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Background/PURPOSE: Royal jelly (RJ), a nutrient-rich secretion from honeybees, has potential health benefits, including hormone-like effects that may improve reproductive health. Thin endometrium, a condition where the endometrial thickness is insufficient for embryonic development, poses a significant challenge to female fertility. Current treatments often involve hormone therapy, which can have adverse side effects. This study explores the therapeutic potential of RJ and its extracts in improving endometrial receptivity and their effects on MCF-7 breast cancer cells.

Problem Description: Thin endometrium affects fertility and pregnancy outcomes. Hormone therapies, while effective, can impose a burden on the liver and have other side effects. Safer, natural alternatives are needed to enhance endometrial thickness and receptivity without adverse effects.

METHODOLOGY: A rat model of thin endometrium was established and treated with RJ, RJ protein extract (RJ-Pr), RJ fatty acid extract (RJ-FA), and estradiol valerate (E2) as a positive control. Endometrial thickness, gland number, and blood vessel count were measured. Serum estrogen and progesterone levels were assessed, and VEGF expression was analyzed. In vitro experiments on MCF-7 cells evaluated cell proliferation, apoptosis, and estrogen receptor (ER) expression.

Results and CONCLUSION: RJ and its extracts significantly improved endometrial thickness and vascularization in rats with thin endometrium. RJ-FA showed the most pronounced effects, increasing VEGF and AKT expression while decreasing PI3K expression. In MCF-7 cells, RJ and RJ-Pr promoted apoptosis and increased ER β expression, while RJ-FA enhanced cell proliferation and ER α expression. These findings suggest that RJ and its extracts can improve endometrial receptivity through estrogen-like effects, with RJ-FA being particularly effective. However, high doses of RJ-FA may promote cancer cell growth, indicating a need for careful dosage consideration.

Practical Implications for Beekeepers: The study highlights the potential of RJ as a natural alternative for improving reproductive health. Beekeepers can explore the production and marketing of RJ and its extracts for therapeutic applications. However, the dual effects of RJ on endometrial health and cancer cell growth suggest that further research is needed to optimize dosages and ensure safety. Beekeepers should collaborate with researchers to develop standardized RJ-based products that maximize health benefits while minimizing risks.