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Primary and secondary clarithromycin, metronidazole, amoxicillin and levofloxacin resistance to *Helicobacter pylori* in southern Poland

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Abstract:
The aim of this study was to assess the primary and secondary resistance of *H. pylori* strains cultured from adult patients of the Małopolska region of Poland, mainly of Kraków and the surrounding areas, to antibacterial agents (amoxicillin, clarithromycin, metronidazole and levofloxacin). In total, 115 *H. pylori* strains were isolated, of which 90 strains originated from patients who had never been treated for *H. pylori* infection, while the remaining 25 were isolated from patients in whom eradication of the infection failed after treatment. All tested *H. pylori* strains were susceptible to amoxicillin. Forty-four percent of strains isolated were resistant to metronidazole. The primary and secondary resistance to this antimicrobial chemotherapeutic reached 37% and 72% ($p = 0.002$), respectively. In total, 34% of strains were resistant to clarithromycin, and the ratio of strains with secondary resistance was significantly greater than that of the strains with primary resistance (80% *vs.* 21%, $p < 0.001$). The double resistance to both metronidazole and clarithromycin was confirmed in 23% of *H. pylori* strains. Five percent of *H. pylori* strains were resistant to levofloxacin, while primary and secondary resistance to this drug accounted for 2% and 16% ($p = 0.006$), respectively. In total, 4% of *H. pylori* strains were simultaneously resistant to metronidazole, clarithromycin and levofloxacin. Thus, the high resistance to metronidazole and clarithromycin excludes the possibility of using these drugs for treatment of *H. pylori* infection without earlier antibiogramming. Levofloxacin, as a drug of high efficacy against *H. pylori*, should be reserved for an "emergency" therapy and used in a limited capacity in order to preserve its potent antimicrobial activity. The Polish Society of Gastroenterology recommends levofloxacin as a third-line therapy [14].

Key words:
Helicobacter pylori, resistance, amoxicillin, clarithromycin, metronidazole, levofloxacin