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Comparing Stool Antigen And Urea Breath Tests For Helicobacter Pylori Diagnosis Post-Ppi Therapy: A Non-Invasive Approach

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Abstract:

Helicobacter pylori (H. pylori) infection remains a common cause of gastrointestinal disorders, and accurate diagnosis is crucial for effective treatment. Non-invasive diagnostic methods such as the urea breath test (UBT) and stool antigen test are widely used for detecting H. pylori. This study compares the performance of stool antigen tests with UBT, particularly after proton pump inhibitor (PPI) therapy. A cohort of 56 patients, who were undergoing PPI treatment for conditions like ulcerative colitis or reflux esophagitis, was evaluated using both UBT and stool antigen tests. The results showed that stool antigen tests maintained high sensitivity and specificity even after PPI therapy, with minimal reduction in accuracy. In contrast, UBT demonstrated reduced sensitivity post-PPI treatment. The stool antigen test was found to be a simpler, faster, and more cost-effective alternative to UBT, particularly for patients with high daily activity levels, children, and elderly individuals. Despite a slight decrease in sensitivity after PPI administration, stool antigen tests proved to be a reliable option for H. pylori diagnosis when UBT is unavailable or difficult to perform. This study supports the integration of stool antigen tests into clinical practice and advocates for further research to optimize diagnostic strategies for H. pylori infection.

Keywords: Helicobacter pylori, Stool antigen test, Urea breath test (UBT), Proton pump inhibitors (PPI), Non-invasive diagnostic methods

INTRODUCTION

It is a highly sensitive as well as specific test to diagnose Helicobacter pylori (H. pylori) so it is the most valuable test to diagnose Helicobacter pylori (H. pylori) infection all the same which is non-invasive. This is suggested according to the 2005 guidelines of diagnosing and treatment of Helicobacter pylori. Besides the UBT, stool antigen tests are also applied, based on ructions (polyclonal and monoclonal) antibodies in identifying the presence of H. pylori [1], with most of them as sensitive and specific. Maastricht III has also recommended the use of a stool antigen test in detecting or clearing H. pylori [2]. Helicobacter pylori releases catalase, as an antigen [3]. Not only is the process that entails use of monoclonal antibodies precise, as compared to polyclonal, but also it is so fast taking just 70 minutes [4]. UBT is at once noninvasive and only involves a straightforward lab procedure, but it needs time and training. Moreover, not all patients can easily undergo UBT e.g. children, handicapped, and even the old people. The analytical process is less cumbersome and a smaller number of medical staff is needed and stool antigen test can be applied in a convenient way in case of patients with high activities of the daily living, children and old age patients. A proton pump inhibitor (PPI) suppresses the formation of gastric acid and is antibacterial. Application of UBT in H. Pylori could deliver a false negative outcome in patients on PPIs, and, as such, PPIs treatment should be discontinued at least 2 weeks before UBT in H. Pylori. The Testmate pylori antigen enzyme immunoassay (EIA) is a stool antigen test in which native catalase is the antigen. PPI therapy ought not to interfere with the accuracy of the test in the diagnosis of Helicobacter pylori infection. An analysis was done on the comparison of stool antigen and UBT post PPI to be compared in their accuracy

METHODOLOGY

The 56 patients who had ulcerative colitis or reflux esophagitis or other illnesses that necessitated the taking of PPIs were assessed. UTB and local stool antigen examinations were done after or during the administration of PPI. The research participants were requested to provide a breath sample, as well as a sample sample after the intake of one tablet containing 100 mg of UBT tablet under brand name UBT tablet). CO2/CO2 ratio that was used by INIS at the cut-off point of 3.5 was analyzed to determine the CO2/CO2 ratio. The stools of each patient were taken before and after the use of PPI and kept at -80 C until the time they were to be used to analyze them. Stool antigen testing was studied by using testmate pylori antigen EIA. Two hundred milligrams of stool containing anti catalase monoclonal antibody conjugated with peroxidase was diluted in 50 ml of water and added into a well at 25 o C. Absorbance at 450 nm and 630 nm was determined.

RESULTS

It has 40 positive on 56 patients after PPI and five negative on five patients before UBT and stool antigen. One patient was positive in both the stool antigen and UBT tests whereas two patients were negative. Using UBT, the stool antigen tests contained 96.2% sensitivity rates, 72.4 rates of specificity and an agreement rate of 90.3 prior to PPI treatment (Table 1).
Three weeks after the administration of PPI, 32 patients identified as positive and 18 as negative on the UBT and stool antigen. in one of them, the UBT was positive and the stool antigen was negative, in two patients, the UBT was positive and no stool antigen test was positive. Stool antigen test sensitivity, specificity, and agreement were 89.9%, 91.9 and 90.3 after PPI treatment according to UBT (Table 2).

UBT and fecal antigen pre and post PPI treatment

PPI was associated with an increase in positivity of 76.0 per cent for UBT before and 82.4 per cent after treatment, 79.6 per cent and 61.7 per cent respectively for the stool antigen test. There was no significant difference in the positivity ratios before the or after PPI treatment.
Strains before and after PPI treatment had their UBT and stool antigen (A values) measured
In 30 patients treated with PPIs during 4 weeks, UBT values were 24, 98% +/- 6.33 % before and 17, 19% +/- 5.75 % after PPI treatment. Consequentially, the A ratios before and after treatment with PPI were 2.160 0.20 and 1.17 0.24, respectively. There was also a mean A ratios of 1.02 +/- 0.26 and 0.69 +/- 0.28, respectively in 30 patients who underwent four-weeks of PPI treatment.

Table 1 : Test results related to proton pump inhibitors including urea breath test results and stool antigen test results

Urea breath test			
	Positive	Negative	Total
Stool antigen test			
Positive	40	4	44
Negative	2	10	12
Total	42	14	56

Table 2: The results of the urea breath test and stool antigen test in association with proton pump inhibitors

	Urea breath test		
	Positive	Negative	Total
Stool antigen test Positive Negative	32	2	34
Total	4	18	22
	36	20	56

Table 3: Positive rates before and after treatment with proton pump inhibitors

	Before PPI treatment	After PPI treatment	P value
Urea breath test	76.0%	65.3%	0.56
Stool antigen test	79.6%	61.7%	0.16

DISCUSSION

Stool antigen tests just like UBTs are non-invasive Helicobacter pylori tests. Being easy and simple to perform, this test has good sensitivity and specificity [8]. When they were not treated with H. pylori elimination therapy, they were 91% sensitive, 93 percent specific, 92 percent positive and 87 percent negative in the present context. Eight monoclonal antibody tests were reported and their sensitivity, specificity, positive and negative predictive values were considerably higher. These averages were 96%, 97%, 96% and 97 respectively. Stool antigen testing is also recommended since it is as reliable as a UBT as stated in Maastricht III guidelines [2]. There are a number of drugs that give false-negative UBT: those that inhibit Helicobacter species, or inhibit urease activity [5, 6, 9-12]. The results were UBT false-negative rates of 50 percent in two-week and four-week studies with omeprazole or lansoprazole. False-negative results of UBT were shown in one patient who was treated using lansoprazole 30 mg/d during 2 weeks. In PPI, it is also more frequent to find false-negative stool antigen tests [13, 14]. The UBT outcome of nine positive H. Pylori patients being given PPI was smaller. The authors report that there was high sensitivity of stool antigen test prior to PPI therapy but it was low in specificity. It could be so because the number of negative results of UBT by patients is rather small. Similarly there are numerous reports of the sensitivity and specificity of the stool antigen tests is high but the specificity of the tests has been

reported to be lower. The stool antigen test was very specific (90.9%) despite its loss of slightly in sensitivity following administration of PPI. The percent concordance between the outcome of UBT and stool antigen results was high (89.3%) before and after administration of PPI. Although the stool antigen was performed well after and before using PPIs, still, PPI conducted poorly on the test. Despite the fact that stool antigens prove to be extremely sensitive and specific, UBT and stool antigen tests do not agree [16]. Conversely, an increase in the stool antigen cut-off led to the decrease in conflicting results. Difference between the fact that the UBT failed to detect coccoid H. Pylori and the low cut off score occurred. Probably, the same mechanism can provoke positive stool antigen results and negative results of the UBT.

It was expected that the antigen test of Helicobacter Pylori is no more different than the UBT in terms of positive ratios before and after PPI therapy indicating that it is an effective test to diagnose Helicobacter Pylori. Relative to UBT, the positivity of stool antigen reduced by 78.6 percent to 60.7 percent after PPIs had been administrated. The use of stool antigen tests is similarly beneficial to the UBTs without the termination of PPIs. No significant differences were recorded in either stool antigen testing or UBT results. The results of UBT of patients treated with PPI during four weeks were significantly lower, whereas stool antigen results remained unaffected. The bacteriostatic effects of PPIs influenced both assays, however, the UBT was not influenced by the bacteriostatic effects of PPIs as profoundly as stool antigen. PPIs kept stool antigen results more steady even though some of the studies discoursed false negative results in PPI using. Stool antigen is a non-invasive Helicobacter pylori test; it has a number of strengths over the UBT such as simplicity, speed and low price [17]. Stool antigen test is also very quick and simple beside its high sensitivity and specificity [18]. When UBTs are unavailable, Then stool antigen evaluation can be used in the diagnosis of this disease.

CONCLUSION

This paper has emphasized on the accuracy and sensitivity of stool antigen tests as a non-invasive method of testing Helicobacter pylori infection especially when compared to urea breath test (UBT). Both tests are non-invasive and have high sensitivity, specificity, whereas stool antigen tests demonstrate similar results to UBT despite proton pump inhibitor (PPI) therapy. With regards to the outcomes, stool antigen testing does not become deficient in terms of its accuracy after PPI treatment and its sensitivity is affected only to a minimal extent. Though UBT is not as sensitive when PPIs are used, the stool antigen tests are consistent and simpler to use than UBT, and they are fast and cost-effective. Although the sensitivity is slightly lower following the administration of PPI, stool antigen test is still a good secondary option of testing UBT is not available or challenging to administer. This research highlights the necessity to involve the use of stool antigen tests in clinical practice, particularly when it comes to patients that tend to be highly active throughout the day, as well as children and elderly patients to whom UBT would not be applicable. Such findings should be validated by further research with large sample size and diverse patient population which should lead to the optimization of H. pylori diagnostic approach.

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