

Relationship between Gastric Cancers and Trio of *Helicobacter Pylori* Infection, Chronic Gastritis and Gastric Mucosal Intestinal Metaplasia as seen in Jos University Teaching Hospital, Nigeria

Kwaghe BV¹, Ochigbo AJ¹, Nggada HA², Emmmanuel I¹, Abobarin OI¹, Akpa PO¹, Richard KS¹

ABSTRACT

Background: In 1994 *Helicobacter pylori* was classified as class 1 human carcinogen by the IARC (WHO), based on epidemiological evidence. Experimental evidence was subsequently provided by Wantabe et al. This has triggered several studies on the prevalence of *H. pylori* in patients with Gastric cancers in various regions of the world. In Africa the infection rate in various populations as reported by some studies are not parallel to the incidence of morbidity caused by this infection.

Objective: To determine the relationship between *Helicobacter pylori* infection, Chronic gastritis, Gastric mucosal intestinal metaplasia with Gastric cancers.

Methodology: This was a retrospective histopathological study of all gastric cancers with adjacent non-cancerous epithelium seen between January 2005 and December 2012 in the department of Histopathology, Jos University Teaching Hospital (JUTH). Blocks and archival slides were used for the study.

Results: Out of the 79 cases of gastric cancers seen within the study period, only 46 cases had adjacent non-cancerous epithelium and were included in the study. This comprises of 38 cases of Adenocarcinoma and 8 other tumours. Chronic gastritis was seen in 33 (71.7%) cases. Intestinal metaplasia was present in 14 (30.4%), while *H. pylori* was seen in only 7 (15.2%) cases.

Conclusions: Gastric cancers are not rare in Jos and there is a relationship between it and the trio of *H. pylori* infection, chronic gastritis and gastric mucosal intestinal metaplasia.

Keywords: Gastric cancer, Chronic gastritis, Gastric mucosal intestinal metaplasia, *Helicobacter pylori*

¹Department of Histopathology, Jos university teaching hospital, Jos.

²Department of Histopathology, University of Maiduguri Teaching Hospital, Maiduguri.

Corresponding Author

Dr. Kwaghe, B. Vandi

Department of Histopathology,

Jos University Teaching Hospital (JUTH), Jos PMB 2076, Jos, plateau state, Nigeria.

E-mail: kwaghemann@yahoo.com

Introduction

Evidence of a spiral-shaped gram negative bacterium in the stomach of animals and humans was first known at the end of the 19th century but was dismissed as incidental.¹ In the year 1983, two Australian physicians, Robin Warren and Barry Marshal isolated spiral-shaped Gram negative bacteria from the stomachs of patients with gastritis and peptic ulcer.² The organism was originally named *Campylobacter pyloridis* but was later given a new genus, *Helicobacter* and was named *Helicobacter pylori*.³ In 1994 *H. pylori* was classified as class 1 human carcinogen by the IARC (WHO), based on epidemiological evidence.⁴ Experimental evidence was subsequently provided by Wantabe et al.⁵ The identification of *H. pylori* in gastric epithelium and its classification as a human carcinogen in relation to Gastric Adenocarcinoma triggered

Access this article online

Quick Response Code



website: www.bornomedicaljournal.com

DOI: 10.31173/bomj.bomj_73_15



several studies on the prevalence of *H. pylori* in patients with Gastritis and Gastric and West in Leicester, United Kingdom reported 43% prevalence of *H. Pylori* in gastric carcinoma with no significant difference between intestinal and diffuse types.⁷ In that study no association was seen between the prevalence of *H. pylori* and tumour location or intestinal metaplasia, but the relationship between Carcinoma and gastritis was significant. In Pakistan and Saudi Arabia, Muhammad et al.⁸ and Jamal et al.⁹ reported a prevalence of 70% and 79.8% respectively. Komolafe et al.¹⁰ in Ile-Ife, south western Nigeria reported 60%.¹⁰ These values are however higher than 15% reported by Abdulkareem et al.¹¹ in Lagos and 17.9% reported by Oluwasola and Ogunbuyi¹² at Ibadan, both in south western Nigeria. In the study by Oluwasola et al.¹², moderate to severe gastritis was seen in 91.7% of cases, there was no significant difference between the prevalence of *H. pylori* in the intestinal and diffuse type of gastric carcinoma, while intestinal metaplasia was seen in 41.7% of cancers. Abdulkareem et al.¹¹ in Lagos and Komolafe et al.¹⁰ in Ile-Ife also reported the presence of gastritis in 64% and 75% of their case respectively. Chronic gastritis precedes intestinal metaplasia in gastric carcinogenesis; this made it an important finding. Oluwasola et al in Ibadan, reported intestinal metaplasia in 41.7% of cases in their study while Komolafe et al. in Ile-Ife and Abdulkareem et al in Lagos reported 16% and 22% respectively.

In the year 2002 almost 20% of cancers were considered to be attributable to infectious diseases, with *H. pylori* leading the cause (5.5% of all cancers)¹³. *H. pylori* is estimated to be responsible for about 65% of all stomach cancers worldwide, comprising of 75% of Non-cardia gastric carcinoma and gastric lymphomas¹³. *H. pylori* infection is said to be the commonest chronic bacterial infection in the world. More than half of the world's population in both developing and developed countries are infected with this organism¹⁴. Its prevalence in the US is 52% and ranges between 80-90% in developing countries. The route of infection is not known, but it was suspected that it enters the stomach by being

ingested in food or water¹⁵. Interestingly however, in Africa the infection rate in various populations does not parallel the incidence of morbidity caused by the infection¹⁵. This has been termed by a number of authors as the 'African enigma' based on an apparently low incidence of gastric carcinoma and other *H. Pylori*-associated morbidities in the continent of Africa¹⁶. This concept has been challenged, and suggestion that the enigma could be explained by lack of infrastructure and access to hospitals and care in African countries thereby resulting to incomplete reporting of gastric cancers. Another criticism on the African enigma has been the high prevalence of HIV infection. A relatively large population will die before the age in which gastric cancer becomes frequent¹⁶. Similar discordance between *H. pylori* infection and gastric carcinoma prevalence has also been reported within the Asian continent¹⁷. However, previous study by Kwaghe et al.¹⁸, looked at the clinicopathological characteristics of gastric malignancies. Therefore, this study aimed to determine the relationship between *Helicobacter pylori* infection, Chronic gastritis and Gastric mucosal intestinal metaplasia with Gastric cancers

Materials and Methods

This was a retrospective study of all Gastric cancers with adjacent non - cancerous epithelium, seen in the department of Histopathology Jos University Teaching Hospital, between January 2005 and December 2012. Paraffin wax embedded tissue blocks and corresponding archival routine haematoxylin and eosin (H&E) stained slides of all gastric cancer cases were retrieved and reviewed. Fresh sections were taken where original slides were missing or damaged and Modified Giemsa stain was used to identify the presence of *H. pylori* organisms in the non-cancerous gastric mucosa adjacent to these malignancies. Immunohistochemistry using c-KIT, SMA (smooth muscle actin) and CD34 antibodies was done on seven mesenchymal malignancies.

Results

Malignant gastric tumours accounted for 79 cases, representing 4.19% of the 1883 malignant tumours recorded in Histopathology department J.U.T.H.



over the study period. Out of the 79 gastric cancers seen within the study period, 46 cases had adjacent non-cancerous epithelium and were included in the study. This comprises of 38 cases of Adenocarcinoma, 6 cases of gastrointestinal tumour (GIST), a case of carcinoid and a case of leiomyosarcoma, that was positive for SMA, but negative for c-KIT and CD34. These were analysed for evidence of gastritis, intestinal metaplasia and the presence of *H. pylori*. Chronic gastritis was seen in 33 (71.7%) cases. All these were Adenocarcinoma cases, thus 86.6% of adenocarcinoma cases with adjacent non-cancerous epithelium had chronic gastritis (Table 1). Sixteen (34.8%) had moderate Gastritis,

fourteen (30.4%) had severe gastritis, 10 (21.7%) had mild gastritis, while 6 (13.0%) were normal. Intestinal metaplasia was present in adjacent normal epithelium of 14 cases, i.e. 30.4% of all tumours in the study. Intestinal metaplasia was not seen in the adjacent non-cancerous epithelium of other tumour types (Table). The presence of *H. Pylori* was seen in only 7 (15.2%) cases of all the Gastric malignancies. However, the percentage of *Helicobacter pylori* in Adenocarcinoma cases is 18.4%. The presence of *H. pylori* based on Lauren classification was 3 (27.3%) and 4 (14.8%) for the diffuse and intestinal types respectively. *H. Pylori* were not seen in cases of Adenocarcinoma with intestinal metaplasia.

Table 1: Distribution of Chronic gastritis, intestinal metaplasia and *H. pylori* in adjacent non-cancerous gastric epithelium of Gastric cancers seen in J.U.T.H., Jos

Gastritis	Frequency	(%)
Absent	7	15.2
Present	39	84.8
Total	46	100
Intestinal metaplasia		
Absent	32	69.6
Present	14	30.4
Total	46	100
Helicobacter pylori		
Absent	39	84.8
Present	7	15.2
Total	46	100



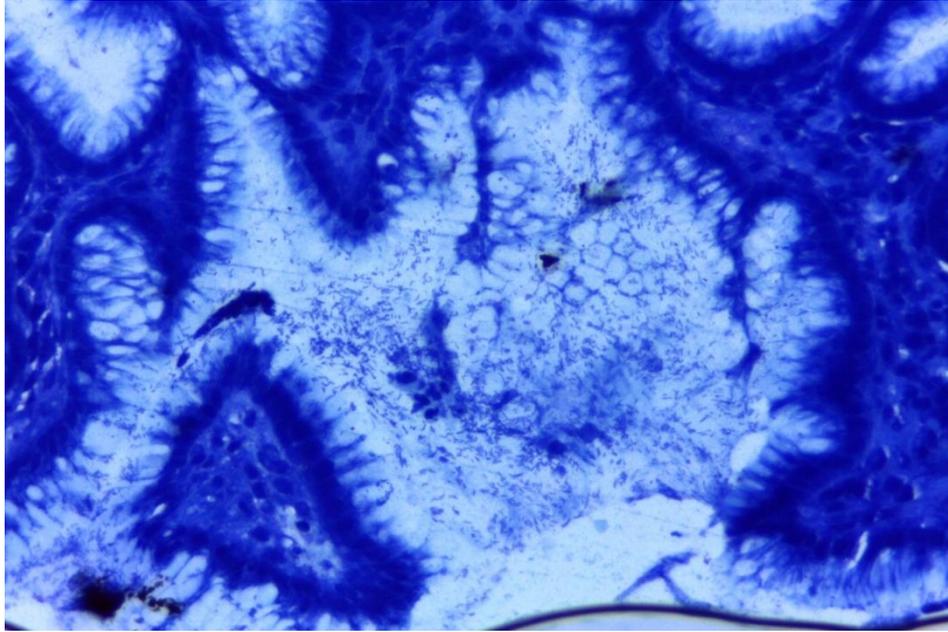


Figure 1. *H. pylori* seen in the adjacent normal gastric epithelium of a gastric cancer case. (Modified giemsa x 400)

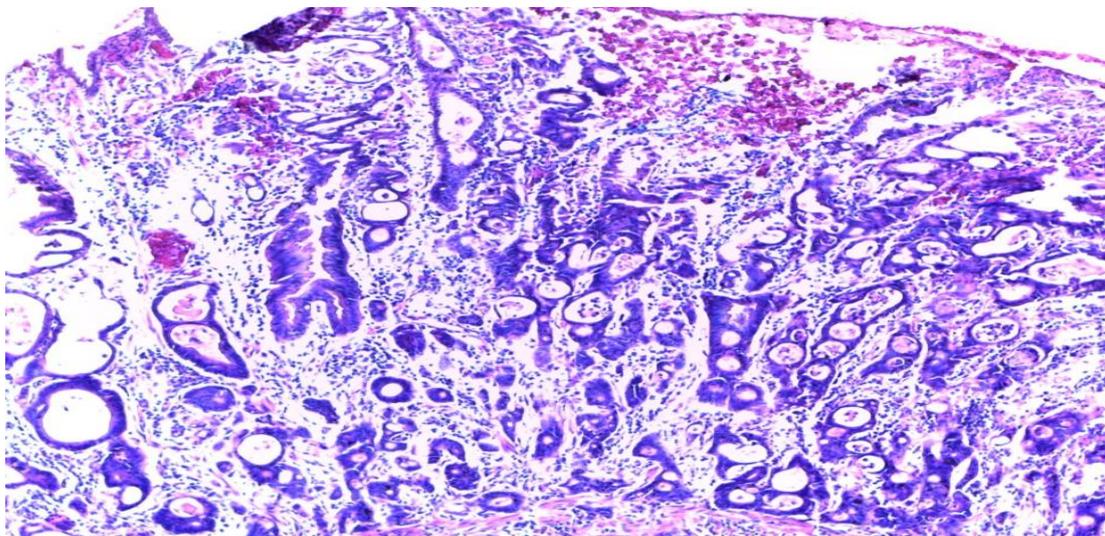


Figure 2. Gastric cancer seen with background chronic gastritis (H and E x 100)

Discussion

Forty-six cases of cancers seen within the study period had adjacent non-cancerous epithelium, this comprises of 38 Adenocarcinoma cases and 8 cases of other tumours. Chronic gastritis was seen in 33 (71.7%) cases. This concurs with the work of Komolafe et al. in Ile-Ife and Abdulkareem et al. in Lagos Nigeria who reported 64% and 75%

respectively^{10, 11}. This shows that there is a strong relationship between Gastric cancer and chronic gastritis which might have been caused by chronic *H. Pylori* infection or Autoimmunity. Intestinal metaplasia was seen in 14(30.4%) cases of all denocarcinoma cases. This is comparable to 22% reported by Abdulkareem et al.¹¹ in Lagos, but

significantly lower than 41.7% reported by Komolafe et al.¹⁰ in Ile-Ife and higher than 16% reported by Oluwasola et al.¹² in Ibadan. H. Pylori is said to be responsible for 65% of all gastric cancers seen worldwide. The presence of H. pylori was seen in 7 cases of gastric Adenocarcinoma, i.e 15.2% of all the gastric malignancies seen in the study. No H. pylori seen in cases with other tumour types apart from Adenocarcinomas. This corresponds closely with 15% reported by Abdulkareem et al.¹¹ and 17.9% reported by Oluwasola et al.¹² These values are however lower than 43% reported in United Kingdom, 70% in Pakistan and 79.8% in Saudi Arabia.^{6,8,9} The low association of gastric cancers and H. Pylori seen in this study may be The the relationship between H pylori and gastric cancer was not significant. This may be attributable to the advanced tumour stages in which most of our patients presented and also the fact that most of the specimens were endoscopic biopsies containing mostly the tumour with very little adjacent non-cancerous epithelium.

Conclusion: Gastric cancer showed a significant relationship with chronic gastritis and gastric mucosal intestinal metaplasia as seen in the other studies, however there was no significant relationship between gastric cancer and H. pylori infection.

Acknowledgements

The authors wish to thank the Resident doctors, the laboratory scientist and Technicians of the Jos University Teaching Hospital who assisted with collection of data and processing of tissue samples used in this work. We also want to thank the doctors and other laboratory workers of the department of Histopathology, National Hospital Abuja where immunochemistry on the mesenchymal tumours were done.

References

1. Salmon H. Spiral bacteria in human stomach. Dubois A. 1995; 1(8)9879-9881
2. Marshal BJ, Warren JR. Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration. Lancet 1984; 1(1)1311-1315
3. Gordon CS, Armstrong J, Chilvers M, Peters MD. Transfer of Campylobacter pylori to Helicobacter gen nov as Helicobacter pylori. Intl J Sys Bacteriol. 1989; 3(9)397-405
4. IARC working group. IARC monographs on the evaluation of carcinogenic risk to humans. Schistosomes, Liver flukes and Helicobacter pylori. 1994; Vol 61. Lyon France
5. Wantabe T, Tada M, Nagai H, Sasaka N. Helicobacter infection induced gastric carcinoma in Mongolian gerbils. Cancer Res. 1998; 5(8)4255-4259
6. Loffeld RJ, Willems I, Flendrig JA, Arends JW. Helicobacter pylori and gastric carcinoma. Histopathology. 1990; 17(1) 537-541.
7. Clarkson KS, West KP. Gastric cancer and Helicobacter pylori infection. J Clin Pathol. 1993; 4(6)997-999.
8. Muhammad A, Serajudduala S. Association of helicobacter pylori with carcinoma of stomach. J Pak Med Assoc. 2007; 57(7)337-341
9. Jamal H, Nadar M. Helicobacter pylori infection in gastric carcinoma a study of 84 cases from Asir region. Annals of Saudi medicine. 1994; 14(1)286-289.
10. Komolafe AO, Ojo OS, Olasode BJ. Gastric malignancies and associated premalignant lesions in a teaching hospital in southwest Nigeria. Afr J Biotechnol. 2008;1(3)2104-2111.
11. Abdulkareem FB, Onyekwere CA, Awolola NA, Ajekigbe AT. Clinicopathological review of malignant gastric tumours in Lagos, Nigeria. Nig Q J Hosp Med. 2010; 20(2)49-54.
12. Oluwasola AO, Ogunbiyi JO. Helicobacter pylori-associated gastritis and gastric cancer in Nigeria. Indian J Gastroenterol. 2003; 22(6)212-214
13. Parkin DM. The global health burden of infection-associated cancers in the year 2002. Int J Cancer. 2006; 118(1) 3030-3044.
14. Ahmed KS, Khan AA, Ahmed I, Tiwari Sk, Habeeb A, Ali JD, Abid Z, Ahmed N, Hahibullah CM. Impact of household hygiene and water source on the prevalence and transmission of H. Pylori a South Indian perspective. Singapore Med J. 2007; 48(6)543-549.



15. Tanih NF, Clarke AM, Mkwetshana N, Green E, Ndip LM, Ndip RN. Helicobacter pylori infection in Africa Pathology and microbiological diagnosis. Afr J biotech. 2008; 7(25) 4653-4662.
16. Tinike EB, Melanie L, Nicole CT, Marriane T, Beatriz C, Bauke Y et al. Gastric cancers of western European and South African patients show different patterns of genomic instability. BMC Med Genomics. 2011; 4(1) 7-19.
17. Hirato M, Mae FG, Nobuhiro S. H. Pylori and gastric cancer the Asian Enigma. Am J Gastroentrol. 2002; 97(5) 1106-1112.
18. Kwaghe BV, Mandong BM, Manasseh AN, Nggada HA, Emmanuel I, Amos AG. Clinicopathological study of gastric malignancies in Jos. JJM 2017; 11(1) 51-59

Cite this article as: Kwaghe BV, Ochigbo AJ, Nggada HA, Emmmanuel I, Abobarin OI, Akpa PO, Richard KS. **Relationship between Gastric Cancers and Trio of Helicobacter Pylori Infection, Chronic Gastritis and Gastric Mucosal Intestinal Metaplasia as seen in Jos University Teaching Hospital, Nigeria.** *Bo Med J* 2018;15(1): 29-34. **Source of Support:** Nil, **Conflict of Interest:** None declare

