

In vitro Antimicrobial Resistance Pattern of Bovine Mastitis Bacteria in Ethiopia

Authors : Befekadu Urga Wakayo

Abstract : Introduction: Bacterial infections represent major human and animal health problems in Ethiopia. In the face of poor antibiotic regulatory mechanisms, development of antimicrobial resistance (AMR) to commonly used drugs has become a growing health and livelihood threat in the country. Monitoring and control of AMR demand close coloration between human and veterinary services as well as other relevant stakeholders. However, risk of AMR transfer from animal to human population's remains poorly explored in Ethiopia. This systematic research literature review attempted to give an overview on AMR challenges of bovine mastitis bacteria in Ethiopia. Methodology: A web based research literature search and analysis strategy was used. Databases are considered including; PubMed, Google Scholar, Ethiopian Veterinary Association (EVA) and Ethiopian Society of Animal Production (ESAP). The key search terms and phrases were; Ethiopia, dairy, cattle, mastitis, bacteria isolation, antibiotic sensitivity and antimicrobial resistance. Ultimately, 15 research reports were used for the current analysis. Data extraction was performed using a structured Microsoft Excel format. Frequency AMR prevalence (%) was registered directly or calculated from reported values. Statistical analysis was performed on SPSS - 16. Variables were summarized by giving frequencies (n or %), Mean \pm SE and demonstrative box plots. One way ANOVA and independent t test were used to evaluate variations in AMR prevalence estimates (Ln transformed). Statistical significance was determined at $p < 0.050$. Results: AMR in bovine mastitis bacteria was investigated in a total of 592 in vitro antibiotic sensitivity trials involving 12 different mastitis bacteria (including 1126 Gram positive and 77 Gram negative isolates) and 14 antibiotics. Bovine mastitis bacteria exhibited AMR to most of the antibiotics tested. Gentamycin had the lowest average AMR in both Gram positive (2%) and negative (1.8%) bacteria. Gram negative mastitis bacteria showed higher mean in vitro resistance levels to; Erythromycin (72.6%), Tetracycline (56.65%), Amoxicillin (49.6%), Ampicillin (47.6%), Clindamycin (47.2%) and Penicillin (40.6%). Among Gram positive mastitis bacteria higher mean in vitro resistance was observed in; Ampicillin (32.8%), Amoxicillin (32.6%), Penicillin (24.9%), Streptomycin (20.2%), Penicillinase Resistant Penicillin's (15.4%) and Tetracycline (14.9%). More specifically, *S. aureus* exhibited high mean AMR against Penicillin (76.3%) and Ampicillin (70.3%) followed by Amoxicillin (45%), Streptomycin (40.6%), Tetracycline (24.5%) and Clindamycin (23.5%). *E. coli* showed high mean AMR to Erythromycin (78.7%), Tetracycline (51.5%), Ampicillin (49.25%), Amoxicillin (43.3%), Clindamycin (38.4%) and Penicillin (33.8%). *Streptococcus* spp. demonstrated higher ($p = 0.005$) mean AMR against Kanamycin ($> 20\%$) and full sensitivity (100%) to Clindamycin. Overall, mean Tetracycline ($p = 0.013$), Gentamycin ($p = 0.001$), Polymixin ($p = 0.034$), Erythromycin ($p = 0.011$) and Ampicillin ($p = 0.009$) resistance increased from the 2010's than the 2000's. Conclusion; the review indicated a rising AMR challenge among bovine mastitis bacteria in Ethiopia. Corresponding, public health implications demand a deeper, integrated investigation.

Keywords : antimicrobial resistance, dairy cattle, Ethiopia, Mastitis bacteria

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