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GNAWING TIME: A NOVEL BEHAVIORAL TEST TO ASSESS OROFACIAL PAIN IN RATS

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Abstract

35 million Americans suffer from temporomandibular pain disorders, preferentially afflicting females in a 8:1 ratio. Most continue to suffer debilitating pain despite receiving treatment, mainly because the mechanisms that cause it aren't well understood. Current models of TMD pain lack many characteristics of the human condition. Therefore, we set out to develop a rat model that closely resembles human orofacial pain dysfunction to be used as a tool for developing novel therapeutics. In the current study, we used gnawing function as a proxy for nociception in the temporomandibular region of rats. We developed a novel apparatus termed the ratgnawmeter, that uses time to chew through a resin dowel as an endpoint to indicate painful masticatory dysfunction in rats. To produce a condition that closely resembles human TMD, rats were subjected to a 3.5N force jaw hyperextension procedure that occurred for 1 hour daily for 7 consecutive days. Ratgnawmeter testing occurred on days 1, 3, 5, 8, 10, and 13. Female (n=8) and male (n=7) Sprague Dawley (SD) rats reached a baseline gnawing time of around 2 minutes after five sessions of training in the ratgnawmeter. During the jaw loading period, females exhibited an elevated chewing time ($p<0.05$) compared to baseline. However, minimal increases in chewing time were observed for males subjected to the same protocol. In females, chewing time took longer to return to baseline after cessation of jaw loading. These results reflect the known susceptibility of females to develop orofacial pain and indicates the ratgnawmeter is an efficient method for studying acute masticatory pain dysfunction in rats.