

# Antibiotic susceptibility patterns of *Aeromonas* species isolated from water and stool samples in Mthatha region Eastern Cape province of South Africa

## Abstract

**Objective:** To determine the antibiotic susceptibility patterns of species isolated from water and stool samples in Mthatha Region.

**Materials and methods:** A study was undertaken to determine the presence and susceptibility profiles of *Aeromonas* species isolated from water and stool samples submitted to Mthatha Government hospital from January 2012- October 2012. A total of 500 water samples and 150 stool samples were analysed.

**Results:** *Aeromonas* species were found in 30% of the water samples and in 10% of the stool samples. 20% of the isolates from the water samples were  $\beta$ -lactamase positive and 100% of the stool isolates respectively, giving a total of 45 isolates which were ESBL positive. The isolates were susceptible to ciprofloxacin, imipenem and tazobactam and the ESBL strains presented with variable resistance to all the antibiotics and were mostly resistant to  $\beta$ -lactams. Table 1 shows the comparisons of the susceptibility profiles of *Aeromonas* species from water and stool samples. The results show a similar trend in susceptibility profile of *Aeromonas* isolated from water and stool samples implicating a likely hood of cross contamination due to contaminated water or the population contaminating the water sources.

**Conclusion:** There is need for laboratories to expand their screening methods and include routine checking of *Aeromonas* species in patients with diarrhea. While this research needs to further evaluate the Phylogenetic characteristics of the isolated strains in order to link the sources of contamination.

**Keywords:** *Aeromonas* species, kirby bauer disc diffusion method, diarrhea, ESBL, septicemia, endocarditis, peritonitis, osteomyelitis

Volume 3 Issue 3 - 2016

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**Received:** May 06, 2015 | **Published:** December 19, 2016

## Introduction

*Aeromonas* species are motile gram negative rods of the family *Aeromonadaceae*. They are emerging human pathogens suspected to cause gastroenteritis ranging from mild enteritis to cholera-like diarrhea, known as travelers diarrhea. *Aeromonas* species have been reported to cause infections such as septicemia, endocarditis, peritonitis, osteomyelitis, myonecrosis, haemolytic uraemic syndrome, meningitis, respiratory tract diseases and ocular infection.<sup>1</sup> In addition to humans, they are also important pathogens in amphibians, reptiles and fish causing major problems in fish farming. *Aeromonas* species have also been isolated from a variety of foods such as vegetables, raw milk, icecream, meat and seafood.<sup>2,3</sup> They are known to form biofilms in chlorinated water pipes and this also serves as a source of human contamination. Its pathogenicity is due to the production of exotoxins (heamolysins and enterotoxins). *Aeromonas* spp are becoming increasingly resistant to multiple antibiotics. Such resistance could lead to serious clinical sequelae. Rate of faecal carriage in asymptomatic persons ranges from 0%-4%, while the isolation rate from individuals with diarrhea ranges from 0.8-7.4%.<sup>1,4</sup> It is commonly isolated from drinking water and seasonal relationship between presence in drinking water and in stools of patients with gastroenteritis have been reported.<sup>5,6</sup>

## Materials and methods

500 Water samples and 150 stool samples were analysed between January -October 2012. Unformed stools submitted to NHLS M that was used.

### Microbiological tests

Water samples were first inoculated onto selenite F broth and then inoculated onto blood agar supplemented with Ampicillin and a selective media cefsulodin- igrason- novobiocin agar (CIN). Stool samples were inoculated directly onto CIN and ampicillin blood agar. The cultures were incubated for 24-48hours aerobically at 37°C. An oxidase test was done on all *bacilli* colonies and hippurate hydrolysis test was done to differentiate the *Aeromonas* species.  $\beta$ -lactamase test was done on all isolates using a calorimetric test strip.

### Susceptibility testing

Kirby bauer disc diffusion Method was used for susceptibility testing. The following antibiotics were used, Ampicillin, Gentamicin, Ciprofloxacin, Imipenem, Cotrimoxazole, piperacillin/tazobactam, chloramphenicol, cephalexin and erythromycin. NCCLS 2012 Standards were used.

## Results

*Aeromonas* species were isolated in 30% of the water samples and in 10% of the stool samples. A hydrophilia of the isolates from water samples, 20% were ESBL strains and 100% of the stool isolates respectively. All strains were resistant to Ampicillin but susceptible to Ciprofloxacin, imipenem, piperacillin/tazobactam. Their susceptibility varied on erythromycin, chloramphenicol, gentamicin and ciprofloxacin as shown in Table 1.

**Table 1** Comparison of Susceptibility profiles of *Aeromonas* species from water and stool

Antimicrobial agents	Water isolates	Stool isolates
	N=150	N=30
Ampicillin	0	0
Gentamicin	0	0
Ciprofloxacin	150	30
Imipenem	150	30
Cotrimoxazole	150	10
Piperacillin/Tazobactam	90	20
Chloramphenicol	80	15
Ciprofloxacin	150	20
Erythromycin	60	10

## Conclusion

The results were as expected as all the strains were resistant to Ampicillin due to the production of  $\beta$ -lactamases and were sensitive

to third -generation Cephalothins and were in accordance to results from findings from other researchers.<sup>1</sup> He justifies the need to include laboratory isolation techniques for *Aeromonas* species in unformed stool samples and also to screen for species in water sources. More work needs to be done in order to compare the Phylogenetic characteristics of isolates from water and stool samples so that we can be able to link the relationship between environment and human diseases due to *Aeromonas* in patients presenting with diarrhea/gastroenteritis.

## Acknowledgements

None.

## Conflict of interest

The author declares no conflict of interest.

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