Manuka Honey and Temperature: An Experimental Study of Antimicrobial Activity

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Manuka honey is known for its antimicrobial properties, but it is unclear how heating affects its ability to inhibit bacterial growth. This experiment tested whether increasing the temperature of Manuka honey reduces its antimicrobial effectiveness against Staphylococcus epidermidis. The null hypothesis stated that heating Manuka honey would not change bacterial inhibition, while the alternative hypothesis predicted that higher temperatures would decrease its antimicrobial activity. Manuka honey was heated to four temperatures: room temperature (21 °C), 40 °C, 70 °C, and 100 °C, and held at each temperature for 15 minutes. Sterile filter paper disks were inoculated with the heated honey and placed on agar plates that had been inoculated with S. epidermidis to form a bacterial lawn. Seven replicate plates were prepared for each temperature, with six honey- treated disks per plate and one sterile control disk placed at the center. After incubation, antimicrobial activity was measured as the inhibition radius in millimeters from the edge of the disk to the edge of visible bacterial growth. The mean inhibition radius at room temperature was 14.40 mm. Mean inhibition decreased at higher temperatures, measuring 11.85 mm at 40 °C, 11.96 mm at 70 °C, and 11.84 mm at 100 °C. A one-way ANOVA showed a statistically significant effect of temperature on inhibition radius ($F(3,24) = 38.1$, $p < 0.001$, $a = 0.05$). Control disks showed no inhibition. These results indicate that heating Manuka honey significantly reduces its antimicrobial effectiveness, suggesting that heat-sensitive components may contribute to its antibacterial properties.

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