Galleria mellonella as a Proxy for the Human Immune Response: Allium sativum's Effectiveness Against Enterobacter cloacae

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This study aimed to evaluate the effectiveness of garlic extract against E. cloacae infections. First, inhibition zones were created using lawns of E. cloacae and sterile disks soaked with decreasing concentrations of garlic extract. A one-way ANOVA (a = .05, p = 4.36x10?²7) followed by a Tukey test identified 100% garlic extract as the MIC. Seven trials involved Galleria mellonella, which has a comparable innate immune response to that of humans, being divided into five groups: E. cloacae control, PBS control, garlic extract control, prophylactic treatment, and therapeutic treatment. Larvae were injected with 10µl of inocula, with bacteria and garlic extract injections separated by two hours for treatment groups. Survival was measured every 24 hours over 72 hours. A one-way ANOVA (p = 2.41x10?¹³) and Tukey test revealed significant differences between therapeutic and prophylactic treatments. A two-sample t-test between prophylactic and therapeutic treatment groups (p = .007) confirmed the higher effectiveness of therapeutic treatment. A parallel experiment collected hemolymph from larvae every 24 hours after the last injection starting at the 2-hour mark. A one-way ANOVA (p = 6.31x10?³¹) and post-hoc test highlighted significant differences between treatments, supported by a two-sample t-test (p = 3.74x10?8), again confirming the superior efficacy of therapeutic treatment. These findings validated the H1 hypothesis but did not support the H2 and H3 hypotheses which suggested the prophylactic treatment would increase survival rate and decrease PO in hemolymph. The results suggest that while prophylactic treatment may not be effective, therapeutic treatment should be researched further.

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