Evaluating the Effects of Honey and Propolis on Cancer Cell Viability, Metabolism, Morphology, and DNA Production in Selected Cell Lines and Evaluating the Effects of Honey on Antibiotic Resistance in Selected Microbial Cell Models

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Recent studies have discovered a greater connection between two of the fastest growing global epidemics—cancer and multidrug resistant bacterial infections (Lamb, 2015). This research attempts to treat these problems using the natural, novel treatment of honey and bee propolis. Honey and propolis provide a potentially safer, less expensive, easily accessible, nontoxic chemotherapeutic solution to the growing concerns of antibiotic resistance and to the toxic and often ineffective radiation and chemotherapeutic treatments for cancer. These products are thought to contain many compounds like flavonoids and polyphenols that contribute to their anticancer and antibacterial nature. This project evaluates the effects of 3 honey types and bee propolis on multiple cancer cell lines. Cell viability assays that quantify cell death, ATP production assays to determine honey's effects on metabolism, and a DNA fragmentation assays were utilized. Morphological changes in cancer cell lines were examined by comparing untreated cancer cells to those treated with honey. The effects of honey on fibroblasts that contain the tumor suppressor gene, p27, a cyclin dependent kinase inhibitor, and those that lack the gene were compared to determine honey's role and influence in inhibiting cells with altered metabolic pathways due to dysregulated p27. Additionally the antibacterial properties of honey were examined in a Kirby Bauer Disc Diffusion Test and a Standard Growth Curve. The synergistic effect of honey and antibiotics was evaluated using enhanced agar, and the minimum inhibitory concentration of honey was determined through a serial dilution. Antibacterial results were evaluated using ANOVA, Tukey, and Dunnett statistical analyses with many antibiotic-honey synergies significant ($p<.001$).