The Effects of Cholecalciferol of the Survivability of Methicillin-Resistant Staphylococcus aureus

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Methicillin-resistant Staphylococcus aureus, a Gram-positive cocci resistant to betal-lactams, assesses an estimated $19.7 billion on U.S. society annually through morbidity, mortality, and overall treatment costs. In treating and preventing Staphylococcus aureus infections, a bacteriostatic treatment, which inhibits growth, is as effective as a bactericidal treatment, which kills the bacteria. Vitamin D regulates the immune system, stimulating production of antimicrobial peptides. Cholecalciferol is the most readily absorbed and effectively used form of vitamin D. This project is the result of in vitro experimentation on MRSA using cholecalciferol as bacteriostatic treatment. In part 1, MRSA control was cultured on blood agar, with paper disc medium (PDM) soaked in cholecalciferol applied to agar. Colony growth patterns, hemolysis, and inhibition zones were compared for varied strengths of vitamin application. In part 2, MRSA control was cultured in cholecalciferol-infused liquid media. Turbidities of varied strengths were assayed. Colonization and hemolysis decreased as cholecalciferol amounts were increased, with the most effective treatment at 10,000 IU ($p = 6.06151E-42$). This result was confirmed in liquid media assay, with net turbidities showing least bacterial growth at 8,000 IU ($p = 1.275E-22$). Current treatment methodology employs antibiotics, to which resistance quickly occurs if not administered correctly. Cholecalciferol treatments may prove dually useful, both as a bacteriostatic treatment and synergistic application against MRSA.

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