عنوان مقاله:

Rheological Characterization of Biological Hydrogels in Aqueous State

محل انتشار:

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خلاصه مقاله:

Introduction: Biological hydrogels provide a conducive extracellular environment for encapsulating and growing cells and play an important role in regulating cell behavior. Mechanical and rheological properties of hydrogels can influence cell function, mechanotransduction and cellular behaviors such as growth, migration, adhesion, self-renewal, differentiation, morphology and fate. Determination of rheological properties of biogels is important for printing tissues by controlling physical properties and developing efficient drug delivery systems. The main purpose of the current study was to determine some important rheological properties of two well-known hydrogels (agarose and gelatin methacryloyl [GelMA]). Materials and Methods: Rheological properties of gel solutions with different concentrations were measured using oscillatory rheometry. Agarose gels of 1% and 2% (w/v) concentration were prepared in 100 mL de-ionized water. The GelMA solutions of 10% and 15% concentrations were prepared by dissolving dry GelMA in deionized water. Rheological measurements were performed using a rheometer with cone-plate geometry. Results: Both storage modulus (G′) and loss modulus (G″) increased with an increase in frequency. Rheological properties of both types of gel solutions were strongly influenced by the amount of concentration. The shear stress profiles demonstrated shear thinning in both types of gels. Viscosity of 1% agarose and 2% agarose was found comparable with 10% GelMA and 15% GelMA , respectively. Conclusions: Results obtained from experiments revealed that rotational rheometry can be confidently used to determine viscous and elastic response of hydrogels in the aqueous .state. The results will help to select the right type of gel and amount of concentration for the bio-printing of tissues

کلمات کلیدی:

Biological Gels, Agarose, Gelatin Methacryloyl, Rheology, Viscosity