Original Research Article

Comparison of rapid urease and histology tests for the diagnosis of *Helicobacter pylori* infection in Cameroon

Ebule I.A,[1,2] Djune, Fokou, A. K[1,2], Anago T. C[2], Heugueu C[2], Tanni B[3], Pal oheimo L[4]

[1]Faculty of Science, University of Buea, Cameroon

[2]School of laboratory Technologies, Yaound, Cameroon

[3]Prtestant University of Central Africa

[4]Biohit HealthCare Oyj, Helsinki, Finland

*Corresponding author

Alonge Ivo Ebule

Email: alolevo@yahoo.com/alonge.ivo@ubuea.cm

Abstract: Infection with spiral rod shaped bacterium *Helicobacter pylori* induces chronic active gastritis that develops with time in a proportion of infected people to atrophic gastritis and stomach cancer. At present, the available methods to diagnose active *H. pylori* infection are endoscopy with biopsy for histology, culture, rapid urease tests, 13C or 14C urea breath test, urine antibody, the stool antigen test and serology. The aim of this study was to evaluate the usefulness of the quick urease test for the diagnosis of *H. pylori* infection compared to histology. Patients who underwent upper endoscopy for standard clinical indications (e.g. dyspepsia, abdominal pain) were enrolled. Data was expressed in micosoft excel and the statistics interpreted at 95% confidence interval using Epi Info 6.0 A total of 50 patients (27 F, 23 M, mean age 47.34±17.57) were evaluated; 29 (58%) of them were *H. pylori* positive by histology and 34(68%) by the quick urease method. The performance characteristics for the quick urease test for diagnosis of *H. pylori* infection were calculated using the histology test as gold standards. The quick urease test had a sensitivity of 100% and specificity of 76.19 as compared with the histology test. We conclude that the quick urease test is an appropriate, simple, convenient and accurate method to diagnose *H. pylori* infection.

Keywords: Comparison, rapid urease test, histology, *H. pylori* Infection

INTRODUCTION:

Infection with spiral rod shaped bacteria *Helicobacter pylori* is now identified as the causal factor for several clinically important diseases in gastric and duodenal mucosa [1]. Gastric carcinoma and non-Hodgkin lymphoma (mucosa associated lymph node tissue or MALT lymphoma) have also been associated with this organism [2, 3]. In 1994, the IARC expert group classified *H pylori* infection as a group-I carcinogen for humans (IARC, 1994) [4]. This bacterial infection (usually acquired in childhood) initially affects only the antral mucosa causing superficial gastritis. If not eradicated, *H pylori*-infection remains chronic and progresses to corpus-predominant gastritis or pangastritis, with mucosal atrophy as the end result [5]. The majority of *H. pylori* an infected individual develop atrophy of the stomach mucosa and is considered a pre-malignant lesion for gastric cancer [6, 7]. Although atrophy may be the result of autoimmune gastritis, *H. pylori* may also play a role in this condition.

H. pylori eradication is recommended in the presence of atrophy [8]. The future of prevention of gastric cancer deaths now relies on the on timely and early diagnosis and surveillance of patients with precancerous lesions as well as early detection of the cancer, making higher survival rates and lower healthcare costs per patient achievable [9-11]. It is critically important and challenging, therefore, to determine the presence or absence of *H. pylori* in patients with atrophic gastritis. Presently, several diagnostic techniques are available to identify infection with *H. pylori*. These methods include both invasive (rapid urease test - RUT, histology, and culture) and non-invasive (urea breath test - UBT, 13C-urea blood test, serology, and stool antigen test - HpSA) [8]. In the course of progression of atrophy, however, the density of *H. pylori* in the stomach mucosa may completely disappear and may considerably influence test results, leading to false-negative results especially with UBT and HpSA [2]. The objective of our study was to evaluate the usefulness of the rapid urease test

for the diagnosis of *H. pylori* infection compared to histology.

METHODS:

For a period of two months, February to April 2016, we undertook a prospective study amongst consented patients who underwent upper diagnostic endoscopy with biopsy for dyspeptic reasons at the Yaounde Central Hospital. Four biopsies were collected from each patient for histology and the RUT. *Histology*: Two biopsies (one from the antrum and the other from the corpus) were used. The slides were stained with haematoxylin and eosin and Giemsa; the latter was used to confirm presence or absence of *H .pylori*. Cases identified with *H. pylori* in any of the biopsy specimens were considered positive. *RUT*: Two biopsy specimens (one from the antrum and the other from the corpus) were analyzed from each patient. The *H. pylori* Quick Test (Biohit, Plc., Finland) was used according to the instructions of the manufacturer. The color change within 30 min of the biopsies being placed in the gel was used to check positivity. All patients signed an informed consent form. Ethical clearance was obtained from the ethics committee.

RESULTS:

A total of 50 subjects were recruited during the study period age 18-84 yrs, mean±SD, 47.34±17.57 (including 27 females aged 18-75 mean±SD, 42.00±16.1; males 23 aged 20-84 years, mean±SD 53.60±17.47). 29 (58.0%) were *H. pylori* positive by histology while 34(68.0%) were positive for RUT. Agreement between RUT and histology test results occurred in 45/50 (90%) cases. Using the histology test as the diagnostic standard, the RUT test resulted in 29 true positive, 16 true negative, five, false positive, and zero false negative results, giving a sensitivity of 100%, specificity of 76.19%, positive predictive value of 85.29%, and negative predictive value of 100%.

DISCUSSION:

In the present study we investigated the feasibility, sensitivity and specificity of the quick urease test in the diagnosis of *H. pylori* infection compared to histology examination. The prevalence of *H. pylori* infection by the quick urease test compared to histology was respectively 68.0% and 58.0%. The overall accuracy for the RUT test was 90% compared to histology. In addition, the sensitivity, specificity, positive predictive value and negative predictive value were respectively 100%, 76.19%, 85.29%, 100%. Endoscopy with biopsy has been reported as the gold standard for gastric diseases [2]. However, biopsies are not usually sent for histological examination.

The RUT detection of *H. pylori* is a very sensitive method to diagnose infection as well as to provide early treatment and eradication of the organism. In general, good concordance between the RUT and histology was observed in our study subjects. Our results are similar to what has been reported in different studies. For example Vouhkonen in 2008 reported a sensitivity of 100%, and a specificity of 93%. Sudraba *et al.*; in 2011 observed a sensitivity of 98%, specificity of 100% amongst patients with atrophic gastritis as well as a sensitivity of 81% and a specificity of 100% amongst patients with non-atrophic gastritis. In 2005, Lucía *et al.;* demonstrated a sensitivity of 98% and a specificity of 100%. Our results were however, in disagreement with low sensitivity of 57% and 75% reported by Pilotto *et al.*; in 2014 [1]. The quick urease tests diagnosed more positive cases than the histology test. The false positive cases may be as a result of the low concentration of *H. pylori* in biopsies especially during atrophy or the presence of blood in the biopsies (www.biohithealthcare.com) [12]. The quick urease test had been reported as very convenient and accurate in clinical practice [13].

CONCLUSION:

This study shows that the Biohit quick urease test is an appropriate method to diagnose *H. pylori* infection. Performance characteristics of this quick urease test were as good as the histology test. The test is convenient, simple, accurate in the diagnosis of Helicobacter pylori infection and for the early eradication of *Helicobacter pylori*.

REFERENCES

1. Pilotto A, Franceschi M. Helicobacter pylori infection in older people. World J Gastroenterol. 2014 Jun 7; 20(21):6364-73.
2. Di Mario F, Franzè A, Cavallaro LG. A non-invasive approach to diagnosis of upper gastrointestinal diseases. Via Comelico; 2008.
3. Fry LC, Curioso WH, Rickes S, Horton G, Hirschowitz BI, Monkemuller K. Comparison of 13C-urea blood test to 13C-breath test and rapid urease test for the diagnosis of Helicobacter pylori infection. Acta Gastroenterol Latinoam. 2005 Dec; 35(4):225-9.
4. International Agency for Research on Cancer, World Health Organization Schistosomes, Liver flukes and *Helicobacter pylori*. IARC working group on the evaluation of carcinogenic risks to human. *Monogr Eval Carcinog Risks Hum* 1994; 61:218-220.

5. Benberin V, Bektayeva R, Karabayeva R, Lebedev A, Akemeyeva K, Paloheimo L, Syrjänen K. Prevalence of H. pylori infection and atrophic gastritis among symptomatic and dyspeptic adults in Kazakhstan. A hospital-based screening study using a panel of serum biomarkers. Anticancer research. 2013 Oct 1; 33(10):4595-602.

6. Agréus L, Kuipers EJ, Kupcinskas L, Malfertheiner P, Di Mario F, Leja M, Mahachai V, Yaron N, Van Oijen M, Perez Perez G, Rugge M. Rationale in diagnosis and screening of atrophic gastritis with stomach-specific plasma biomarkers. Scandinavian journal of gastroenterology. 2012 Feb 1; 47(2):136-47.

7. Lahner E, Esposito G, Galli G, Annibale B. Atrophic gastritis and pre-malignant gastric lesions. Translational Gastrointestinal Cancer. 2015 Aug 6; 4(4):272-81.

8. Sudraba A, Daugule I, Rudzite D, Funka K, Tolmanis I, Engstrand L, Janciauskas D, Jonaitis L, Kiudelis G, Kupcinskas L, Ivanauskas A. Performance of routine Helicobacter pylori tests in patients with atrophic gastritis. J Gastrointestin Liver Dis. 2011 Dec 1; 20(4):349-54.

9. Dinis-Ribeiro M., Areia M., de Vries A. C., Marcos-Pinto R., Monteiro-Soares M.,. O'Connor7 A, Pereira C, Pimentel-Nunes P, Correia R., Ensari A, Dumonceau J. M., Machado J. C, G. Macedo, MalfertheinerP, Matysiak-Budnik T, Megraud F, Miki K., O'Morain C, Peek R. M., Ponchon T., Ristimaki A, Rembacken B, Carneiro F, KuipersE. J. Management of precancerous conditions and lesions in the stomach (MAPS): guideline from the European Society of Gastrointestinal Endoscopy (ESGE), European Helicobacter Study Group (EHSG), European Society of Pathology (ESP), and the Sociedade Portuguesa de Endoscopia Digestiva (SPED). *Endoscopy* 2012; 44: 74–94

10. Amal H, Leja M, Funka K, Skapars R, Sivins A, Ancans G, Liepniece-Karele I, Kikuste I, Lasina I, Haick H. Detection of precancerous gastric lesions and gastric cancer through exhaled breath. Gut. 2016 Mar 1; 65(3):400-7.

11. Kurilovich S, Belkovets A, Reshetnikov O, Openko T, Malyutina S, Ragino Y, Scherbakova L, Leja M, Paloheimo L, Syrjänen K, Voevoda M. Stomach-specific Biomarkers (GastroPanel) Can Predict the Development of Gastric Cancer in a Caucasian Population: A Longitudinal Nested Case-Control Study in Siberia. Anticancer research. 2016 Jan 1; 36(1):247-53.

12. Available at : www.biohithealthcare.com

13. Leodolter A, Wolle K, Malfertheiner P. Current standards in the diagnosis of Helicobacter pylori infection. Digestive Diseases. 2001 Aug 29; 19(2):116-22.

14. Vauhkonen M. Helicobacter pylori quick test comparison to biopsy histology. Poster presentation at the European Helicobacter study group conference; Riga Lativa 2008.