**Neuroprotective effects of bromelain in peripheral nerve Injuries: a rat sciatic nerve crush injury model**

Onur Aksoy,1, İlker Uscetin1, Samed Ozer3, Gokcen Ozgun2,4, Seda Sezer2,5, , Merve Açıkel Elmas2 , **Serap Arbak2**

1 Prof Dr Cemil Tascioglu City Hospital, Department of Plastic and Reconstructive Surgery, Istanbul, Turkiye

2 Department of Histology and Embryology, School of Medicine, Acibadem Mehmet Ali Aydinlar University, Istanbul, Turkiye

3 Animal Application and Research Center, Acibadem Mehmet Ali Aydinlar University, Istanbul, Turkiye

4 Institute of Health Sciences, Department of Biotechnology, Acibadem Mehmet Ali Aydinlar University, Istanbul, Turkiye

5 Institute of Health Sciences, Department of Histology and Embryology Acibadem Mehmet Ali Aydinlar University, Istanbul, Turkiye

**AIM**: Bromelain is a substance that can be easily absorbed into the body without losing its proteolytic activity and without showing any significant side effects. Previous studies have demonstrated the properties of bromelain, such as accelerating healing effect in tendon and muscle injuries, faster healing rate in burn wounds, and reducing post-surgical edema. This present study aims to explore the neuroprotective effects of bromelain on peripheral nerve injuries, specifically through a rat sciatic nerve crush injury model. The investigation focused on the capacity of bromelain to enhance nerve regeneration and post-injury functional recovery.

**MATERIALS AND METHODS:** A controlled experimental study was conducted on 36 adult male Sprague-Dawley rats, divided into four groups: Sham, Control (Nerve injury), and two Treatment groups receiving oral bromelain at doses of 25 mg/kg and 50 mg/kg respectively. The sciatic nerve crush injury was induced using a standardized protocol. The intervention groups received their respective doses of bromelain daily for six weeks post-injury. Evaluation of neuroprotective effects was assessed through walking track analysis for functional recovery, hot plate tests for nociception, nerve conduction studies and histological examinations including light and transmission electron microscopy. Sciatic nerve samples taken from all the experiemental groups were fixed in 10% buffered formalin solution. Masson's trichrome stain was applied to paraffin section to reveal myelinated axon morphology. Tisue samples from sciatic nerve, fixed in 2.5% glutaraldehyde solution were processsed for transmission electron microscopy.

**RESULTS:** The bromelain-treated groups exhibited significant improvements in functional recovery assessed by the Sciatic Functional Index (SFI) compared to the control group. The 50 mg/kg bromelain group showed the most pronounced improvement (p<0.05). Nociceptive testing indicated a reduction in pain sensitivity in bromelain-treated groups. Electrophysiological studies revealed enhanced nerve conduction velocities in treatment groups (p<0.05) with histochemical and ultrastructural analysis confirming accelerated nerve regeneration and reduced scar tissue formation. Statistically significant differences were observed between treatment groups and the control group with the higher bromelain dose demonstrating superior outcomes.

**CONCLUSION:** Bromelain administration in post-sciatic nerve crush injury in rats significantly enhances nerve regeneration, functional recovery, and reduces pain sensitivity. The study highlights bromelain's potential as a beneficial therapeutic agent in the management of peripheral nerve injuries with dose-dependent effectiveness. Further research is warranted to elucidate the underlying mechanisms and explore the clinical applicability of bromelain in peripheral nerve injury treatment.

UP TO 3 REFERENCES MAY BE INCLUDED.