



FOURIER TRANSFORM INFRARED SPECTROSCOPY AND THERMOGRAVIMETRIC EVALUATION OF HYALURONIC ACID HYDROGELS ASSOCIATED WITH HYDROCORTISONE.

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Abstract:

Introduction: Temporomandibular disorder is characterized by a set of pathophysiological conditions that affect neuromuscular structures of the masticatory muscles, temporomandibular joint and musculoskeletal structures. It is an important public health problem with a variant distribution, affecting around 6 to 12% of the general population, and is considered the most common cause of chronic pain of non-dental origin in the orofacial area. The pathophysiological process of the disease is complex, as it is defined as a local inflammatory disease, but its development may be due to local and systemic factors. Local factors include microtrauma secondary to bruxism, parafunctional habits and improper detachment of the articular disc. Systemic factors include rheumatoid, psoriatic and reactive arthritis. Its clinical manifestation can be pain in the masticatory structures, headache in the temporal region or influenced by movement, stabilization, crepitations, among other symptoms. Treatment of the disease is based on the patient's immune-inflammatory regulation. **Objectives:** This study aims to carry out a Fourier transform infrared spectroscopic and thermogravimetric evaluation of hyaluronic acid hydrogels conjugated to the drug hydrocortisone. **Methodology:** For the physicochemical analysis of hyaluronic acid gels associated with hydrocortisone, two methods were carried out, Fourier

transform infrared spectroscopy analysis, and thermogravimetry analysis. **Results:** The Fourier transform infrared spectrum of hydrocortisone showed characteristic absorptions at 3.400 cm^{-1} stretching (O-H), 2.910 cm^{-1} stretching (C-H) 1.646 cm^{-1} carbonyl ketone group (C=O). While the Fourier transform infrared spectrum of hyaluronic acid showed characteristic absorptions at 3.265 cm^{-1} (O-H) and (N-H) stretching, 2.882 cm^{-1} stretching (C-H), 1.607 cm^{-1} asymmetric stretching of carboxyl groups (C=O), 1.402 cm^{-1} symmetric stretching of carboxyl groups (C-O), 1.560 cm^{-1} (amine II), 1.148 cm^{-1} the C-O-C group (O bridge), 1.080 cm^{-1} exocyclic groups (C-O) and (C-C), 1036 cm^{-1} (C-OH). The Fourier transform infrared spectrum of the hidrogel 3% of hyaluronic acid associated with 1% of hydrocortisone showed the characteristic absorptions of the both molecules. With regard to thermogravimetric analysis, it was possible to observe two peaks of mass drop, the first between 30°C to 100°C representing the evaporation of the hydrogel's water mass and the second between 200°C to 270°C representing the degradation of hyaluronic acid and hydrocortisone. It was not possible to determine the thermodegradation temperatures of hyaluronic acid and hydrocortisone in hydrogel, as the starting temperatures for the degradation of the two molecules are close. **Conclusions:** The hyaluronic acid hydrogels showed physicochemical properties suitable for viscosupplementation of the temporomandibular joint. However, further studies should be carried out to ensure their effective clinical use.

Keywords: temporomandibular joint; viscosupplementation; chronic pain; adrenal cortex hormones.