Comparison of antimicrobial resistance phenotypes and resistance genes in Enterococcus faecalis and Enterococcus faecium from humans in the community, broilers and pigs in Denmark

Enterococcus faecalis and E. faecium isolated from humans in the community (98 and 65 isolates), broilers (126 and 122), and pigs (102 and 88) during 1998 were tested for susceptibility to 12 different antimicrobial agents and for the presence of selected genes encoding resistance using PCR. Furthermore, the presence of vancomycin resistant enterococci was examined in 38 human stool samples using selective enrichment. Widespread resistance to chloramphenicol, macrolides, kanamycin, streptomycin, and tetracycline was found among isolates from all three sources. All E. faecium isolates from humans and pigs were susceptible to avilamycin, whereas 35% of isolates from broilers were resistant. All E. faecium isolates from humans were susceptible to vancomycin, whereas 10% and 17% of isolates from broilers and pigs, respectively, were resistant. A vancomycin resistant E. faecium isolate was found in one of the 38 human fecal samples examined using selective enrichment. All vancomycin resistant isolates contained the vanA gene, all chloramphenicol resistant isolates the catIP501 gene, and all five gentamicin resistant isolates the aac6-aph2 gene. Thirty-one (85%) of 72 erythromycin resistant E. faecalis examined and 57 (90%) of 63 erythromycin resistant E. faecium isolates examined contained ermB. Forty (91%) of the kanamycin resistant E. faecalis and 18 (72%) of the kanamycin resistant E. faecium isolates contained aphA3. The tet(M) gene was found in 95% of the tetracycline resistant E. faecalis and E. faecium isolates of human and animal origin, examined. tet(K) was not observed, whereas tet(L) was detected in 17% of tetracycline resistant E. faecalis isolates and in 16% of the E. faecium isolates. tet(O) was not detected in any of the isolates from pigs, but was observed in 38% of E. faecalis isolates from broilers, in two E. faecalis isolates from humans and in three E. faecium isolates from broilers. tet(S) was not detected among isolates from animals, but was observed in 31% of E. faecalis and one E. faecium isolate from humans. This study showed a frequent occurrence of antimicrobial resistance and the presence of selected resistance genes in E. faecalis and E. faecium isolated from humans, broilers and pigs. Differences in the occurrence of resistance and tetracycline resistance genes were observed among isolates from the different sources. However, similar resistance patterns and resistance genes were detected frequently indicating that transmission of resistant enterococci or resistance genes takes place between humans, broilers, and pigs.

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