Pain perception can dampen in the icv-STZ rat model of sporadic Alzheimer disease

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Background and Aim: Age is known as the main risk factor of sporadic Alzheimer's disease (sAD). Pain management in AD is a critical health condition. However, behavioral display and verbal reports of pain could be dampened or exaggerated in AD patients. The icv-STZ (Intracerebroventricular streptozotocin injections) rat model of sAD has been foregrounded as a hopefully suitable model that could mimic some features of sporadic AD. However, there is no empirical research evaluating the long-term icv-STZ effect on rat behaviors post pain induction which is the aim of this investigation.

Methods: 84 adult male Wistar rats weighing 280-330 g (Department of Biology, University of Mashhad, Iran) were used in this study. Icv-STZ or its vehicle (saline) was administered into the right side of lateral ventricles of animals. Using formalin and tail-flick tests, we were seeking if icv-STZ injection (3mg/Kg) could affect neurogenic and inflammatory pain sensation along with the thermal threshold and edema volume of animals over time. Behavioral responses were observed at three testing times (1, 2.5, and 3-month post-injection).

Results: Differences were assessed using repeated measures ANOVA followed by the Bonferroni test. Icv-STZ could not induce any significant change in the early (neurogenic) phase of the formalin test over time. Formalin-induced animal’s pain score dramatically decreased one-month post-injection and last even after the third month. On the other hand, STZ-treated animals had normal thermal thresholds and edema volume (inflammation) over time which is aligned with the results acquired from the formalin test.

Conclusion: Icv-STZ could impair brain pathways relaying inflammatory pain-related responses in male rats over time. AD-like pathology induced by icv-STZ could at least partially activate inflammatory pain processing pathways, a suggestion that needs more investigation. Upon the results of such studies, anti-inflammatory agents could be proposed to adjust pain perception in sAD patients.

Keywords: pain, formalin, tail-flick, icv-STZ, Alzheimer’s, rat