

**TITLE:** GENETIC MARKERS ASSOCIATED WITH RESISTANCE TO B-LACTAMIC DRUGS IN *KLEBSIELLA PNEUMONIAE* ISOLATED FROM PATIENTS WITH COMMUNITY ACQUIRED URINARY TRACT INFECTION

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**ABSTRACT:**

*Klebsiella pneumoniae* is associated with Healthcare-associated infections (HAIs) and community-acquired infections such as urinary tract infections (UTIs). This species expresses the ability to acquire and transfer genes that confer antimicrobial resistance. An important mechanism of antimicrobial resistance observed in *Enterobacteriaceae* is linked to enzymes production, such as extended spectrum  $\beta$ -lactamases (ESBL) and carbapenemases. Such enzymes degrade  $\beta$ -lactam drugs, a class often used in clinical practice for treatment of patients with UTI. The aim of this study was to evaluate the presence of the *bla*<sub>KPC1,2,3</sub>, *bla*<sub>SHV</sub>, *bla*<sub>CTX-M</sub> and *bla*<sub>TEM</sub> genes, and the antimicrobial susceptibility profile in *Klebsiella pneumoniae* isolated from patients with community acquired UTI in Belo Horizonte / MG. A total of 519 bacterial samples were evaluated. Antimicrobial susceptibility profile test was performed by disk-diffusion method. In addition, the research of resistance molecular markers was done by PCR, followed by 1% agarose gel electrophoresis. Among the samples tested, 51.6% harbored at least one of the genes surveyed. Relative frequencies observed: *bla*<sub>SHV</sub> = 46.1%; *bla*<sub>CTX-M</sub> = 7.3%; *bla*<sub>TEM</sub> = 5.6%; *bla*<sub>KPC</sub> = 1.0%. Two and three markers were detected simultaneously in 6.0% and 1.2% of the samples. Phenotypically, 6.4% of the samples were ESBL-producing. Among the 51 multi-drug resistant samples, 41 (80.4%) harbored at least one of the markers investigated, suggesting that the genes are related to the observed profile. Regarding to susceptibility test, disregarding beta-lactams, the highest frequency of sensitivity was observed for Amicacin (99.4%). Furthermore, the high resistance rate to Nitrofurantoin (30.3%) deserves attention, as this antimicrobial drug is often used for treatment and prophylaxis of community acquired UTI. It is concluded that  $\beta$ -lactamases are important resistance markers carried by *K. pneumoniae*, since more than half of the samples harbored at least one of the four genes in question. ESBL and KPC phenotypic screening tests have advantages such as simplicity and accessibility. However, genetic testing is important to detect presence of markers that may not be expressed at the time of phenotypic test evaluation. The results of this research are of epidemiological importance and can support in establishing empirical antibiotic therapy.

**Keywords:** Antimicrobial resistance,  $\beta$ -lactamases, *Klebsiella pneumoniae*, urinary tract infection.

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