

Summary of the DVSc thesis No. 18538 Faculty of Veterinary Medicine, Urmia University.

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Title: The effect of Thymoquinone on experimental acute pain induced by surgical incision of the hind paw in rats.

Summary:

Surgery commonly causes post-operative pain that should be alleviated to prevent complications. In addition to the use of synthetic drugs, there has been a widespread desire to use medicinal plants for surgical pain management. Pain represents a critical outcome of surgical procedures that can lead to chronic pain and consequences, if not treated adequately. Natural products are increasingly investigated for their potential in optimizing postoperative pain control. Thymoquinone (TQ), a constituent of *Nigella sativa* black seeds, exhibits a potent anti-oxidant property. Celecoxib (CLX), a potent non-steroidal anti-inflammatory drug, is widely used in pain management. Acute postoperative pain was induced via hind paw incision surgery in a rat model. TQ and CLX were administered orally, and their effects were evaluated through measurements of mechanical allodynia and locomotor activity post-surgery. Additionally, the oxidative stress, inflammation and apoptosis biomarkers levels were determined in the serum and spinal cord.

In the vehicle-treated groups, the fifty percentage of paw withdrawal threshold (PWT 50%) decreased significantly on days 1, 3 and 7 post-surgery, subsequently returning to baseline levels. Oral administrations of TQ and CLX increased PWT 50%. Spinal cord contents of malondialdehyde (MDA), caspase-3, tumor necrosis factor-alpha (TNF- α) and superoxide dismutase (SOD) were restored by TQ and CLX. Notably, locomotor activity remained unaffected by these treatments. Oral administrations of TQ and CLX demonstrated comparable anti-allodynic effects, potentially mediated through their modulation of inflammatory, oxidative stress, and apoptotic pathways within the spinal cord.

Keywords: Thymoquinone, Celecoxib, Surgery, Pain, Rats