



# Prevalence of chloramphenicol-resistant gene in *Escherichia coli* from water sources in aquaculture farms and rivers of Kuching, Northwestern Borneo

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## Abstract

Antibiotic resistant *Escherichia coli* cases are increasing high especially in Southeast Asia. Illegal use of the antibiotic in the aquaculture farming may become the culprit of the outbreak and spread into environmental source. A study was conducted to: 1) detect the chloramphenicol (CAL)-resistant gene in *E. coli* isolated from three aquaculture farms and six rivers of northwestern Borneo and 2) investigate the correlation between *cat* gene with five common antibiotics used. Isolation of *E. coli* was done on Eosin methylene blue agar and characterized using indole, methyl red, Voges-Proskauer, citrate tests. *E. coli* isolates were subsequently tested for their susceptibility to five antibiotics commonly used in aqua-farming. The CAL-resistant *E. coli* were further analyzed for the presence of resistant genes (*cat* I, *cat* II, *cat* III, *cat* IV) using multiplex polymerase chain reaction. 42 bacterial colonies were isolated from a total of 80 individual water samples, 34 of which were identified as *E. coli*. Result showed 85.3% of the *E. coli* isolates were resistant to amoxicillin, 35.3% were resistant to tetracycline, 29.4% were resistant to CAL, 17.6% were resistant to nitrofurantoin and 8.8% were resistant to nalidixic acid. All of the 10 CAL resistant *E. coli* isolates were detected with *cat* II genes; five isolates detected with *cat* IV genes; three isolates detected with *cat* III genes; and another two detected with *cat* I genes. Pearson correlation coefficient shows highly significant relationship between resistance pattern of CAL with amoxicillin; and CAL with tetracycline. Our findings provide the supplementary information of the CAL resistance gene distribution, thereby improving our understanding of the potential risk of antibiotic resistance underlying within this microbial ecosystem.

**Keywords:** Chloramphenicol, *cat* genes, *Escherichia coli*, Aquaculture farms, Rivers

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