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Expression of Somatostatin and Neuropeptide Y in Dorsal Root Ganglia Following Hind Paw Incision in Rats

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Abstract : Background: Somatostatin is an endogenous regulatory neuropeptide. Somatostatin and its analogues play an important role in neuropathic and inflammatory pain. Neuropeptide Y is extensively distributed in the mammalian nervous system. NPY has an important role in blood pressure, circadian rhythm, obesity, appetite and memory. The purpose was to investigate somatostatin and NPY expression in dorsal root ganglia during pain. The plantar incision model in rats is similar to postoperative pain in humans. Methods: 24 adult male Sprague dawley rats were distributed randomly into two groups – Control (n=6) and incision (n=18) groups. Using Hargreaves apparatus, thermal hyperalgesia behavioural test for nociception was done under basal condition and after surgical incision in right hind paw at different time periods (day 1, 3 and 5). The plantar incision was performed as per standard protocol. Perfusion was done using 4% paraformaldehyde followed by extraction of dorsal root ganglia at L4 level. The tissue was processed for immunohistochemical localisation for somatostatin and neuropeptide Y. Results: Post incisional groups (day 1, 3 and 5) exhibited significant decrease of paw withdrawal latency as compared to control groups. Somatostatin expression was noted under basal conditions. It decreased on day 1, but again gradually increased on day 3 and further on day five post incision. The expression of Neuropeptide Y was noted in the cytoplasm of dorsal root ganglia under basal conditions. Compared to control group, expression of neuropeptide Y decreased on day one after incision, but again gradually increased on day 3. Maximum expression was noted on day five post incision. Conclusion: Decrease in paw withdrawal latency indicated nociception, particularly on day 1. In comparison to control, somatostatin and NPY expression was decreased on day one post incision. This could be correlated with increased axoplasmic flow towards the spinal cord. Somatostatin and NPY expression was maximum on day five post incision. This could be due to decreased migration from the site of synthesis towards the spinal cord.

Keywords : dorsal root ganglia, neuropeptide y, postoperative pain, somatostatin
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