Tetracycline Resistance pattern among Lymphatic Filariasis-hyperendemic communities in Southern Ghana: A mixed-method approach.

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ABSTRACT

Tetracyclines continue to serve as a cost-effective and essential treatment for common infections, particularly in resource-limited regions such as lymphatic filariasis (LF)-hyperendemic communities. The growing use of tetracycline-based antibiotics by symptomatic filarial lymphedema patients, likely influenced by the demonstrated benefits of anti-*Wolbachia* therapy, especially following doxycycline trials, underlines the necessity for vigilant monitoring of tetracycline resistance patterns. This study evaluated patients' antibiotic knowledge and usage, antibiotic availability in LF-endemic communities, and the resistance profiles of tetracycline-class antibiotics to assess the clinical impact of resistance on current anti-*Wolbachia* treatments. Conducted as a cross-sectional survey in the Ahanta West District of Ghana, the study involved 71 filarial lymphedema patients from four (4) LF-hyperendemic communities. Structured questionnaires assessed patients' knowledge, attitudes, and practices (KAP) regarding antibiotic use and resistance, while microbiological analyses were performed on wound samples from 28 patients to characterize the wound microbiome and determine bacterial resistance to tetracyclines. The mean scores for antibiotic knowledge, attitude, and practice were low: 1.8 ± 1.0 (5-point scale), 1.4 ± 1.1 (4-point scale), and 1.9 ± 1.1 (4-point scale), respectively. A combined KAP score of 5.0 ± 1.9, or 31.2% ± 11.9%, was observed with no significant correlation to the educational level of patients. From the facilities survey, the primary healthcare facilities in the area stocked at least one tetracycline-class antibiotic (specifically tetracycline and/or doxycycline). Microbiological testing identified 68 distinct bacterial isolates across 20 genera and 36 species, predominantly *Staphylococcus sciuri* and *Staphylococcus aureus*. The antimicrobial susceptibility testing revealed varying levels of tetracycline resistance: doxycycline (35.3%), tetracycline (26.5%), and minocycline (17.6%), with nine (13.2%) isolates resistant to all three. High-resolution melting (HRM) analysis detected the *tet(M)* gene in 34.1% (14) of isolates. With a confirmed presence in some samples (n = 9), the analysis showed Tm variations (69.27°C - 73.06°C), potentially indicating the presence of *tet(M)* gene variants. Therefore, to preserve tetracycline efficacy and sustain LF-related pathology management in hyperendemic regions, a comprehensive strategy is required. This includes culturally tailored education to improve antibiotic stewardship among patients and healthcare providers, enhanced wound management addressing polymicrobial infections through optimized hygiene and individualized treatment, and ongoing surveillance to track resistance patterns while encouraging alternative therapies to minimize tetracycline overuse.

Keywords: Lymphatic filariasis; Filarial lymphedema; KAP antibiotic use; Anti-*Wolbachia* therapy; tetracycline resistance