Vidhyayana - ISSN 2454-8596
An International Multidisciplinary Peer-Reviewed E-Journal
www.vidhyayanaejournal.org
Indexed in: Crossref, ROAD & Google Scholar

12

Formulation and Characterisation of novel mucoadhesive nanoparticle based ocular drug delivery system

Subhashree Nayak[1], Prajnya Parimita Rout[1], Kalpana Panigrahi[1], Prem Ranjan Rauta[2], Yugal K. Mohanta[3], Pradipta Ranjan Rauta[1]*
[1]School of Biological Sciences, AIPH University, Bhubaneswar, Odisha
[2]Dalmia Institute of Scientific and Industrial Research, Rajgangpur, 770 017, Odisha, India
[3] Department of Applied Biology, University of Science and Technology Meghalaya (USTM)

Introduction

- Novel drug delivery system are continually being developed to defeat the low bioavailability observed in **many** standard ophthalmic formulations. **These** novel **systems** are incorporated for the development of hydrogel.
- For ocular drug delivery system hydrogels are favourable therapeutic material due to their high biocompatibility and biodegradable characteristics and they are able to increased drug address time and undergo release of drugs.

Objectives

- To synthesize the Polymer-liposome complexes (PLCs) based in situ hydrogel consisting of cellulose Nanocrystal, lecithin and cholesterol loaded ocular drug Chloramphenicol sodium succinate.
- To determine the physicochemical properties of formulated alginate-carboxy methyl cellulose-Chloramphenicol in situ hydrogel.

Methods

- Synthesis of Chloramphenicol loaded alginate-carboxy methyl cellulose in-situ hydrogel.
- Study of Physicochemical properties of formulated in situ hydrogel (invitro drug release study, Dynamic light scattering study (DSL, Scanning electron nicroscope (SEM)

Results and Discussion

Figure 1. synthesis of chloramphenicol loaded alginate carboxymethyl cellulose in-situ Hydrogel.

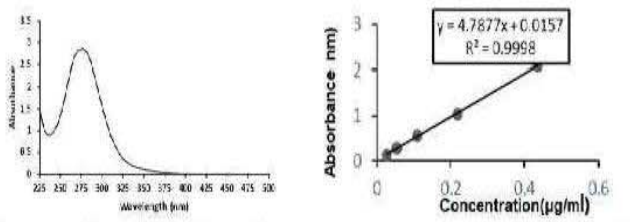

Figure 2. The absorbance maxima and standard curve of drug (chloramphenicol sodium succinate)

- The absorbance of the drug (Chloramphenicol Sodium Succinate) was found 277nm by using UV-visible spectrophotometer.

Figure 3. Morphology of the synthesized hydrogel **was investigated by SEM**

- The surface morphologies of the particles were spherical and large size structure. Particles were found to be regular and isolated in nature. The size of particles observed in the SEM was □ 23.20 nm

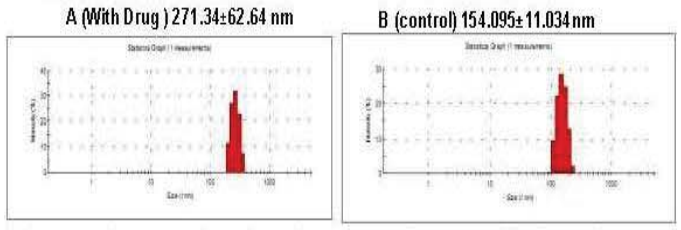

Figure 4. Size (Hydrodynamic diameter) distribution of chloramphenicol loaded hydrogel synthesized from alginate-carboxymethyl cellulose

- DLS study determines the hydrodynamic diameter **of hydrogel. The average diameter of the synthesized hydrogel was 271±62.64 nm (with drug) & 154.095±11.034 (control).**

Time (hrs)	% cumulative Drug Release (Average)	standard deviation
0	7.90	0.46
3	22.37	1.36
6	33.20	2.55
10	52.99	3.30
16	63.21	2.41
24	73.96	2.25
48	81.44	3.25
72	86.76	2.09

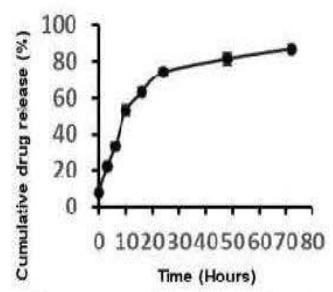

Figure 5. In vitro drug release study of synthesized **Chloramphenicol loaded SA-CMC in-situ hydrogel.**

Conclusion

- Since hydrogels show great potential to tackle the current limitations in retinal biologics delivery, including improving biologics stability by limiting their mobility in the network structure, and reducing dosing frequency via controlled/ sustained release of biologics.
- The ability to **overcome** the limitations of conventional ophthalmic **dosage forms,** hydrogel-based ophthalmic drug delivery **systems have a** promising future for the treatment of ocular diseases.

References

- **Fathi, M., Barar, J., Aghanejad, A., & Omidi, Y. (2015). Hydrogels for drug delivery and tissue** engineering. *BocularioImpacts: BI*, *5*(4), 159–**164.**
- **A, P., K, C., V, A., & AK, M. (2013). Ocular** drug delivery systems: An overview. *World Journal of Pharmacology*, *2*(2), 47. https://doi.org/10.5497/WJP.V2.I2.47