WHC, a marine-derived compound obtained from indigenous soft coral, attenuates neuropathic pain in rats: association with attenuation of spinal glial activation and neuroinflammation

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We previously observed that WHC—a marine-derived compound obtained from indigenous soft coral—showed anti-inflammatory and analgesic effects in a carrageenan-injected rat model. Chronic neuroinflammation, which involves sustained inflammatory states within the central nervous system, can lead the development and maintenance of neuropathic pain. In the present study, we utilized the chronic constriction injury (CCI) model, a well-established rat model of neuropathic pain, for further characterization of the potential antinociceptive properties of WHC with regard to 2 paradigms. First, we observed that a single intrathecal administration of WHC (1–50 μg) significantly attenuated CCI-induced thermal hyperalgesia 14 days post surgery. Second, as a preventive paradigm, 10 μg WHC was intrathecally administered twice daily for 4 consecutive weeks immediately after CCI surgery. This regimen was able to prevent the development of thermal hyperalgesia, mechanical allodynia, cold allodynia, and weight-bearing deficits in CCI rats. This regimen did not result in any obvious side effects on the external behavior of CCI rats. Furthermore, spinal immunohistofluorescence showed that intrathecal WHC significantly inhibited the CCI-induced microglial and astrocytic activation and upregulation of proinflammatory protein, inducible nitric oxide synthase (iNOS), in the ipsilateral dorsal horn. Intrathecal WHC attenuated CCI-induced downregulation of expression of spinal transforming growth factor-β1 (TGF-β1) 14 days post surgery. Moreover, intrathecal SB431542, a selective inhibitor of TGF-β receptor, blocked the analgesic effects of intrathecal WHC in neuropathic rats. Thus, our present findings suggest that WHC may function as a potent therapeutic agent for neuroinflammation-induced diseases, particularly neuropathic pain. In addition, upregulation of spinal TGF-β1 may be involved in the anti-neuroinflammatory and analgesic effects of WHC.