Abstract

Many cellular, humoral and molecular processes are active during the complex events of wound repair. Numerous phytochemicals such as β-sitosterol, pyrogallol, tannic acid, gallic acid, quercetin, ellagic acid and protocatechuic acid are found in the plant *Bergenia ciliata* and help in the proliferation of fibroblasts and keratinocytes, along its wound repairing effect which includes multiple actions such as antimicrobial, anti-inflammatory and antioxidant. In this study, *Bergenia ciliata* extract and carboxy methyl cellulose were used in forming silver nanoparticles conjugated with silver nitrate CMC-BCAgNPs. The formation of nanoparticles was UV scanned for confirmation then their characterization was done by FTIR. Hydrogel poses wide usage, is highly hydrophilic and also has good biodegradability. Groups of two-month-old female mice having 29-30 g weight were used. Five mice were taken in each group. Histological and morphological analysis of the wounds were done. As compared to other treatment groups as well as the disease control group, CMC-BCNPs significantly enhanced the area of wound contraction in burn injuries. The mice treated with CMC-BCNPs were cured at 10 days. On day 25, the wounded control group was fully recovered. On day 18, Group 2, the polyfax group, achieved complete healing. By day 16, CMC Gel had fully healed. By day 12, Group 4 CMC Gel+5% BC was fully healed. On day 13, CMC Gel+10% BC had achieved full healing. By day 16, CMC Gel + Ag has fully healed. By day 10, CMC Gel + BCNPs have fully healed. Group 7th that was subjected to CMC Gel+ BCNPs had excellent healing potential. Disease control had the poorest healing potential.

Among the anti-oxidant enzymes, Glutathione (5.0±0.3 umol/L), Glutathione peroxidase (179.4±7.8 U/L), Superoxide dismutase (194.6±4.0 U/ml) and Catalase (6.2±0.4 mmol/ml) were high in the CMC-BCNPs treatment of burn wounds when compared to the wounded control group (2.6±0.2 umol/L, 72.8±3.0 U/L, 89.6±1.4 U/ml, 3.1±0.1 mmol/ml and respectively. In comparison with the negative control (7.6±0.2 mmol/L), the lowest levels of Malondialdehyde (3.5±0.2 mmol/L) were evident in this group. Histopathological studies further proved the effectiveness of CMC-BC nanoparticles. Additionally, it was noted that in the CMC-BCNPs group in comparison

with the other groups, the epidermis was restored more quickly. CMC-BCNPs significantly decrease the serum level of TNF-α (19.8±2.2 pg/ml), Interleukin-6 (15.8±1.5 pg/ml) and Interleukin-8 (18.4±1.9 pg/ml) to the wounded control group. Another experiment was performed to check for the anti-inflammatory activity of *Bergenia ciliata* to study the effects of the treatment groups on carrageenan-induced paw edema in mice. The standard anti-inflammatory drug diclofenac sodium has been used to reduce the acute inflammatory response in terms of swelling. After 4th hour of the treatment, diclofenac sodium was observed with (44.41%) inhibition in multiple treatment groups where in we were given a dual dose of 200 mg/kg of BC (Once as a pretreatment and a second time at the 3rd hour of the experiment, displayed (38.17%) inhibition at the 4th hour. BC 300 mg/kg, BC 200 mg/kg and BCNPs-CMC were shown (36.43%), (30.40%) and (24.97%) respectively. While BC-CMC and BC 100 mg/kg. Showed with (23.40%) and (22.10%) respectively. The *Bergenia ciliata* plant has also shown great anti-inflammatory potential against the carrageenan-induced paw edema model of mice, in which different treatment groups containing various doses of BC showed a great reduction of paw volume.
keywords: Burn wounds, *Bergenia ciliata*, CMC, Biochemical Parameters, anti-inflammatory