Full Length Research Paper

The relationship between dyspepsia and *H. pylori* infection in Southern Ethiopia

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Dyspepsia is a very common problem worldwide. Dyspepsia is a common complaint among Ethiopians. A cross sectional study was conducted in 2010. In this study 195 subjects, of whom 101 cases and 94 controls were recruited from different areas in southern Ethiopia. All study participants (patients and controls) were interviewed using questions for information on gastro intestinal symptoms, demographic and socio economic status. Whole blood was obtained from all participants. The sera were examined for the presence of IgG antibodies against H. pylori pooled antigens using the Premier EIA method per the manufacturers' instruction. Data was entered in to the SPSS version 18.0 program and was analyzed for statistical association among variables, considering P=0.05 as statistically significant. Result: Seropositivity for H. pylori was found in 99 (98%) of 101 symptomatic patients and 74 (79%) of 94 asymptomatic participants (OR, 13.39; 95% CI: 3.0 to 59.0). There is a statistical relationship between H. pylori prevalence and age among asymptomatic participants. The prevalence of H. pylori in the study area was very high. Improving the socioeconomic status of the population would reduce the transmission and prevalence of H. pylori, and thus the health status of citizens could be improved.

Keywords: *H pylori*, dyspepsia, cases and controls

INTRODUCTION

Dyspepsia is a very common problem. The prevalence of dyspepsia in Western societies has been recorded to be between 23 and 41% (Knill-Jones, 1991; Mazzoleni et al., 2012). Dyspepsia is a common complaint among Ethiopians. Hot, spicy is the staple diet of Ethiopians and has been implicated in the aetiology of Non-Ulcer Dyspepsia (NUD) but the evidence is circumstantial (Biniam Mathewos et al., 2013; Desta et al., 2007; Endale et al., 2014).

Many causes of dyspepsia exist including *Helicobacter pylori* (HP). HP may also produce varied symptoms in different people. Moreover, what is known about variations in host susceptibility and HP virulence has been correlated with specific symptoms (Seyed et al., 2015).

HP is the main cause of Peptic Ulcer Disease (PUD). The role of HP in Non-Ulcer Dyspepsia (NUD) is less clear (Ina et al., 2005; Haim et al., 2003). Many patients with Upper Gastrointestinal (UGIT) symptoms who seek health care do not have follow-up treatment. In 60% of the investigated patients results of tests to rule out PUD, gastro esophageal reflux disease, and gastric cancer are normal and the diagnosis is functional dyspepsia. The benefit of treatment to eradicate HP in functional dyspepsia remains controversial (Christopher and David, 2010; Catherine et al., 2001).

To manage uninvestigated dyspepsia in developed countries, some authors recommend screening patients less than 50 years without severe symptoms with non-invasive tests for HP then treating those with positive results with HP eradicating drugs (Christopher and David, 2010; Wink et al., 2000).

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Empirical antibiotic treatment has been suggested for dyspepsia to cure all patients with "hidden ulcer". In populations with a high incidence for ulcer disease it might be cheaper to prescribe antibiotic therapy to all dyspeptic patients positive for HP than to investigate all dyspeptic patients to identify those with ulcers (Wink et al., 2000).

HP infection is a common finding in patients with upper gastro intestinal symptoms in Ethiopia. There is a higher prevalence of infection among patients with positive endoscopic findings. Thus, the management of patients with upper gastro intestinal symptoms in Ethiopia should take HP infection in to consideration (Biniam Mathewos et al., 2013; Desta et al., 2007; Endale et al., 2014). Also, a non-invasive HP test and treatment strategy in a primary care setting in an economically depressed area such as Africa should be based on data that show an association between dyspepsia and HP infection.

With such a significant impact, the most cost effective strategy for the initial management of patients presenting to their primary care physician with dyspepsia needs to be established. The purpose of this case - controlled study is to report the prevalence and role of HP infection in patients with and without dyspepsia in SNNRP, Ethiopia.

MATERIALS AND METHODS

Study design

A cross sectional study was conducted in 2010. Convenient sampling was used to source the study subjects.

Source population

Study participants were recruited from different areas in southern Ethiopia, which included students and staff from Dilla College, patients from Dilla Hospital and Yirgalem Hospital and students from the Health College of Hawasa University.

Study subjects

This study included 195 subjects, of whom 101 were cases and 94 were controls. Patients who arrived at the (Outpatient Department) OPDs of Dilla Hospital with uninvestigated symptoms of dyspepsia and Dilla College students and staff who visited the students' clinic complaining of dyspepsia were considered as cases. Asymptomatic control persons were recruited from Yirgalem Hospital OPD and the Health College of Hawassa University, (HU) student clinic who visited for other reasons. Dyspepsia in the control group was excluded by clinical interview using a screening questionnaire.

Data Collection

Questions
All study participants (patients and controls) were interviewed using questions for information on gastro intestinal symptoms, demographic and socio economic status.

Gastro intestinal symptom questions

Dyspepsia was defined to include one or more of the following symptoms of PUD and NUD such as upper abdominal discomfort, retrosternal pain, anorexia, nausea, vomiting, bloating, fullness, early satiety, heartburn, epi gastric tenderness, heamatemesis melena and weight loss. Asymptomatic study subjects were selected based on a question - based interview to have either one of the following or combination of conditions (1) Never had dyspepsia (2) No symptoms of dyspepsia for the last two or more years (3) No anti acid drug for the last two or more years.

Demographic and socio economic status

Participants were questioned about demographic data and socioeconomic status: occupation was classified as government employed, student, farmer, housewife, merchant and other. Educational attainment as illiterate, basic education through grade 11, grade 12 and above. Residence as urban or rural; marital status as married, single, divorced, separated and widowed. Latrine use (yes, no), drinking water supply (piped or other).

Serology

Whole blood was obtained from all participants. The sera were collected from the blood by centrifugation and kept at $-20\,^{\circ}$C until tested. The sera were examined for the presence of IgG antibodies against H. pylori pooled antigens using the Premier EIA method, according to the manufacturers instruction. Kits were stored at 4 degrees centigrade and equilibrated to room temperature before use. The sera samples were analyzed for IgG EIA at Hawassa Regional laboratory and Yirgalem Hospital laboratory.

Data analysis

Data was entered in to the SPSS version 18.0 program and was analyzed for statistical association among variables in symptomatic and asymptomatic subjects considering $P=0.05$ as statistically significant.

Ethical clearance

Ethical clearance was sought from the Dilla College research committee and individual consent was obtained during blood collection from each participant.

Table 1. The result of H. pylori prevalence among dyspeptics and Non-dyspeptics

	HP serology		Total
	Pos N (%)	Neg N (%)	
Cases	99 (57.2)	2(9.1)	101(51.8%)
Controls	74(42.8)	20(90.9)	94(48.2%)
Total	173(100.0)	22(100.0)	195(100.0%)

Table 2. The result of H. pylori prevalence among dyspeptics and Non-dyspeptic students

	HP serology		Total
	Pos N (%)	Neg N (%)	
Cases	34 (64.2)	2(12.5)	36(52.2%)
Controls	19(35.8)	14(87.5)	33(47.8%)
Total	53(100.0)	16(100.0)	69(100.0%)

Table 3. Prevalence of H. pylori among different characteristics of asymptomatic subjects

characteristics		HP serology		Total	OR (95% CI)
Age		Pos N (%)	Neg N (%)		
	15-29	32(43.2)	15(75.0)	47(50.0)	1
	30-44	16(21.6)	2 (10.0)	18(19.1)	3.75 (0.763-18.4)
	45-59	11(14.9)	1 (5.0)	12(12.8)	5.16 (0608-43.965)
	≥ 60	15(20.3)	2 (10.0)	17(18.1)	3.52 (0.711-17.378
Residence	Rural	43(58.1)	9 (45.0)	52(55.3)	1.69 (0.627-4.584)
	Urban	31(41.9)	11 (55.0)	42(44.7)	
Latrine use	No	24(32.4)	3 (15.0)	38(40.4)	2.72 (0.726-10.186)
	Yes	50(67.6)	17 (85.0)	56(59.6)	
Drinking water	Piped	43(58.1)	13 (65.0)	56(59.6)	1.33(0.479-3.744)
	Other	31(41.9)	7 (35.0)	38(40.4)	
Occupation	Employee	6(8.1)	1 (5.0)	7(7.4)	NA
	Student	19(25.7)	14 970.0)	33(35.1)	
	Farmer	26(35.1)	4 (20.0)	30(31.9)	
	Housewife	18(24.3)	1 (5.0)	19(20.2)	
	Merchant	5(6.8)	0(0)	5(5.3)	
Education status	Grade 12	9(12.2)	0(0)	9(9.6)	NA
	Basic edu	29(39.1)	9 (45.0)	38(40.4)	
	College	6(8.1)	6 (30.0)	12(12.8)	
	Illiterate	30(40.5)	5 (25.0)	35(37.2)	
Marital status	Married	55(74.3)	5 (25.0)	60(63.8)	8.68(2.78-27.12)
	Single	19(25.7)	15(75.0)	34(36.2)	
Sex	Female	24 (32.4)	3 (15.0)	27(28.7)	2.72(0.726-10.186)
	Male	50 (67.6)	17 (85.0)	67(71.3)	

Note: The variables with statistical association showed a wide confidence interval (CI). This may be due to the small sample size used in this study. We may have obtained better precision if the sample size used has been larger.

RESULTS

Study participants

Overall, 195 subjects were involved in the study, of which 101 were in the dyspeptic category, while 94 were in the control group. In the dyspeptic cohort, 64 men and 37 females with dyspepsia were involved with an age range of 16-51years. In this category, 36 were students, 11 were College staff, and 54 were patients from Dilla Hospital. Among the asymptomatic subjects 67 men and 27 females with an age range of 15-90 years were involved. Among these 33 were students, while the remaining listed different occupations (farmers, housewives, merchant, and employee).

Seropositivity for H. pylori was found in 99 (98%) of 101

symptomatic patients and 74 (79%) of 94 asymptomatic participants (OR, 13.39; 95% CI: 3.0 to 59.0). This implicates H. pylori was more likely associated with dyspeptic patients than controls (Table 1). In addition, this association was further duplicated in selected similar group student subjects. There was a statistically significant difference between seropositivity of H. pylori and dyspeptic students with OR of 12.53 (95% CI: 2.569 to 61.082) (Table 2).

This study result obtained only 2 (two) HP negatives in 101 dyspeptic cases, who were both males and college students. The association of variables in this sample size (category) was less important.

In this study 64% of the asymptomatic subjects were married. Being married has shown to have 8.68 times more risk of infection with H. pylori (95% CI= 2.78 to 27. 12). There was a statistical relationship between *H. pylori* prevalence and age among asymptomatic participants (Table 3).

DISCUSSION

The prevalence of H. pylori in dyspeptics in the study population was 98% (99/101), which was similar with the prevalence of H. pylori infection among the population who reside in northern Sardinal, Italy (Maria et al., 2002). However, this result was higher than most research studies undertaken in various parts of Ethiopia. In a study performed in a similar population in southern Ethiopia, a 84% H. pylori prevalence was reported. In addition, sero prevalence results of 67.7%, 85.6%, and 72.2% were reported in different areas of Gondar in Ethiopia (Biniam Mathewos et al., 2013; Feleke et al., 2006; Wubejig et al). In the capital city Addis Ababa, 89% H. pylori prevalence was reported in similarly dyspetic subjects. This indicates the very wide-spread occurrence of H. pylori infection in dyspeptic individuals in Ethiopia. This result has also been shown to be higher than reports from other countries: 63.4% in Brazil, 71% in Kenya and 54-76% in two Asian studies (Ina et al., 2005; Haim et al., 2003; Batts et al., 2013; Leja et al., 2013).

Several studies have reported that socioeconomic factors have been associated with H. pylori infection. Subjects with a low socioeconomic status had a higher likelihood of carrying H. pylori infection. In addition, ethnic and social groups contribute to exposure of individuals, which in turn may be influenced by cultural background, social, dietary, or environmental factors. Moreover, several factors related to residence have been found to be associated with the infection. Indeed, living in a rural area, in crowded homes and having contaminated sources of drinking water are risk factors for H. pylori infection (Malaty et al., 1998; Lim et al., 2013; Vilaichone et al., 2013; Ozaydin et al., 2013).

Likewise, the prevalence of H. pylori reported from developed nations was found to be significantly lower in comparison with this report: 9.4% in USA (Jackman et al., 2006), 23.1% in Canada (Naja et al., 2007) 32% in Netherlands (van Blankenstein et al., 2013), and 52.2% in Mexico (Alvarado-Esquivel, 2013), which further associates H. pylori infection with low socio economic factors. Therefore, improving the standard of living and socio economic status coupled with proper eradication therapy profoundly decreases the prevalence of H. pylori, and hence, the ill- effects (consequences) of H. pylori infection in symptomatic patients.

The variability in global prevalence can also be due to the differences in study methods as some studies undertaken cohort type while this is a case control study. In addition, this could be as results of the different methods used for the evaluation, inherent prevalence, and use of antibiotic practices amongst others factors.

The prevalence of H. pylori in asymptomatic controls in this study was 78.7%, which was found to be higher than other studies reported from Saudi Arabia (28%), Korea (54.4%), China 63.4%, 9 and Kenya 51% (Hanafi and Mohamed, 2013; Lim et al., 2013; Zhu et al., 2002; Haim et al., 2003). Much research has been done to identify the role of H. pylori in symptoms of dyspepsia. This study demonstrated H. pylori was associated with more symptomatic patients (98%) than asymptomatic controls (78.7%) (OR, 13.39; 95% CI: 3.0 to 59.0). This is a similar finding with other studies (Haim et al., 2003). Thus, the findings in this study also favor the association of H. pylori with dyspepsia.

In the asymptomatic participants, the prevalence of H. pylori infection was associated with age, from 68% in the 15 to 29 year age group to 89% is the 30-44 year age group, peaking 92% in the 45-59 year age group and declining to 88% in subjects of age > 60. This association was further supported by analysis of linear trend in proportion, where ($X2$ =4.456, P=0.032). Other studies also indicated a similar pattern of HP positivity: a study in Kenya reported an increase in prevalence of HP related to age. The peak age group of HP positivity was observed in 31- 40 years with 68% positivity (Haim et al., 2003).

This study reported that place of residence, latrine use, drinking water supply, and gender didn't show a statistical relationship with prevalence of *H. pylori* in asymptomatic subjects. However, being a student showed less prevalence of H. pylori than the other professional groups. Among the occupational group, students had the lowest rate for HP infection (57.6%) than other study groups. In addition, in the educational category students were identified as the most negative (50%), and the least positive for HP (50%), than the other educational group. All students were found in the 15-29 age group which is the group with less positive results for H. pylori (P=0.001). Likewise, the younger age group was considered as the most likely factor for low prevalence of HP in college students.

Overall, this short report showed *H. pylori* is a highly

prevalent bacterium in individuals in the study area. Moreover, it has been shown to be more highly associated in the dyspeptic group of subjects than the asymptomatic cohort. Therefore, diagnosis of H. pylori should be considered as a step-in management of dyspeptic cases.

CONCLUSION AND RECOMMENDATION

The prevalence of H. pylori in the study area was very high. Improving the socioeconomic status of the population would reduce the transmission and prevalence of H. pylori, and thus the health status of citizens could be improved.

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REFERENCES

Alvarado-Esquivel C (2013). Seroepidemiology of *Helicobacter pylori* infection in pregnant women in rural durango. *Mexico Int. J. Biomed. Sci.* 9:224–229.

Batts KP, Ketover S, Kakar S, Krasinskas AM, Mitchell KA, Wilcox R, et al (2013). Appropriate use of special stains for identifying *Helicobacter pylori*: recommendations from the Rodger C. Haggitt Gastrointestinal Pathology Society. *Am. J. Surg. Pathol.* 37: 12–22.

Biniam Mathewos, Beyene Moges and Mulat Dagnew (2013). Seroprevalence and trend of *Helicobacter pylori* infection in Gondar University Hospital among dyspeptic patients, Gondar, North West Ethiopia. *BMC Res. Notes.* 6:346.

Catherine F Weijnen, Mattijs E Numans, Niek J de Wit, André J P M Smout, Karel G M Moons, Theo J M Verheij, Arno W Hoes (2001). Testing for *Helicobacter pylori* in dyspeptic patients suspected of peptic ulcer disease in primary care: cross sectional study. *BMJ.* 323:7.

Christopher R Harmon, David A Peura (2010). Evaluation and management of dyspepsia. *Therap. Adv. Gastroenterol.* 3(2): 87–98.

Desta K, Asrat D, Derbie F (2007). Seroprevalence of *helicobactor pylori* infection among health blood donors in Addis Ababa. *Ethiop. Can. J. Gastroenterol.* 21:501–506.

Endale Tadesse, Deresse Daka, Demo Yemane, Techalew Shimelis (2014). Seroprevalence *of Helicobacter pylori* infection and its related risk factors in symptomatic patients in southern Ethiopia. *BMC Res. Notes* 7:834.

Feleke M, Afework K, Getahun M (2006). Seroprevalence of H. pylori in dyspeptic patients and its relationship with HIV infection, ABO blood groupings and life style in GUH. *World J. Gastroenol.* 12:1957–1961.

Haim Shmuely, Samson Obure, Douglas J Passaro, Galia Abuksis, Jacob Yahav, Gerald Fraser, Silvio Pitlik, Yaron Niv (2003). Dyspepsia Symptoms and *Helicobacter pylori* Infection, Nakuru, Kenya. *Emerging Infectious Diseases.* 9: 9.

Hanafi MI, Mohamed AM (2013). *Helicobacter pylori* infection: seroprevalence and predictors among healthy individuals in Al Madinah, Saudi Arabia. *J. Egypt Public Health Assoc.*; 88:40–45.

Ina S Santos, Jose Boccio, Ari S Santos, Neiva CJ Valle, Camila S Halal, Marta Colvara Bachilli, Ricardo D Lopes (2005). Prevalence of *Helicobacter pylori* infection and associated factors among adults in Southern Brazil: a population-based cross-sectional study. *BMC Public Health.* 5:118.

Jackman RP, Schlinchting C, Carr W, Dubois A (2006). Prevalence of *Helicobacter pylori* in United States navy submarine crews. *Epidemiol. Infect.* 134:460–464.

Knill-Jones RP (1991). Geographical differences in the prevalence of dyspepsia. *Scand. J. Gastroenterol. Suppl.* 182:17-24.

Leja M, Funka K, Janciauskas D, Putnins V, Ruskule A, Kikuste I, et al (2013). Interobserver variation in assessment of gastric premalignant lesions: higher agreement for intestinal metaplasia than for atrophy. *Eur. J. Gastroenterol. Hepatol.* 25:694–699.

Lim SH, Kwon JW, Kim N, et al (2013). Prevalence and risk factors of *Helicobacter pylori* infection in Korea: nationwide multicenter study over 13 years. *BMC Gastroenterol.* 13:104.

Lim SH, Kwon JW, Kim N, et al (2013). Prevalence and risk factors of *Helicobacter pylori* infection in Korea: nationwide multicenter study over 13 years. *BMC Gastroenterol.* 13:104.

Malaty HM, Graham DY, Isaksson I, Engstrand L, Pedersen NL (1998). Cotwin study of the effect of environment and dietary elements on acquisition of *Helicobacter pylori* infection. *Am. J. Epidemiol.* 148: 793–797.

Maria P. Dore, Hoda M. Malaty, David Y (2002). Graham, Giuseppe Fanciulli, Giuseppe Delitala, and Giuseppe Realdi. Risk Factors Associated with *Helicobacter pylori* Infection among Children in a Defined Geographic Area. *Clin. Infect. Dis.* 35(3):240-245.

Mazzoleni LE, Sander GB, Francesconi CF, Mazzoleni F, Uchoa DM, De Bona LR, Milbradt TC, Von Reisswitz PS, Berwanger O, Bressel M, Edelweiss MI, Marini SS, Molina CG, Folador L, Lunkes RP, Heck R, Birkhan OA, Spindler BM, Katz N, Colombo Bda S, Guerrieri PP, Renck LB, Grando E, Hocevar de Moura B, Dahmer FD, Rauber J, Prolla JC (2012). The role of *Helicobacter pylori* infection in functional dyspepsia. *Annals of Gastroenterol.* 25, 176-177.

Naja F, Kreiger N, Sullivan T (2007). *Helicobacter pylori* infection in Ontario: prevalence and risk factors. *Can. J. Gastroenterol.* 21:501–506.

Ozaydin N, Turkyilmaz SA, Cali S (2013). Prevalence and risk factors of *Helicobacter pylori* in Turkey: a nationally-representative, cross-sectional, screening with the 13 C-Urea breath test. *BMC Public Health.* 13:1215.

Seyed Jalil Masoumi, Davood Mehrabani, Fariba Moradi, Najaf Zare, Mehdi Saberi-Firouzi,, Zohreh Mazloom (2015). The prevalence of dyspepsia symptoms and its correlation with the quality of life among Qashqai Turkish migrating nomads in Fars Province, Southern Iran. *Pak. J. Med. Sci.* 31(2): 325–330. 12

van Blankenstein M, van Vuuren AJ, Looman CW, Ouwendijk M, Kuipers EJ (2013). The prevalence of *Helicobacter pylori* infection in the Netherlands. *Scand. J. Gastroenterol.* 48:794–800. 14

Vilaichone RK, Mahachai V, Shiota S, Uchida T, Ratanachu-ek T, Tshering L, Tung NL, Fujioka T, Moriyama M, Yamaoka Y (2013). Extremely high prevalence of *Helicobacter pylori* infection in Bhutan. *World J. Gastroenterol.* 19:2806–2810.

Wink A de Boer, internist and Guido N J Tytgat, professor (2000). Treatment of *Helicobacter pylori* infection. *BMJ.* 320 (7226): 31–34.

Wubejig Abebaw, Mulugeta Kibret, Bayeh Abera. Prevalence and Risk Factors of *H. pylori* from Dyspeptic Patients in Northwest Ethiopia: A Hospital Based Cross-sectional Study. *Asian Pac. J. Cancer. Prev.* 15 (11), 4459-4463. 13.

Zhu Y, Zhou X, Wu J, Su J, Zhang G (2002). Risk factors and prevalence of Helicobacter pylori infection in persistent high incidence area of gastric carcinoma in Yangzhong city. Gastroenterol Res Pract 2014; 2014:481365. 28. F Bazzoli, L De Luca, P Pozzato, RM Zagari, S Fossi, L Ricciardiello, G Nicolini, D Berretti, E Roda. *Helicobacter pylori* and functional dyspepsia: review of previous studies and commentary on new data. *Gut.* 50: 33–35.