Effect of Platelet Rich Plasma / Minoxidil-alone or in combination on Hair Growth in Rat Model of Androgenic Alopecia Histological and Immuno histochemical study.

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Background:

Androgenic alopecia (AGA) is the commonest cause of hair loss in men with limited treatment options. Platelet-rich plasma (PRP) is defined as an autologous concentration of plasma with a greater count of platelets than that of whole blood. Its action depends on the released growth factors from platelets. It has been investigated and used in numerous fields of medicine. Recently, PRP has received growing attention as a potential therapeutic tool for hair loss.

Aim of the work:

This study aimed at comparing the efficacy of PRP therapy with minoxidil therapy in experimentally induced AGA in adult male albino rats.

Materials and Methods:

Forty-five male albino rats were divided equally into 5 groups - Group I (the control group). Rats of the remaining 4 groups received subcutaneous (SC) injections of 0.1 ml testosterone for induction of alopecia, after 10 days alopecia was observed. Group II (testosterone group); each rat received subcutaneous injection of 0.1 ml testosterone daily in the marked area for the following 21 days. Group III (minoxidil group); each rat received topical minoxidil daily on the marked area together with SC injection of 0.1 ml testosterone daily in the marked area for the following 21 days. Group IV (PRP); each rat received SC injection of 0.1 ml PRP every 3 days in the marked area, together with daily SC injection of 0.1 ml testosterone in the marked area for the following 21 days. Group V (PRP+ minoxidil group); each rat received SC injection of 0.1 ml PRP every 3 days in the marked area+ topical minoxidil daily on the marked area, together with SC injection of 0.1 ml testosterone daily for the following 21 days. Rats were sacrificed after 31 days from the start of the experiment. Skin samples of size 1cmx1cm were collected from the site of injection and prepared for histological, immunohistochemical, and electron microscopic examination. Morphometrical and statistical analysis were performed.

Results:

Testosterone group when compared to the control group showed a significant decrease in mean epidermal thickness, decreased mean number of anagen hair follicles, and increase in mean number of telogen hair follicles, all were statistically significant ($P<0.05$). Groups III, IV, and V showed a significant increase in mean epidermal thickness, increase in mean number of total hair follicles, increase in mean number of anagen hair follicles

($p<0.05$), and a decrease in mean number of telogen hair follicles ($p<0.05$). All were also statistically significant ($p<0.05$). Group V showed the best results. Examination of Mallory's trichrome-stained sections of testosterone group showed perifollicular fibrosis and follicular streamers. Minoxidil group showed less perifollicular fibrosis and less follicular streamers. PRP group and group V also showed less perifollicular fibrosis and streamers, as compared to the previous groups.Examination of anti-Ki 67 immunohistochemically stained sections in testosterone group showed significant decrease of Ki 67 positive basal epidermal cells, outer root sheath Ki 67 positive stem cells, bulge stem cells and matrix cells, all were statistically significant ($p<0.05$) compared to control group. PRP and minoxidil groups showed a significant increase in number of Ki 67 positive cells ($p<0.05$) as compared to the control group and the testosterone group. Group V showed numerous Ki 67+ cells which was statistically higher than the other experimental groups. When comparing the PRP group and the minoxidil group, PRP group showed significantly better results than the minoxidil group in all the above-mentioned parameters. However, the best results were obtained when simultaneously applying both PRP and minoxidil.

Conclusion:

Our data suggest that PRP injections have a better therapeutic effect than minoxidil, and that both PRP and minoxidil when administered together have the best effect on hair growth in experimentally induced androgenic alopecia in adult male albino rats.

Keywords: Platelet Rich Plasma, Minoxidil, Hair Growth, Rat, Androgenic Alopecia