

**EVALUATION OF THE INFLUENCE OF HYDROXYPROPYLGUAR GUM AND  
HYALURONIC ACID ON PHYSICOCHEMICAL AND FUNCTIONAL  
CHARACTERISTICS OF OPHTHALMIC VEHICLES FOR OLOPATADINE**

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To improve ocular bioavailability of eye drops, viscosity-increasing polymers with improved functional properties have been used (1,2). The aim of this study was formulation and evaluation of viscous eye drops using vehicles containing hydroxypropyl guar gum (HPG) (0.25% w/v), sodium hyaluronate (SH) (0.4% w/v), and their combination (HPG-SH) as carriers for olopatadine (0.1% w/v). Physicochemical properties (appearance, clarity, pH, osmolality, viscosity) of the prepared formulations were tested. The drug permeability was estimated *in vitro* using HCE-T cell-based models and the parallel artificial membrane permeability assay (PAMPA). MTT cytotoxicity assay was performed at the end of the permeability study. Physicochemical stability of the formulated eye drops was tested during 12 months. An accelerated stability study was performed using the heating/cooling cycles test. The clarity, pH and osmolality of all formulations were in acceptable range for ophthalmic preparations. Formulation HPG-SH showed significantly higher viscosity (73.1 mPa·s) than formulations with single polymer (7.4 mPa·s for HPG i.e 3.7 mPa·s for SH) pointing to synergistic effect of polymers. The addition of polymers led to a decrease in transcorneal permeability and lower permeability coefficients with prolonged residence of drug at the ocular surface. The results of MTT assay demonstrated that the tested formulations were biocompatible and well tolerated. Formulated eye drops showed satisfactory physicochemical stability under all storage conditions.

Olopatadine was successfully formulated in biocompatible viscous ophthalmic solutions. The combination of viscosity enhancer HPG with mucoadhesive polymer SH has a potential to improve precorneal residence time and therapeutic effect of olopatadine.

**References**

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**Acknowledgements**

This research was funded by the Ministry of Education, Science and Technological Development, Republic of Serbia through Grant Agreement with University of Belgrade – Faculty of Pharmacy No: 451-03-68/2022-14/200161.

## PROCENA UTICAJA HIDROKSIPROPIL GUAR GUME I HIJALURONSKE KISELINE NA FIZIČKOHEMIJSKE I FUNKCIONALNE KARAKTERISTIKE OFTALMOLOŠKIH VEHIKULUMA ZA OLOPATADIN

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Polimeri poboljšanih funkcionalnih karakteristika koji povećavaju viskozitet koriste se u kapima za oči kako bi se povećala okularna raspoloživost (1,2). Cilj ove studije bio je formulacija i ispitivanje viskoznih kapi za oči korišćenjem vehikuluma koji sadrže hidroksipropil guar gumu (HPG) (0,25% v/v), natrijum hijaluronat (SH) (0,4% v/v) i njihovu kombinaciju (HPG-SH) kao nosača za olopatadin (0,1% v/v). Ispitivane su fizičkohemijske osobine (izgled, bistrina, pH, osmolalnost, viskozitet) pripremljenih formulacija. Permeabilnost leka je procenjena *in vitro* korišćenjem modela zasnovanih na HCE-T ćelijama i testa permeabilnosti na paralelnim veštačkim membranama (PAMPA). MTT citotoksični test sproveden je na kraju studije permeabilnosti. Fizičkohemijska stabilnost formulisanih kapi za oči ispitivana je tokom 12 meseci. Sprovedena je ubrzana studija stabilnosti korišćenjem cikličnog testa grejanja/hlađenja. Bistrina, pH i osmolalnost svih formulacija bili su u prihvatljivom opsegu za oftalmološke preparate. Formulacija HPG-SH je pokazala značajno viši viskozitet (73,1 mPa·s) od formulacija sa pojedinačnim polimerom (7,4 mPa·s za HPG, tj. 3,7 mPa·s za SH) ukazujući na sinergistički efekat polimera. Dodatak polimera je doveo do smanjenja transkornealne permeabilnosti i nižih koeficijenata permeabilnosti uz produženo zadržavanje leka na površini oka. Rezultati MTT testa su pokazali da su testirane formulacije biokompatibilne i dobro podnošljive. Formulirane kapi za oči imale su zadovoljavajuću fizičkohemijsku stabilnost pri svim uslovima čuvanja. Uspešno su formulirani biokompatibilni viskozni rastvori za oftalmološku primenu sa olopatadinom. Kombinacija HPG kao sredstva za povećanje viskoziteta sa mukoadhezivnim polimerom SH ima potencijal da poboljša prekornealno vreme zadržavanja i terapijski efekat olopatadina.

### Literatura

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### Zahvalnica

Ovo istraživanje je finansiralo Ministarstvo prosvete, nauke i tehnološkog razvoja Republike Srbije kroz Ugovor o dodeli bespovratnih sredstava sa Univerzitetom u Beogradu – Farmaceutskim fakultetom broj: 451-03-68/2022-14/200161.