

H. pylori: Pathogen Causing Gastric Ulcers and the State of Antibiotic Resistance

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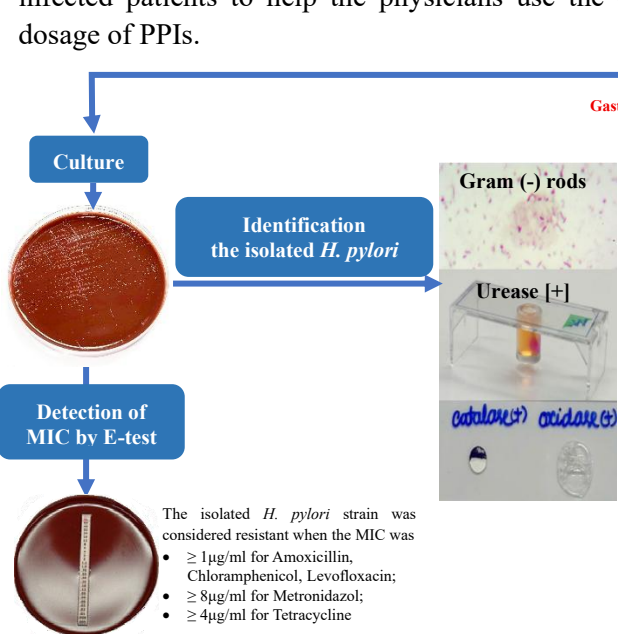
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BACKGROUND

H. pylori is the causative microorganism of peptic ulcers, therefore several antibiotics have been recommended for treatment. However, in Vietnam, a significant rate of resistance to some of these antibiotics has been observed and reported^[1,2]. Therefore, data identifying the resistance status of these antibiotics and the virulence factors of *H. pylori* are essential to help physicians assess the disease risk and select the appropriate treatment options for the patients

AIMS OF THE STUDY

This study aims to determine the prevalence of the *Helicobacter pylori* infection using the culture methods for isolation and evaluation of its antibiotic resistance patterns. Additionally, this study utilizes real-time PCR to detect the VacA and CagA genes of *H. pylori* to determine its virulence, and to identify CYP2C19 genotypes of the infected patients to help the physicians use the correct dosage of PPIs.



Picture 1: The methods to culture the *H. pylori* from the gastric biopsy samples collected from patients and to detect the antibiotic resistances of the isolated *H. pylori* by MIC detection method

RESULTS

From March 2023 to March 2025A, 2,056 gastric biopsy samples were submitted to NK-Biotek Laboratory. *H. pylori* were detected by culture in 1,607 (78.16%) and by MPL real-time PCR in 1809 (87.99%) samples. Antibiotic susceptibility results of the isolated *H. pylori* were: Resistance rates to clarithromycin, levofloxacin, and metronidazole were 94.1%, 61.1%, and 4.5%, respectively, while resistance to amoxicillin and tetracycline was low (0.2% and 0.06%). Among children (≤15 years), resistance to clarithromycin and levofloxacin reached 96.0% and 39.4%. Resistant strains showed MICs ranging from 1 to 6 µg/mL. The distribution of the vacA s1/m1, cagA[+] gene was high in children (60.42%), while adults had a lower s1/m1, cagA[+] rate (44.57%). The CYP2C19 genotypes in the two groups of subjects (children and adults) were: EM (44.54% and 48.09%); IM (44.97% and 42.96%); PM (10.49% and 8.94%).

DISCUSSIONS AND CONCLUSION

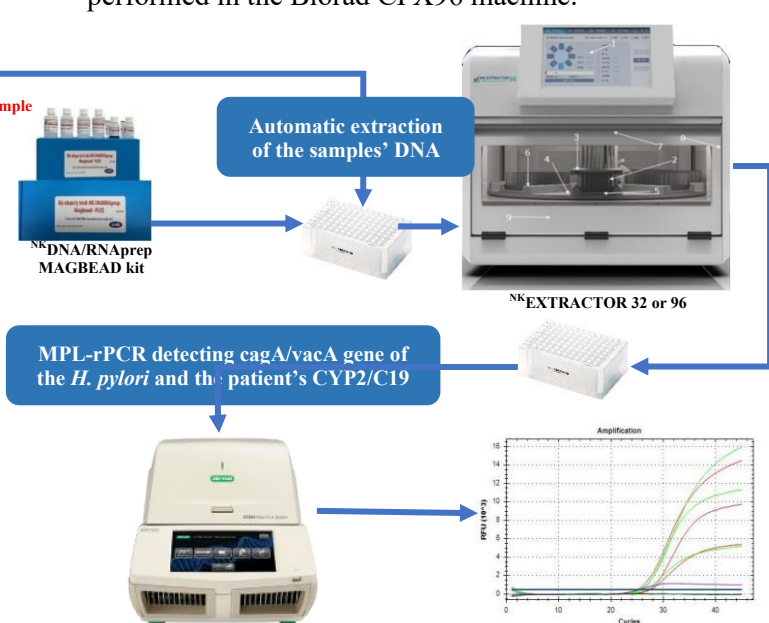
Using culture and MPL-rPCR techniques performed at the NK-Biotek laboratory, the detection rate of *H. pylori* in gastric biopsy samples taken from patients clinically diagnosed as peptic ulcers causing by *Helicobacter pylori* infection showed a relatively high presence of *H. pylori*. The test results also revealed a very high resistance rate of *H. pylori* to clarithromycin and levofloxacin. This finding explains the many clinical failures in the antibiotic treatment. Furthermore, the study also identified the distribution of vacA and cagA genotypes, as well as the variability of PPIs metabolized in patients by detection the variation of CY2C19 genotype. These results provide essential information for therapists to assess risks and determine appropriate treatment solutions.

KEY WORDS

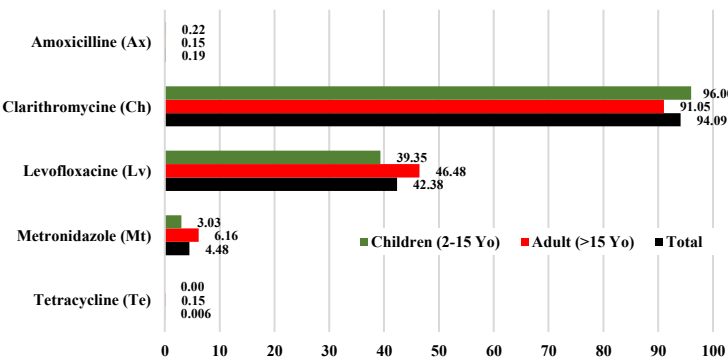
HPV genotypes, E6/E7 mRNA; Reverse transcriptase multiplex real-time PCR (RT MLP-rPCR).

MATERIALS AND METHODS

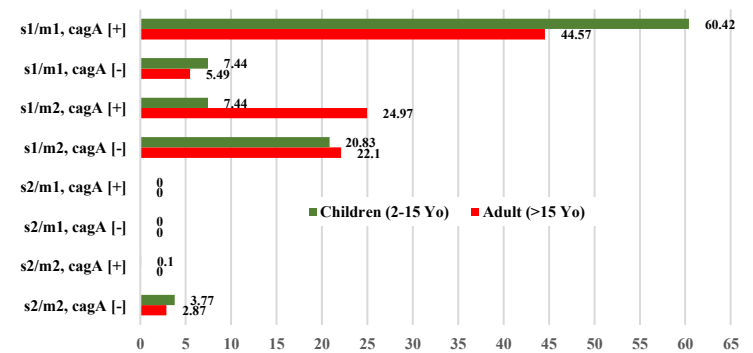
A cross-sectional study was conducted on gastric biopsy samples submitted to the NK-Biotek Laboratory from March 2023 to March 2025. *Helicobacter pylori* bacteria were detected by using the culture and the real-time PCR. With the culture method, antibiotic susceptibility of *H. pylori* isolates was detected by using the minimum inhibitory concentration (MIC) determination method for following antibiotics including amoxicillin, clarithromycin, levofloxacin, metronidazole, and tetracycline. In addition to the culture method, DNA from the gastric biopsy samples was automatically extracted in the ^{NK}EXTRACTOR instrument by the ^{NK}DNA/RNAprep MAGBEAD kit. The DNA extracted from the samples were added to the PCR tubes containing the specific MPL-rPCR mixes to detect the VacA/CagA genes of *H. pylori* presented in the samples and also to determine the patient's CY2C19 genotype. The real-time PCR program was performed in the Biorad CFX96 machine.



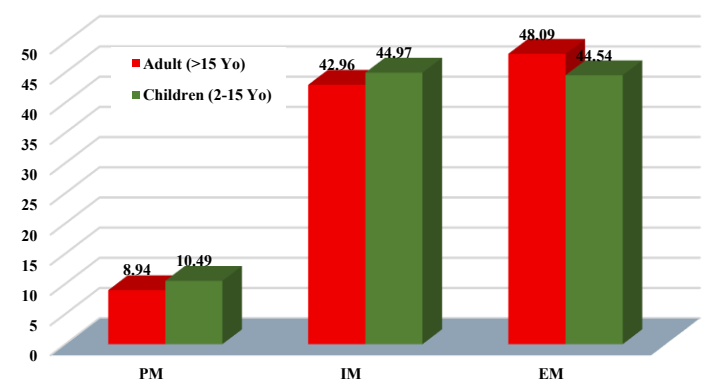
Picture 2: The methods of the MPL-rPCR to detect the cagA/vacA gene of the *H. pylori* existing in the gastric biopsy samples and the allene modifications the CYP2/C19 of the patients



Graph 1: The antibiotic resistances ratio (%) of the *H. pylori* isolated from the gastric biopsy samples collected from adults' and children's patients



Graph 2: The distribution ratio (%) of the Vac A and CagA gene of the *H. pylori* existed in the gastric biopsy samples collected from adults' and children's patients.



Graph 2: The ratio (%) of the metabolizer degree (including PM, IM, and EM) of the proton pump inhibitor (PPI) in the patients based on the CYP2C19 alleles variation. and CagA gene of the *H. pylori* existed in the gastric biopsy samples collected from adults' and children's patients.

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