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Antibiotic pretreatment inhibits white band disease infection by suppressing the bacterial pathobiome

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Diseases have caused unprecedent mortality in Caribbean coral communities. White band disease (WBD) has killed up to 95% of all endangered Caribbean Acroporids since it was first observed in 1979. Despite the devastating impacts of WBD, its etiology is currently unknown although recent research identified two bacterial strains – ASVs classified as a *Cysteiniphilum litorale* and a *Vibrio* sp., as the most likely pathogens. To better understand the disease etiology of WBD, we pretreated corals with antibiotics to determine how prophylactic use of antibiotics impacts the transmission of WBD in a replicated tank-based experiment. We found the prophylactic use of antibiotics led to significantly reduced infection rates in disease exposed corals with a 30-percentage point decrease in the infection rate. Analyses of 16S rRNA amplicon gene sequencing data in the disease exposed corals demonstrated that antibiotic pretreatment resulted in coral microbiomes which were less speciose and contained relatively fewer *Vibrio* spp. than untreated corals, indicating that the benefit of the antibiotic pretreatment was its ability to reduce the relative abundance of intrinsic secondary opportunists and/or opportunistic pathogens suggesting their likely importance to the etiology of WBD. We propose two distinct etiologies involving either an extrinsic keystone pathogen (*Cysteiniphilum litorale*) or overgrowth of intrinsic opportunistic pathogens (*Vibrio* spp.). Future research should isolate these strains to confirm the etiology of white band disease.

KEYWORDS

white band disease, *Acropora*, keystone pathogen, opportunistic pathogen, *Vibrio*, *Cysteiniphilum litorale*