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PHYSICOCHEMICAL EVALUATION OF HYALURONIC ACID GELS ASSOCIATED WITH KETOPROFEN FOR THE TREATMENT OF TEMPOROMANDIBULAR DISORDERS

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Abstract:

Introduction: Temporomandibular disorders is defined as a set of pathophysiological conditions that affect the musculoskeletal and neuromuscular structures of the masticatory muscles and temporomandibular joint. It is an important public health problem, affecting around 6–12% of the general population. Its clinical presentation can be diverse, consisting of pain modified by movement, headaches, clicks, and crackles, among other signs and symptoms. The pathophysiology of the disease is complex, but it consists of inflammatory immune dysregulation, so treatments are based on regulating this process. **Objectives:** This study aims to evaluate the physicochemical properties of hydrogels based on hyaluronic acid conjugated to ketoprofen. **Metodology:** Fourier Transform Infrared Spectroscopy (FTIR), Thermogravitometry, and Oscillatory Rheology Testing were carried out for the physicochemical analysis. **Results:** The FTIR spectrum of ketoprofen showed characteristic absorptions at 1695 cm-1 acid carbonyl group (C=O), 1654 cm-1 ketone carbonyl group (C=O), 1598 cm-1 aromatic stretching (C=C), 1441 cm-1 CH-CH3 deformation, and 716 and 966 cm-1 out-of-plane (C-H) deformation. While the FTIR spectrum of hyaluronic acid showed characteristic absorptions at 3265 cm-1 (OH) and (NH) stretching, 2. 882 cm-1 stretching (C-H), 1607 cm-1 asymmetric stretching of carboxyl groups (C =O), 1402 cm-1 symmetric stretching of carboxyl groups (CO), 1560 cm-1 (amine II), 1148 cm-1 the C-O-C group (O bridge), 1080 cm-1 exocyclic groups (C-O) and (C-C), 1036 cm-1 (C-OH). The FTIR spectrum of the gel showed the characteristic absorptions of hyaluronic acid. With regard to thermogravimetric analysis, two peaks of mass drop were observed, the first between 30 and 100°C, representing the evaporation of the hydrogel's water mass, and the second between 200 and 270°C, representing the degradation of hyaluronic acid. It was not possible to determine the thermodegradation of ketoprofen, but it is at a temperature higher than 400°C. With regard to the rheology test in the oscillatory regime, it was observed that the dynamic viscosity varies between: 139204 Pas to 32470 Pas in the HA gel associated with Ketoprofen 1.0 mmol; 123182 Pas to 25645 Pas in the HA gel associated with Ketoprofen 0.500 mmol; 135888 Pas to 28650 Pas in the HA gel associated with Ketoprofen 0.250 mmol; and 95656 Pas to 24713 Pas in

the HA gel associated with Ketoprofen 0.125 mmol. Furthermore, from this analysis, it is possible to classify the hyaluronic acid gel as fluid, non-Newtonian, time-dependent, and thixotropic. It was also possible to observe that the shear stress remained between 245 and 345 Pas. **Conclusions:** Hydrogels have suitable chemical properties for temporomandibular joint viscosupplementation. However, more studies are needed for their clinical use.

Keywords: Viscosupplementation; Temporomandibular joint; Anti inflammatory agents.