

Antibiotic resistance and plasmid profiling of *Vibrio* spp. in tropical waters of Peninsular Malaysia

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Abstract *Vibrio* species isolated from four different sampling stations in the west coast of Peninsular Malaysia were screened for their antimicrobial resistance and plasmid profiles. A total of 138 isolates belonging to 15 different species were identified. *Vibrio campbellii*, *V. parahaemolyticus*, *V. harveyi*, and *V. tubiashii* were found to predominance species at all stations. High incidence of erythromycin, ampicillin, and mecillinam resistance was observed among the *Vibrio* isolates. In contrast, resistance against aztreonam, cefepime, streptomycin, sulfamethoxazole, and sulfonamides was low. All the *Vibrio* isolates in this study were found to be susceptible to imipenem, norfloxacin, ofloxacin, chloramphenicol, trimethoprim/sulfamethoxazole, and oxytetracycline. Ninety-five percent of the *Vibrio* isolates were resistant to one or more different classes of antibiotic, and 20 different resistance antibiograms were identified. Thirty-two distinct plasmid profiles with molecular weight ranging from 2.2 to 24.8 kb were detected among the resistance isolates. This study showed that multidrug-resistant *Vibrio* spp. were common in the aquatic environments of west coast of Peninsular Malaysia.

Keywords *Vibrio* · Antimicrobial resistance · Multidrug · Plasmids · Coastal

Introduction

Vibrios are ubiquitous in aquatic environments, depending on their salt requirement for optimum growth (Thompson et al. 2004). However, they tend to be more common in warmer waters, particularly in tropical waters (Wright et al. 1996). They are found free or in association with aquatic organisms (Reidl and Klose 2002; Thompson et al. 2005). The genus *Vibrio* comprises more than 63 species, of which about one third are potential human pathogens and have been implicated in water- and seafood-related outbreaks of gastrointestinal and wound infections in humans (Campos et al. 1996; Oliver and Kaper 1997; Thompson et al. 2004). The common pathogenic *Vibrio* species include *Vibrio cholera*, *V. parahaemolyticus*, *V. fluvialis*, *V. mimicus*, *V. metschnikovii*, *V. hollisae* (gastrointestinal tract infection), *V. damsela*, *V. vulnificus*, *V. alginolyticus*, *V. lyticus*, and *V. furnissii* (septicemias and wound infections) (Hlady et al. 1993; Campos et al. 1996; Oliver and Kaper 1997). Some *Vibrio* species are also known as zoonotic pathogens that cause diseases in marine animals (e.g., *V. anguillarum*, *V. ordalii*, *V. salmonicida*, *V. splendidus*, and *V. harveyi*) (Moriarty 1997; Vaseeharan and Ramasamy 2003; Jayasree et al. 2006).

V. cholera is the most important and well-studied strain. *V. cholera* is associated with both epidemic and pandemic diarrhea outbreaks in many parts of the world.

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