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Abstract

Radiation therapy is a cancer treatment method that involves irradiating cancerous tissues with ionizing radiation, leading to the death of cancer cells. This treatment may result in damage to healthy tissues adjacent to the tumor. Since hair follicles are highly sensitive to ionizing radiation, alopecia induced by radiation therapy is one of the primary side effects of this treatment method, and finding ways to mitigate these side effects is of great importance. This study investigates the impact of metformin on hair regrowth in rats experiencing alopecia induced by radiation therapy. In this research, 20 Wistar breed rats were used, divided into four groups of five each. The first group (control) received a cream base (Eucerin). The second group (rad) received only radiation with a dose of 30 grays in the dorsal area. The third group (rad+met) received topical 10% metformin ointment daily on the irradiated area, in addition to radiation therapy. The fourth group (met) only applied 10% metformin ointment in the dorsal area. Pathological examination of samples taken on days ten and thirty measured parameters such as the number and diameter of follicles in different stages of the hair cycle (terminal, anagen, catagen, and telogen). Results indicated that short-term use (ten days) of metformin can reduce the number of hair follicles in the resting phase and prompt the follicles to enter the growth phase, due to the stimulation of autophagy and reduction of DNA damage. However, long-term (thirty-day) use of metformin could lead to hair loss due to reduced levels of vitamin b12 and folate, along with a decline in growth factors. This research provides a basis for a better understanding of the mechanisms associated with hair growth and suggests the potential use of metformin as a therapeutic strategy to reduce the unpleasant side effects of radiation therapy.

Keywords: Metformin, Alopecia, Radiation Therapy, Hair Regrowth.