Prevalence of *Helicobacter Pylori* among Health Care Workers in Endoscopy Units

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Abstract: Background: Several modes of transmission of *Helicobacter Pylori* (*H. pylori*) have been described in the literature these include direct contact between subjects which is considered the most common mode, contaminated water sources and food and less commonly iatrogenic transmission (during endoscopies and dental care), The potential for transmission of infection during a gastro intestinal endoscopy is a matter of concern to both physicians and patients. **Aim of the study**: To assess the prevalence of *H. pylori* infection among health care workers in endoscopy unit and evaluation of Infection control measures in the endoscopy units. **Patients and methods:** The study was conducted on 90 subjects classified into 3 groups: group A includes 30 Subjects from the general population as a control, group B includes 30 health care workers not working in endoscopy units and group C includes 30 health care workers in gastro intestinal endoscopy units (This group was collected from 3 different endoscopy units). All the groups have been subjected to full medical history taking and full clinical examination, *H. pylori* IgG antibodies (using ELIZA technique). Infection control measures in the different endoscopy units have been evaluated using a structured check list based on Egyptian infection control guide lines. **Results:** The result of our study revealed that no significant difference in the prevalence of *H. pylori* between health care workers inside and outside the endoscopy unit and control group**.** The prevalence of *H. pylori* was inversely related to the total score of compliance to infection control measures in the endoscopy unit .**Conclusions &Recommendations:** Working in the endoscopy unit is not a risk factor for *H. pylori*, yet non compliance with infection control measures is associated with increased risk of *H. pylori* in the endoscopy units. And we recommend strict adherence to infection control measures in the endoscopy units.

1. Introduction

Helicobacter pylori (*H. pylori*), a gram-negative bacterium found on the luminal surface of the gastric epithelium, was first isolated by Warren and Marshall in 1983. The infection is usually contracted in the first few years of life and tends to persist indefinitely unless treated. Its prevalence increases with older age and with lower socioeconomic status [1, 2].

It is estimated that 50% of the world's population is infected by *H. pylori*. Although most infections are not associated with clinical disease, a significant proportion will go on to develop some of the commonest problems in gastroenterology: gastritis, peptic ulcer disease, gastric cancer and gastric MALT-lymphoma. Although less than one percent of infected persons will develop gastric cancer, this is the fourth most common malignancy in the world [3, 4]. A variety of extra digestive disorders, including cardiovascular, skin, rheumatic and liver diseases, have also been associated with *H. pylori* infection [5]**.** Several modes of transmission of *H. pylori* have been described in the literature these include direct contact between subjects which is considered the most common mode ,contaminated water sources and food and less commonly iatrogenic transmission (during endoscopies and dental care)[6.]

Healthcare workers who come into contact with patients and contaminated secretions could be at increased risk of infection by *H. pylori*. The majority of studies on the risk of infection for healthcare workers have focused on endoscopists and endoscopy room staff [7].

Like many medical devices, flexible endoscopes are reusable and must be reprocessed to render them safe for use on subsequent patients [8]**.** In general, complications related to the use of endoscopes are few Nevertheless, nosocomial infection; pseudo-infection outbreaks and endogenous infections have been linked to contaminated endoscopies than to any other medical device [9]**.**

The potential for transmission of infection during a gastro intestinal endoscopy is a matter of concern to both physicians and patients. Some evidence exists that *H. pylori* infection may be more of a hazard for gastroenterologists and certain categories of nursing staff, but occupational risk factors for transmission

remain incompletely elucidated in the endoscopy units [10]

Aim of the Study:

To assess the prevalence of *H. pylori* infection among health care workers in the endoscopy units and to evaluate relation between prevalence of *H. pylori* and compliance to infection control measures in the endoscopy units .   .

2. Patients and Methods:

This study was a cross sectional study and it was carried out at Internal Medicine Department; gastroenterology Unit, Ain Shams University hospital.

The study was conducted on 90 subjects classified into 3 groups as the following:

- **Group A:** 30 Subjects from the general population as a control.
- **Group B:** 30 health care workers not working in endoscopy units.
- **Group C:** 30 health care workers in gastro intestinal endoscopy units. This group was collected equally from 3 different endoscopy units.

All the groups have been subjected for the following

1. Full medical history taking with special emphasis on history of intestinal and extra intestinal manifestation of *H. pylori*.
2. Full clinical examination with special emphasis on abdominal examination and signs of extra intestinal manifestation of *H. pylori*.
3. *H. pylori* Ig G antibodies (using ELIZA technique) (BioCheck, Ink. USA).
4. Infection control measures in the endoscopy units have been evaluated using a structured check list based on **Egyptian infection control guide lines** [11] with special emphasis to compliance to infection control measures   in the Procedure room, Reprocessing room, Barrier equipment, Hand washing, Endoscopy disinfection, Endoscope storage area, Environment, Employee and Quality control and monitoring.

Statistical Methodology:

Analysis of data was done by IBM computer using SPSS (statistical program for social science version 12) as follows

$P > 0.05 \rightarrow$ insignificant

$P < 0.05 \rightarrow$ significant

$P < 0.01 \rightarrow$ highly significant

3. Results:

Table (1) Comparison between the studied groups   as regard general data

Variables	Group A (N=30)	Group B (N=30)	Group C (N=30)	*P* value
Age (Mean±SD)	35±13	30±8	35.9±10	>0.05 NS
Gender Male Female	14(46.7%) 16(53.3%)	6(20%) 24(80%)	4(13.3%) 26(86.7%)	<0.001 HS
Smoking No Yes	18(60%) 12(40%)	29(96.7%) 1(3.3%)	29(96.7%) 1(3.3%)	<0.001 HS

This table shows that there was a statistically highly significant difference between groups as regard gender and smoking; on the other hand there was no statistically significant difference as regard age.
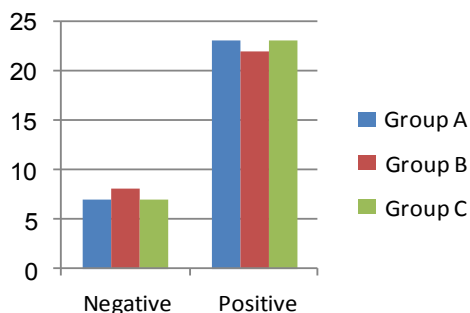

Figure (1) Comparison between the studied groups   as regards *H-pylori* antibodies

Twenty three subjects of group A (76.7%) were positive for H. pylori Versus 22(73.3%) in group B and 23(76.7%) in group C with no statistically significant difference in between (*P*>0.05).

Table (2) Comparison between the mean age of *H. pylori* positive and negative in the different study groups

	Mean age of *H-pylori*		*P* value
	Negative	Positive	
Group A (N=30)	24±4	38±7	<0.05 S
Group B (N=30)	23±6	32±8	<0.05 S
Group C (N=30)	31.2±6	37.4±10	>0.05 NS

This table shows that *H. pylori* positive group had older age compared to negative group with statistically significant difference in between in group A and B. On the other hand there was no statistically significant difference as regard prevalence of *H.*

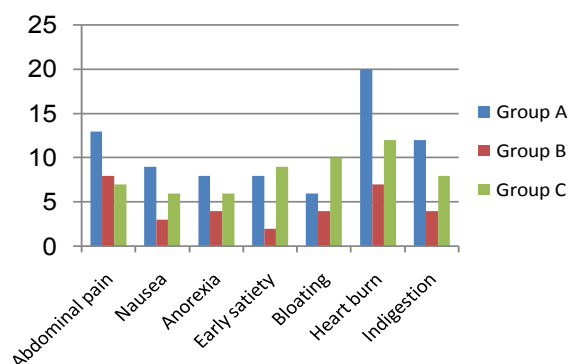*pylori* and other variables as gender and smoking in all groups.

Figure (2) Comparison between the studied groups as regard gastrointestinal presenting symptoms

Table (3) Comparison between the studied groups as regard history of extra intestinal manifestation of *H. pylori*

Variables	Group A (N=30)	Group B (N=30)	Group C (N=30)	*P* value
CAD	0	3(10%)	2(6.7%)	>0.05 NS
Urticaria	2(6.7%)	0	1(3.3%)	>0.05 NS
Dermatitis	0	1(3.3%)	1(3.3%)	>0.05 NS
Purpura	0	0	0	-
Aphthous stomatitis	5(16.7%)	3(10%)	5(16.7%)	>0.05 NS
Psoriasis	0	2(6.7%)	0	>0.05 NS
Respiratory disease	9(30%)	0	1(3.3%)	<0.001 HS

This table shows that respiratory diseases were more frequent among group A compared to group B and c with statistically highly significant difference in between. No significant difference as regard other variables .

Table (4) Comparison between the studied groups as regard history of gastrointestinal manifestation of *H. pylori* and prevalence of *H pylori*

Variables	group	No of patients	*H-pylori* N(%)		*P* value
			Negative	Positive	
Abdominal pain	A	13	2(15.4%)	11(84.6%)	>0.05(NS)
	B	8	0	8(100%)	< 0.05(S)
	C	7	1(14.3%)	6(85.7%)	>0.05(NS)
Nausea	A	9	1(11.1%)	8(88.9%)	>0.05(NS)
	B	3	0	3(100%)	>0.05(NS)
	C	6	1(16.7%)	5(83.3%)	>0.05(NS)
Anorexia	A	8	3(37.5%)	5(62.5%)	>0.05(NS)
	B	4	0	4(100%)	>0.05(NS)
	C	6	0	6(100%)	<0.05(S)
Early satiety	A	8	2(25%)	6(75%)	>0.05(NS)
	B	2	0	2(100%)	>0.05(NS)
	C	9	1(11.1%)	8(88.9%)	< 0.05(S)
Bloating	A	6	1(16.7%)	5(83.3%)	>0.05(NS)
	B	4	0	4(100%)	>0.05(NS)
	C	10	1(10%)	9(90%)	<0.05(S)
Heart burn	A	20	4(20%)	16(80%)	>0.05(NS)
	B	7	0	7(100%)	< 0.05(S)
	C	12	2(16.7%)	10(83.3%)	>0.05(NS)
Indigestion	A	12	2(16.7%)	10(83.3%)	>0.05(NS)
	B	4	0	4(100%)	>0.05(NS)
	C	8	1(12.5%)	7(87.5%)	>0.05(NS)

There was no statistically significant difference between the prevalence of *H Pylori* and the gastrointestinal symptoms of *H Pylori* in Group A; On the other hand there was a statistically significant difference between the prevalence of *H Pylori* and abdominal pain and heart burn in group B. In group C there was a statistically significant difference between the prevalence of *H Pylori* and anorexia, early satiety and bloating.

Table (5) Comparison between the studied groups as regard history of extra intestinal manifestation of *H. pylori* and prevalence of H pylori

Variables	group	No of patients	*H. pylori* Negative	Positive	*P* value
CAD	A	0	0	0	-
	B	3	0	3(100%)	>0.05(NS)
	C	2	0	2(100%)	>0.05(NS)
Urticaria	A	2	1(50%)	1(50%)	>0.05(NS)
	B	0	0	0	-
	C	1	0	1(100%)	>0.05(NS)
Dermatitis	A	0	0	0	-
	B	1	0	1(100%)	>0.05(NS)
	C	1	0	1(100%)	>0.05(NS)
Purpura	A	0	0	0	-
	B	0	0	0	-
	C	0	0	0	-
Acute stomatitis	A	5	1(20%)	4(80%)	>0.05(NS)
	B	3	0	3(100%)	>0.05(NS)
	C	5	1(20%)	4(80%)	>0.05(NS)
Psoriasis	A	0	0	0	-
	B	2	0	2(100%)	>0.05(NS)
	C	0	0	0	-
Respiratory disease	A	9	4(44.4%)	5(55.6%)	>0.05(NS)
	B	0	0	0	-
	C	1	1(100%)	0	>0.05(NS)

There was no statistically significant difference between the prevalence of *H Pylori* and the extra intestinal manifestation of *H. pylori* in all groups.

Table (6): Comparison between the 3 endoscopy units as regard Compliance to infection control measures and prevalence of *H .pylori*

	Unit 1	Unit 2	Unit 3
* Procedure room: **- General infection control measures** **- Hand washing**	60%	70%	70%
	80%	90%	75%
* Reprocessing room: **- General infection control measures**	40%	60%	40%
- Barrier equipment	50%	40%	50%
* Endoscopy disinfection	50%	90%	90%
* Endoscopy storage area	40%	90%	90%
Environment*	60%	50%	50%
* Employee	30%	40%	40%
* Quality control & monitoring	30%	60%	50%
* Total compliance to infection control measures	45%	67%	60%
Prevalence of H. pylori*	80%	70%	75%

This table shows that the highest total compliance to infection control measures was in unit 2 (67%) followed by unit 3 (60%) and   unit 1 (45%) respectively. The highest prevalence of *H. pylori* was in unit 1 (80%) followed by unit 3 (75%) and unit 2 (70%).There was inverse relationship between the total compliance to infection control measures and the prevalence of *H. pylori*.

4. Discussion:

In the present study, we found increased prevalence of H. pylori infection with increasing age. This may be attributed to prolonged exposure period. This result agrees with **Crew and Neugut,** [12] who reported the increased prevalence of *H. pylori* infection with increasing age.

As regard gender, we did not find significant difference between males and females as regard *H. pylori* prevalence. This result is consistent with

Graham et al., [13]. In contrast **Malaty and Graham,** [14], showed that *H. pylori* infection is significantly higher in males.On the other hand **Aljandra et al.,** [15] showed that *H. pylori* infection is significantly higher in females.

In this study there was no statistically significant difference between the studied groups as regard as prevalence of *H. pylori* infection (76.7% in group A vs. 73.3% in group B and. 76.7% in group C) .These data agree with **Noone et al.,** [16] in their cross-sectional study who fail to find evidence of excess risk of being seropositive to *H. pylori* for those working in endoscopy units. On the contrary In a prospective, long term follow up study **Hildebrand et al.** [17] found that a group of gastroenterologists had a considerably higher risk of acquiring *H. pylori* infection than a matched control group.

Mastromarino et al., [7] demonstrate that the prevalence of *H. pylori* infection is high and similar in gastrointestinal endoscopy personnel and other medical staff with direct patient contact, underlining the importance of contact with patients rather than the endoscopy activity itself as a risk factor for the acquisition of infection. Similar conclusions were reported by **Braden et al.,** [18] who found high H. pylori infection rates in physicians and nurses with contact to patients in general but not additionally in personnel with explicit exposure to gastric secretions during endoscopy And concluded that endoscopy is not a risk factor for *H. pylori* infection, but medical practice slightly raises *H. pylori* acquisition..

Lin et al., 1994[19] demonstrate that there was no significant difference in *H. pylori* prevalence between the gastroenterology nurses, general nurses and controls. The prevalence of *H. pylori* in gastroenterology nurses increased with years of practice to levels greater than age-matched controls.

The results of the different studies have been contradictory. Part of the explanation for the controversy may be the fact that these were cross sectional epidemiological studies rather than prospective ones with long term follow up.

As regard the compliance with infection control national guidelines in reprocessing and procedure rooms we found that the procedure room was not separated from reprocessing room in all units under study which was not compliant with the national guidelines .Units :[2 and 3] had the best compliance with national guidelines as regard the procedure room design and structure (70%), unit1 was (60%). Hand washing was somewhat acceptable as it was the best in unit 2(90%), followed by unit 1(80% complaint) and unit 3 (75%).

Akyuz et al.,[20] reported that Personnel should perform meticulous hand washing with an appropriate antimicrobial agent when entering or leaving the endoscopy area, after coming into contact with patients or infectants , and after removing their gloves. Thorough hand washing should be performed before and after each procedure, even if gloves are worn. In addition, personnel should wash their hands and other skin surfaces immediately when they become contaminated with blood or body fluids.

As regard the compliance with the national guidelines in the reprocessing room design and structure we found compliances were not high as unit 1and 3 compliance was (40%), unit 2 compliance was (60%). As regard the compliance with infection control national guidelines in the use of barrier equipments by the endoscopy unit employees this study revealed that the compliances were not good in the three units under study it was the worst in unit 2 (40%), the other two units have had the same compliance which was (50%). From that we found that the unit 2 had the best compliance with the national guidelines as regard the process of endoscopes reprocessing while it had the worst compliance as regard the use of barrier equipments.

Alvarado ,[21] said that endoscopy unit staff should understand that a patient's infectious status may be unknown at the time of endoscopy, so during the endoscopic procedure and while cleaning endoscopes, endoscopy personnel should wear protective devices (including gloves, masks, eye protection, and moisture-resistant gowns or aprons) as needed to protect themselves from exposure to blood and body fluids.

As regard the Quality control and monitoring measures compliance with the infection control national guidelines, study revealed that compliance in unit 2 was 60 %, unit 3 was 50 % and in unit 1 was 30%.

Prevalence of *H. pylori* in the three endoscopy units was 80%,70% and 75% in unit1,2, and 3 respectively which is inversely related to total compliance to national infection control guidelines (unit 1 =45% , unit 2 =67% , unit3=60%) .

Conclusions and Recommendations

We conclude that there was no significant difference in the prevalence of *H. pylori* between health care workers inside and outside the endoscopy unit and control group. As regard the prevalence in the three endoscopy units, it was inversely related to the total compliance to infection control measures. And we recommend strict adherence to infection control measures in the endoscopy units.

References

1. **McColl KE** .*Helicobacter pylori* Infection. The New England Journal of Medicine 2010; 362:1597-1604.

2. **Bashir AH, Yousif S and Mahmoud MO.** Clinico epidemiological study in Sudanese patients: Prevalence and effect of eradicative triple therapy on extra digestive Helicobacter pylori skin manifestations. Clinical Reviews and Opinions 2011; 3(2): 14-19

3. **Mandeville KL, Krabshuis J, Ladep NG *et al.*** Gastroenterology in developing countries: Issues and advances. World Journal of Gastroenterology 2009; 15(23): 2839-2854.

4. **Delgado JS, Gené E, Suárez D *et al.*** Has *H. pylori* Prevalence in Bleeding Peptic Ulcer Been Underestimated? A Meta -Regression. Am J Gastroenterol 2011; 106(3):398-405

5. **Hosseini NS, Mousavi SA, Ahmadipour E., *et al. Helicobacter Pylori*** in Patients Suffering from Pulmonary Disease. Tanaffos 2011; 10(1): 31-36.

6. **Salih BA**. *H. pylori* infection in developing countries: the burden how long? .the Saudi Journal of Gastroenterology 2009; 15(3):201-207.

7. **Mastromarino P, Conti C, Donato K, *et al.*** Does hospital works constitute a risk factor for Helicobacter pylori infection? Journal of Hospital Infection 2005; 60(3): 261-268

8. **Shen Bo, Nelson DB, Lichtenstein DR, *et al .*** Infection control during GI endoscopy . Gastrointestinal Endoscopy 2008;67: 781-790

9. **Vazquez ES, Monguio RR, Visaria J *et al.*** Exogenous endoscopy-related infections, pseudo-infections, and toxic reactions: clinical and economic burden. Current Medical Research And Opinion 2006; 22(10):2007–2021

10. **Banerjee S, Shen B, Nelson D B *et al.*** Infection control during GI endoscopy. Gastrointestinal endoscopy 2008; 67(6):781-790.

11. **Arab Republic of Egypt , Ministry of health and population , preventive sector**, National Guidelines for Infection Control 2008; part II infection control in special care settings, infection control in endoscopy unit:p43:53

12. **Crew KD and Neugut AI.** Epidemiology of gastric cancer. World J Gastroenterology 2006; 12 (3): 354-62.

13. **Graham DY, Adam E and klein PD.** Comparison of the prevalence of asymptomatic H. pylori infection in the United states. Effect of age-gender and race. Gastroenterology 1991; 101:180-5.

14. **Malaty HM and Graham DY.** Importance of childhood socioeconomic status on the current prevalence of Helicobacter pylori infection. Gut 1994; 35:742-745

15. **Aljandra B, Maxianella P, Maria C., *et al.*** Detection of Helicobacter pylori DNA in the oral cavity and gastro duodenal system of Venezuelan population. J Med Microbiol 2002; 51: 764-70

16. **Noone P A, Waclawski E R and Watt AD.** Are endoscopy nurses at risk of infection with *Helicobacter pylori* from their work? Occupational Medicine 2006; 56: 122–128.

17. **Hildebrand P, Meyer WB, Mossi S., *et al.*** Risk among gastroenterologists of acquiring *Helicobacter pylori* infection: case-control study. BMJ 2000; 321: 149.

18. **Braden B, Duan LP, Caspary WF., *et al.*** Endoscopy is not a risk factor for *Helicobacter pylori* infection, but medical practice is. Gastrointestinal Endoscopy 1997; 46(4):305-10.

19. **Lin SK, Lambert JR, Schembri MA., *et al. Helicobacter pylori*** prevalence in endoscopy and medical staff. J Gastroenterology Hepatology 1994;9(4):319-24.

20. **Akyuz N, Ozbas A and Cavdar I.** Safety of personnel working in endoscopy units. AORN Journal 2007; 11:56-59.

21. **Alvarado CJ.** APIC Guideline for Infection, Prevention and Control in Flexible Endoscopy. Olmsted RN, ed. APIC Infection Control and Applied Epidemiology: Principles and Practice. St. Louis: Mosby-Year Book 2000