

The lactam groups of molecules are integrated into four families, i.e., beta-lactam [11], gamma-lactam [12], delta-lactam [13], and epsilon-lactam [14], with a specific action and not necessarily like antibiotics. The main causes associated with this increase in bacterial resistance are the error in the medical prescription, self-medication, incomplete antibiotics treatment, and the use of these drugs by the agricultural and livestock industry for the treatment of crops for human consumption. For these reasons, we test the hypothesis that the Enterobacteriaceae integrating the human gastrointestinal microbiome are carriers of beta-lactamases genes in healthy individuals who have not received antibiotic treatment during their last year of life. The beta-lactam family is made up of various members, such as penicillins B and G, amoxicillin, ampicillin, cephalosporins (cephalothin, cephalexin, ceftriaxone, and cefepime), carbapenems (imipenem, meropenem, ertapenem), aztreonam, monobactam, and some others. The first-line antibiotic treatment regimens for gastrointestinal and airway infections usually include beta-lactams drugs, such as ampicillin, amoxicillin, or third generation cephalosporins (Ceftriaxone), but the resistance determines the treatment that can be given to patients and decreases the effectiveness significantly of these treatments. They are characterized by a beta-lactam ring presence, which confers the antimicrobial effect by the transpeptidases and carboxypeptidases inactivation (the proteins responsible for the biosynthesis of the cell wall) through their binding to Penicillin Binding Protein (PBPs) receptors [15].