



DETERMINATION OF MULTIPLE ANTIBIOTIC RESISTANCE (MAR) AND MAR INDEX IN BACTERIA ISOLATED FROM AQUACULTURE FARMS

Liyanage G.Y., Manage P.S. and Pathmalal M.M.*

Centre for Water Quality and Algae Research, Department of Zoology, University of Sri
Jayewardenepura, Sri Lanka pathmalal@sjp.ac.lk

ABSTRACT

Concurrent resistance to antibiotics of different structural classes has arisen in a multitude of bacterial species and cause complicating the therapeutic management for both human and animal. The objectives of the study were isolation and characterization of antibiotic resistance bacteria from Nile Tilapia (*O. niloticus*) and determined MAR index of isolated resistance bacteria against Tetracycline (TET), Ampicillin (AMP), Amoxicillin (AMX), Sulfamethaxazol (SMX), Erythromycin (ERM), Cloxacillin (CLOX), Azithromycin (AZY) and Ciprofloxacin (CIP). In the present study 165 antibiotic resistant bacteria were isolated from intestines and gills in Nile tilapia. Antibiotic-resistant bacteria were identified to genus level using 16S rRNA sequencing and the Minimum Inhibition Concentration (MIC) was determined using agar dilution method. Multiple Antibiotic Resistance (MAR) was determined using 96 well plate method in order to calculate the MAR index. Overall, the bacterial isolates showed the highest resistance against TET (44%), AMX (21%), AMP (17%), SMX (9%) and ERM (9%). However, resistance against AMX, AMP, SMX, TET and ERM were higher (9% -44%) compared with the other tested antibiotics; CIP, CLOX and AZY (1%-2%). Most frequently recorded intestinal bacteria genus was *Bacillus* (40%) followed by *Enterobacter* (23%), *Lactobacillus* (12), *E.coli* (10%), *Streptococcus* (8%), *Vibrio* (6%) and *Klebsiella* (1%) respectively. Among the isolated bacteria from gills *Aeromonas* sp. (30%), *E. coli* (20%), *Streptococcus* sp. (18%), *Pasteurella* sp. (10%), *Streptococcus* sp. (9%), *Lactobacillus* sp. (6%) and *Moraxella* sp. (3%), were detected in high frequency. More than 50% of the total resistant isolates showed their MIC more than 420 ppm for each tested antibiotics except CIP (2%), CLOX (8%) and AZY (6%). In the present study, MAR index ranged was calculated from 0.11 to 0.58 for the isolated bacteria species. The results of the present study suggests that Nile tilapia (*O. niloticus*) might play a role as a reservoir of antibiotic resistant bacteria and that creating a health risk for the fish consumers.

Keywords: Nile Tilapia (*O. niloticus*), Antibiotics resistance, Minimum Inhibition Concentration (MIC), Multiple Antibiotic Resistance (MAR)