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Antimicrobial Susceptibility, Microbial Loads and Isolation of *Plesiomonas shigelloides* from African Sharptooth Catfish (*Clarias gariepinus*) Juveniles and Experimental Pond Water

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Abstract The aim of this study was to investigate the antimicrobial susceptibility, microbial loads and isolation of *Plesiomonas shigelloides* isolated from African catfish, *Clarias gariepinus* juveniles and experimental pond water. Microbial loads of pond water and fish tissues (gill, liver, and intestine) were evaluated using standard methods. Isolation and antibiotic susceptibility of the bacterial species were carried out using standard microbiological techniques. Antibiotic susceptibility of the isolates was assessed using a panel of 12 antibiotics by disc diffusion method and standard guidelines. The microbial loads in water from the experimental ponds ranged from 5.60 to 7.00 $\log_{10}$ CFU/mL, while those in gill, liver, and intestine samples ranged from 6.40 to 7.00 $\log_{10}$ CFU/g. The microbial loads were higher than the permissible limits for wastewater and fish tissues. The microscopic cell morphology analysis of presumptive *P. shigelloides* revealed 40 isolates of round-ended, straight rod shape, which were motile, positive to oxidase, catalase, mannitol, and citrate biochemical test, negative to urease, methyl red, and glucose biochemical test. Antibiotic susceptibility results showed that the presumptive *P. shigelloides* were 100% resistant to cefuroxime and cefotaxime, 87.5% to meropenem, and 77.5% to ceftazidime. However, the isolates were 0% resistant to gentamicin and amikacin of aminoglycoside derivatives, suggesting that these might be only two out of the 12 panels of antibiotics used that presumptive *P. shigelloides* might have responded to. The findings highlight the need for routine microbial monitoring, improved pond hygiene, and responsible antimicrobial use in catfish aquaculture. The observed *in vitro* susceptibility to gentamicin and amikacin may provide useful baseline information for future risk assessment and antimicrobial stewardship.

Keywords Antibiotics; Biochemical test; *Clarias gariepinus*; Microbial loads; *Plesiomonas shigelloides*

1 Introduction

Fisheries and aquaculture products worldwide are important sources of high-quality aquatic animal proteins and good sources of income, foreign exchange, and employment. About 950 million people worldwide rely on fisheries and aquaculture directly or indirectly for their livelihoods. Globally, the consumption of fish and fishery products as a protein source has increased considerably over the years, constituting about 20% of total protein (FAO, 2020). The aquaculture industry grows at a fast rate when compared to all other animal food-producing sectors worldwide, with the world average annual growth rate of 8.8% /yr since 1970, compared with only 1.2% for capture fisheries and 2.8% for land-farmed animal production systems (FAO, 2020). However, as aquaculture production increases, aquaculture waste also increases, and this aquaculture wastewater harbours diverse pollutants, including pathogenic organisms, which are detrimental to public health when released into the environment, and this makes fish farmers treat aquaculture effluent with pesticides and antibiotics.