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Combination of Proton Pump Inhibitors with Fluoroquinolones to Explore their Potential Role as Adjuvant to Combat Antibiotic Resistance Against *Klebsiella pneumoniae*

Badriyah Shadid ALOTAIBI [1], Munazza IJAZ [2], Haya YASIN [3] *, Mizna JAVED [1] & Ghulam MURTAZA [1] *

[1] *Department of Pharmaceutical Sciences, College of Pharmacy, Princess Nourah bint Abdulrahman University, P.O. Box 84428, Riyadh 11671, Saudi Arabia.*
[2] *Department of Pharmacy, COMSATS University Islamabad, Lahore Campus, Lahore, Pakistan*
[3] *Department of Pharmacy, Ajman University, Ajman, 346, United Arab Emirates*

SUMMARY*. Klebsiella pneumoniae* **has acquired resistance against various antibiotics including fluoroquinolones such as levofloxacin, ciprofloxacin and moxifloxacin. The objective of this study was to explore the role of proton pump inhibitors as adjuvants to combat the resistance of** *K. pneumoniae* **against various antibiotics including fluoroquinolones such as levofloxacin, ciprofloxacin, moxifloxacin, and co-amoxiclav. The minimum inhibitory concentration (MIC) of all the antibiotics alone and in combination with caffeine was determined using the agar dilution method. Afterward, the zone of inhibition (ZoI) of all the selected antibiotics against** *K. pneumoniae* **was studied using the disc diffusion method. T-test was applied to compare the findings. Pantoprazole significantly (*p* < 0.05) reduced the MIC of all the selected antibiotics, while omeprazole and dexlansoprazole also exerted an inhibitory effect on the MIC of ciprofloxacin. In the same pattern, there was a non-significantly (*p* > 0.05) increase in the ZoI of the selected antibiotics. The findings reveal that proton pump inhibitors could be used in combination with ciprofloxacin and moxifloxacin to improve their efficacy; however, the use of proton pump inhibitors with levofloxacin could reduce its antibacterial efficacy.**

RESUMEN. *Klebsiella pneumoniae* ha adquirido resistencia a varios antibióticos, incluidas las fluoroquinolonas, como levofloxacina, ciprofloxacina y moxifloxacina. El objetivo de este estudio fue explorar el papel de los inhibidores de la bomba de protones como adyuvantes para combatir la resistencia de *K. pneumoniae* contra diversos antibióticos, incluidas las fluoroquinolonas como levofloxacina, ciprofloxacina, moxifloxacina y co-amoxiclav. La concentración mínima inhibidora (CMI) de todos los antibióticos solos y en combinación con cafeína se determinó mediante el método de dilución en agar. Posteriormente, se estudió la zona de inhibición (ZoI) de todos los antibióticos seleccionados contra K. pneumoniae mediante el método de difusión en disco. Se aplicó la prueba T para comparar los hallazgos. El pantoprazol redujo significativamente ($p < 0,05$) la CMI de todos los antibióticos seleccionados, mientras que el omeprazol y el dexlansoprazol también ejercieron un efecto inhibidor sobre la CIM de la ciprofloxacina. En el mismo patrón, hubo un aumento no significativo ($p > 0,05$) en la ZoI de los antibióticos seleccionados. Los hallazgos revelan que los inhibidores de la bomba de protones podrían usarse en combinación con ciprofloxacina y moxifloxacina para mejorar su eficacia; sin embargo, el uso de inhibidores de la bomba de protones con levofloxacino podría reducir su eficacia antibacteriana.

KEY WORDS: Klebsiella pneumoniae, Antibiotic resistance, Fluoroquinolones, Proton pump inhibitors, Minimum inhibitory concentration, Zone of inhibition.

* Authors to whom correspondence should be addressed. *E-mails:* haya.yasin@gmail.com (Haya Yasin); gmdogar356@gmail.com (Ghulam Murtaza)

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