pared ocular insert film had good appearance with smooth surface. Ocusert films prepared were semi-transparent. Surface texture was smooth and uniform. Evaluation of ocular inserts for weight and thickness variation were carried out and analyzed by ANOVA.

Formulation Code	Rate controlling membrane				Ocusert reservoir			
	Polymer		Plasticizer	Solvent	Drug	Polymer	Plasticizer	Solvent
	HPMC % W/V	EC % W/V	DBP % W/W of polymer	Ethanol ml	Clotrimazole (mg)	Na CMC % W/V	PEG-400 % W/W	Water+Ethanol (1:1) ml
F1	2	-	30	15	50	2	30	15
F2	3	-	30	15	50	2	30	15
F3	4	-	30	15	50	2	30	15
F4	-	2	30	15	50	2	30	15
F5	-	3	30	15	50	2	30	15
F6	-	4	30	15	50	2	30	15
F7	1	1	30	15	50	2	30	15
F8	1.5	1.5	30	15	50	2	30	15
F9	2	2	30	15	50	2	30	15

Table 3: Composition of prepared ocuserts.

Formulation Code	Weight variation (mg) ± SD*, (P value)	Thickness (mm) ± SD*, (P value)	Folding endurance ± SD#	Surface pH ± SD#	Average drug content in each formulation (% of theoretical amount/ocusert = 0.9308) ± SD#	% Moisture content ± SD×, (P value)	% Moisture uptake ± SD×, (P value)
F1	28.205 ± 1.669 p<0.0001	0.0262 ± 0.016 p<0.0001	78.33 ± 6.02	7.16 ± 0.404	92.42 ± 3.309	3.19 ± 0.056 p<0.0061	2.98 ± 0.111 p<0.0246
F2	37.1 ± 2.018 p<0.0001	0.326 ± 0.02 p<0.0001	72 ± 14.0	7.23 ± 0.351	89.01 ± 1.028	2.55 ± 0.02 p<0.0007	3.17 ± 0.036 p<0.0025
F3	47.165 ± 2.499 p<0.0001	0.364 ± 0.026 p<0.0001	64.33 ± 4.16	7.6 ± 0.5	90.72 ± 2.138	3.19 ± 0.053 p<0.0055	4.34 ± 0.036 p<0.0025
F4	24.45 ± 2.722 p<0.0001	0.224 ± 0.021 p<0.0001	51 ± 2.0	7.2 ± 0.3	87.31 ± 0.946	3.39 ± 0.044 p<0.0037	2.42 ± 0.177 p<0.0616
F5	34.38 ± 2.177 p<0.0001	0.229 ± 0.017 p<0.0001	45.66 ± 2.51	7.46 ± 0.416	83.9 ± 0.882	4.57 ± 0.046 p<0.0041	4.21 ± 0.036 p<0.0025
F6	47.165 ± 2.499 p<0.0001	0.354 ± 0.027 p<0.0001	44.66 ± 4.16	7.5 ± 0.519	87.31 ± 0.823	3.15 ± 0.036 p<0.0025	3.55 ± 0.053 p<0.0055
F7	24.78 ± 2.268 p<0.0001	0.224 ± 0.016 p<0.0001	95 ± 3.60	7.066 ± 0.208	89.01 ± 2.67	3.40 ± 0.026 p<0.0013	3.19 ± 0.07 p<0.0097
F8	33.18 ± 0.891 p<0.0564	0.308 ± 0.014 p<0.0001	74 ± 13.07	7.2 ± 0.360	87.31 ± 2.094	3.69 ± 0.026 p<0.0013	3.08 ± 0.044 p<0.0037
F9	44.395 ± 2.096 p<0.0001	0.38 ± 0.02 p<0.0001	78.66 ± 3.51	7.166 ± 0.35	89.01 ± 1.612	4.60 ± 0.026 p<0.0013	4.30 ± 0.046 p<0.0041

Table 4: Physicochemical evaluation of Clotrimazole ocuserts.

*Average of twenty readings, #Average of three readings, × Average of five readings.

Figure 6: Formulated ocuserts F1 to F9.

Figure 7: Comparative *in-vitro* cumulative % drug release profile of formulations F1to F9.

Conclusion

From current study we can conclude that by using different polymer in rate controlling membrane of an ocusert release rate of drug from ocusert can be controlled or altered. In present study polymers used in rate controlling membrane of ocusert showed following sequence of release rate (as shown by Figures) HPMC > 1:1 Combination of HPMC and EC > EC.

Furthermore, change in concentration of a polymer in rate controlling membrane alters the release rate of drug from ocusert and it was found that increasing the concentration of a polymer in rate controlling membrane retards the release rate as shown by (Figures) 2% polymer > 3% polymer > 4% polymer.

For achieving an effective required release of drug whether instantaneous or prolonged release, further study on different polymers in different concentration is suggested.

Bibliography

1. Jain N.K. "Controlled and novel drug delivery". First Edition 1997, Reprint 2009, CBS publishers and distributors, 11 Darya Ganj, New Delhi-110002 (India) (1997): 82-89.

2. Beringer Paul., *et al*. "Remington the science and practice of pharmacy". 21st edition 2005, third Indian reprint 2009, Wolter kulwer publication (India) Pvt. Ltd., New Delhi (2005): 850-862.

3. Thamizhvanan K., *et al*. "Current status and advanced approaches in ocular drug delivery system". *IJCP and CR* 2.2 (2012): 77-82.

4. Cheien YW. "Drugs and the pharmaceutical sciences novel drug delivery systems". Second edition, revised and expanded, volume 50, Informa health care USA inc. 52 Vanderbit avenue New York NY 10017, page no. 269-270.

5. Thakur Richa and Swami Gaurav. "Promising implication of ocuserts in ocular disease". *JDDT* 2.2 (2012): 18-19.

6. Gamal El SS., *et al*. "Formulation and evaluation of Acyclovir ophthalmic inserts". *AJPS* 3.2 (2008): 58.

7. Imam Sarim., *et al*. "Novel ocular dosage form in the treatment of glaucoma". *The Pharma Research* 1 (2009): 76-78.

8. Gevariya Hitesh B. "Formulation and evaluation of sustained release ocular drug delivery system for an anti-glaucoma drug". Saurashtra University (2013): 1-21.

9. Bankar GS and Rhodes CT. "Drug and the pharmaceutical sciences modern pharmaceutics". Second edition, revised and expanded, Volume 40, Marcel Daker, inc., 270 Madison Avenue, New York, New York 10016, page no. 573-574.

10. Brahmankar DM and Jaiswal S.B. "Biopharmaceutics and pharmacokinetics a treatise, second edition, reprint 2010, Vallabh prakashan New Delhi-110088. 473.

11. Kumar KP Sampath., *et al*. "Ocular inserts novel controlled drug delivery system". *TPIJ* 1.12 (2013): 1-14.

12. Karthikeyam D. "The concept of ocular inserts as drug delivery systems: An overview". *AJP* (2008): 194-196.

13. Dabhi V., *et al*. "Ocular inserts as controlled drug delivery systems". *IJPRBS* 3.5 (2014): 468-480.

14. Asija Rajesh., *et al*. "Ocular drug delivery system ocular insert". *IJUP&BS* 1.2 (2012): 30-38.

15. Rasool Abdul KB and Hiba MS. "Development and clinical evaluation of Clotrimazole –β- cyclodextrin eye drops for the treatment of fungal keratitis". *AAPS PharmSciTech* 13.3 (2012): 883-889.

16. Hashem M F., *et al*. "Formulation, characterization and clinical evaluation of micro-emulsion containing Clotrimazole for topical delivery". *AAPS PharmSciTech* 12.3 (2011): 879.

17. Bansal S., *et al*. "Nanaocrystals: current strategies and trends technology". 4 (2012): 6.

18. Jain NK. "Introduction to novel drug delivery system". first edition-2010, Vallabh prakashan, C-5, SMA coop. industerial estate, GT karnal road, Delhi-110033, page no. 115.

19. Dinda S.C. "Advances in pharmaceutical technology". Pharmamed press 4-4-316, Giriraj Lane Sultan Bazar, Hyderabad -500095. (2011): 398-401.

20. Shankar V., *et al*. "A text book of novel drug delivery system". 2012, Pharmamed press 4-4-316, Giriraj Lane Sultan Bazar, Hyderabad -500095. Page no. 398-401.

21. Parmar B Ramesh and Dr HM Tank. "Design, formulation and evaluation of reservoir type controlled released Moxifloxacin hydrochloride ocular inserts". *AJRPS* 3.1 (2013): 19-24.

22. Potu Rao Appa and Veera Reddy PR. "Design and evaluation of ocular inserts for controlled drug delivery of Ketorolac tromethemine". *World Journal of Pharmaceutical Research* 3.4 (2014): 722-734.

23. Singh RK and Khatri OP. "A scanning electron microscope based new method for determining degree of substitution of sodium carboxy methyl cellulose". *Journal of Microscopy* 246 (2012): 43-52.

24. Product monograph. "Canesten 1% topical cream Clotrimazole". Bayer Inc. 77 BelfieldToronto, Ontario, (2011) 2-19.