



PHYSICAL-CHEMICAL EVALUATION OF HYALURONIC ACID GELS ASSOCIATED WITH DEXAMETHASONE FOR THE TREATMENT OF TEMPOROMANDIBULAR DYSFUNCTION

Gabriela Ferraz de Araujo^{1,2}; Diego Garcia Miranda^{1,2,3}; Alexandre Luiz Souto Borges²

¹ Universidade Anhembí Morumbi – São José dos Campos, (gabrielaFerraz.dearaujo@gmail.com)

² Universidade Estadual Paulista (UNESP) – São José dos Campos. (alexandre.borges@unesp.br)

³ Universidade Claude Bernard Lyon 1. (diego.garcia-miranda@etu.univ-lyon1.fr)

Abstract:

Introduction: Temporomandibular disorder is a public health problem that affects 12% of the world population. Its clinical presentation is diverse and may include myalgia, arthralgia, headache, malocclusion, clicking, crackling, reduced mouth opening, among other signs and symptoms. Treatment of the disease is based on the patient's immuno-inflammatory regulation. **Objectives:** To carry out the physicochemical evaluation of hydrogels based on hyaluronic acid conjugated to Dexamethasone. **Methodology:** For physical-chemical analyses, Fourier transform infrared spectroscopy, thermogravimetry and rheology testing in an oscillatory regime were carried out. **Results:** The FTIR spectrum of dexamethasone showed the characteristic absorptions at 3473 cm⁻¹ (OH) stretch, 2880 cm⁻¹ stretch (C-H), 1707 cm⁻¹ ketone (C=O), 1454 cm⁻¹ stretch (C-F). The FTIR spectrum of hyaluronic acid showed the characteristic absorptions at 3265 cm⁻¹ stretching of (OH) and (NH), 2882 cm⁻¹ stretching (C-H), 1607 cm⁻¹ asymmetric stretching of carboxyl groups (C = O), 1402 cm⁻¹ symmetric stretching of the 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 the two compounds, dexamethasone and hyaluronic acid. The graph of the thermogravimetric analysis allows us to observe two peaks of mass drop, the first being between 30 and 100°C representing the evaporation of the hydrogel's water mass and the second being between 200 and 270°C represented by the degradation of hyaluronic acid and dexamethasone. It is possible to observe that the dynamic viscosity varies between: 93000 Pas to 19828 Pas in the HA gel associated with Dexamethasone 1.0 mmol, from 16534 Pas to 40417 Pas in the HA gel associated with Dexamethasone 0.500 mmol, from 77608 Pas to 17354 Pas in the HA gel associated with Dexamethasone 0.250 mmol, from 9.9 Pas to 1.14 Pas in the HA gel associated with Dexamethasone 0.125 mmol. It was possible to observe that the shear stress varies between 0.080 - 402 Pa. Therefore, it is possible to infer that the amount of dexamethasone in the solution promotes a significant change in the shear rate. **Conclusion:** The hydrogels presented suitable chemical properties for viscosupplementation of the temporomandibular joint. However, more studies are needed for clinical use.

Keywords: Temporomandibular disorder; Hyaluronic acid; Dexamethasone.