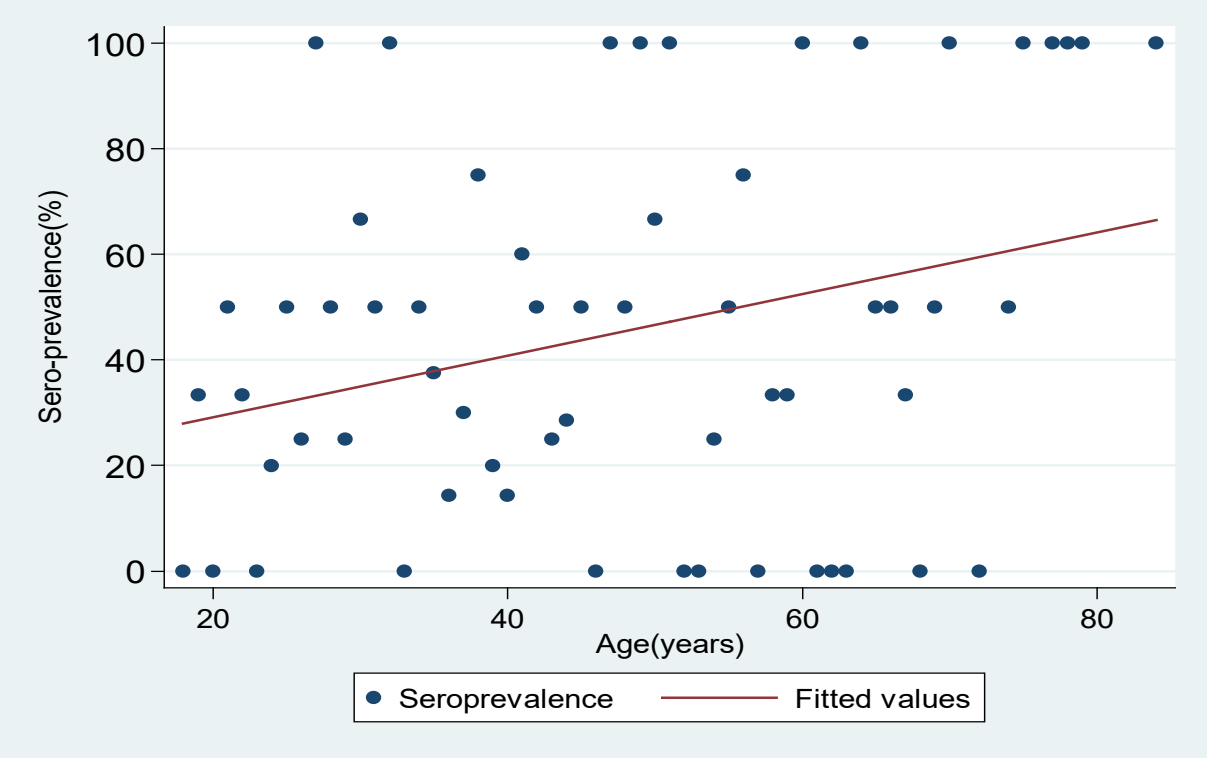
Demographic characteristics

A total of 202 patients were recruited at the gastroenterology unit with median age of 42(IQR: 33-54) years. Females 105(51.9%) formed majority of the study population. Of 202 participants; 119(59%) and 83(41%) were residing in rural and urban areas respectively. Regarding occupational status; 16(7.9%) were students, 46(22.7%) were employed and 140(69.3%) were unemployed.

Prevalence and factors associated with H.pylori infections

A total of 79(39.1%; 95% CI: 32.3 -45.7) participants were sero-positive for *H.pylori.* As the age increased the risk of having *H.pylori* infection also increased (OR: 1.02 95% CI: 1-1.04, P=0.02) (figure1).

Figure 1: As the age increases the risk of having *H.pylori* infection also increases by 2% while the seroprevalence of *H.pylori* increases by 0.5%



On univariate logistic regression analysis; low education level was significantly associated with *H.pylori* seropositivity (49.5% vs. 28.7%; OR: 2.43, CI 1.36-4.35, P=0.003). Patients who used untreated drinking water had 2.33 times risk of getting *H.pylori* infection compared to those used treated water (58.7% vs.30%, P<0.001) table1. Only water treatment was found to be an independent predictor of *H.pylori* seropositivity on multivariate logistic regression analysis (OR: 3.28, CI: 1.77-6.10, P=0.028). (Table 1)

Table1: Univariate and multivariate logistic regression analysis of factors associated with *H.pylori* infection among 202 adult patients

Characteristics	Positive test (N, %)	Univariate		Multivariate	
		OR(95% CI)	P value	OR(95% CI)	P value
Age(years)	**42(IQR:33-54)**	**1.02(1-1.04)**	**0.024**	**1.01(0.98-1.03)**	**0.469**
Sex					
Male(97)	36(37.11%)	1			
Female (105)	43(40.95%)	1.17(0.66-2.07)	0.577	1.31(0.69-2.44)	0.410
Occupation					
Students(16)	4(25%)	1			
Not employed(141)	58(41.13%)	2.09(0.64-6.82)	0.219		
Employed(45)	17(37.78%)	1.82(0.51-6.56)	0.359	1.93(0.92-4.02)	0.08
Education level					
High (101)	29(28.7%)	1			
Low (101)	50(49.5%)	2.43(1.36-4.35)	0.003	1.32(0.64-2.67)	0.448
Source of drinking water					
Tape water(101)	32(31.68%)	1			
Other sources(101)	47(46.53%)	1.87(1.05-3.32)	0.031	0.83(0.39-1.77)	0.634
Water treatment					
Yes(139)	42(30.22%)	1			
No(63)	37(58.73%)	3.28(1.77-6.10)	<0.001	2.33(1.09-4.96)	0.028
Hand washing before eating					
Yes(184)	72(39.13%)	1			
No(18)	7(38.89%)	1.02(0.37-2.7)	0.984	1.11(0.37-3.30)	0.854
Residence					
Urban(83)	27(32.5%)	1			
Rural(119)	52(43.70%)	1.69(0.89-2.88)	0.111	1.00(0.49-2.06)	0.984

Discussion

Although many individuals with *H. pylori* gastric colonization are asymptomatic, often those who seek medical attention may present with dyspepsia. Prolonged infection may result in gastric ulcers formation. The current study indicates the true magnitude of *H.pylori* infection among dyspeptic patients in our settings. Based on the natural history of the disease the seropositive individuals in the present study have 10-20% life time risk of developing peptic ulcers[12] with 1-2% of the infected subjects at risk of developing gastric cancer[13]. This study has found comparable prevalence of *H.pylori* infection among dyspeptic patients as previously reported in Africa[7,8,14,15]. As compared to other studies in Africa[6,16] the observed prevalence in the current study is lower and this could be explained by geographical variation as documented previously[17,18]. Moreover; the sensitivity of the method used may explain such a difference.

However, this prevalence is higher as compared to previous reports from developed countries[19-22]. This could be explained by poor living conditions which favor *H.pylori* transmission in developing countries.

In this study the odds of having *H.pylori* infection increased as the age increased which coincides with what has been reported earlier[14,15,23] and contrary to data from Uganda where the prevalence was found to decrease as the age increased[24]. This could be explained by different study populations whereby in Uganda study the population studied was patients with different levels of malignancies. As suggested earlier gastric changes such as malignancies may cause decline of *H.pylori* specific antibodies and is likely to occur in patients with advanced disease and age; which is not the case in our study[25].

On univariate logistic regression analysis, the odds of having *H.pylori* infections were significantly higher in rural areas compared to urban areas. Similarly, the odds of having *H.pylori* infection were higher among people with low education level than those with higher education level. Our findings are inconsistent with the previous studies which reported higher prevalence rates in urban areas and those with good socioeconomic status[26,27]. In rural settings of Mwanza majority of population have low socioeconomic status whereby the main economic activities are small scale farming and fishing unlike in urban areas where majority of the urban population have high education level and good socioeconomic status.

In the present study, untreated drinking water was independently found to predict *H.pylori* infections. These findings are in agreement with what has been reported earlier[3,4] whereby unsafe drinking water and poor hygiene were found to be associated with *H.pylori* infection. Moreover; low education level in almost half of these participants and majority being from rural areas may explain why they cannot afford to treat water despite the fact that it is unsafe to drink.

Study limitations

Due to limited resources, endoscopy was not done; this resulted in failure to diagnose active disease because urease/histopathological and breath tests were not done. In addition stool antigen tests and other differentials of dyspepsia were not established[28].

Conclusion and recommendations

Drinking untreated water and increasing age have been found to be associated with *H. pylori* infection. More studies should focus on assessing incidence rates in relation to age. Improving drinking water in our setting will reduce *H.pylori* transmission and its associated complications such as gastritis, gastric ulcers and gastric malignancies. Moreover, community in Mwanza should be educated on the preventive measures as one of the efforts to control gastric diseases associated with *H.pylori* infection.

Conflict of interest

None declared

Authors' contributions

HJ, MMM, MM and SEM participated in the design of the work. HJ MFM and LW participated in the collection of specimens and clinical data. MMM, JS and LW performed serological tests. MMM, MM, JS and SEM analyzed and interpreted the data. MMM, MFM and SEM wrote the first draft of the manuscript. MMM and SEM critically revised the final draft of the manuscript. All authors read and approved the final version of the manuscript.

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