INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACY AND CHEMISTRY

Available online at www.ijrpc.com

Research Article

FORMULATION AND EVALUATION OF TOPICAL GEL OF MELOXICAM

Loveleenpreet kaur[1*] and Prabhjot kaur[2]

[1]Department of Pharmaceutical Sciences, Sri Sai College of Pharmacy, Badhani, Pathankot, Punjab, India.
[2]Department of Pharmaceutical Sciences, Pt.J.R.Poly Technical College, Hoshiarpur,Punjab, India.

ABSTRACT

This study to aim the increasing the drug permeation rate used the permeation enhancers and polymers. The topical gel formulation two polymers has been used carbopol-940 and HPMC in different concentration. The formulation has been analyzed by performed a parameters pH determination, Homogeneity, Extrudability, Skin irritation study, Grittiness, viscosity. In- vitro drug release study shows that the maximum drug permeation through the cellophane membrane produced by HPMC formulation as compared to Carbopol-940.

INTRODUCTION[1-10]

Meloxicam is non-steroidal anti- inflammatory drug chemically heterogeneous large groups of drugs which suppress inflammation in a manner similar to steroids, but less side effects of sedation, respiratory depression, or addiction then steroids. They are widely used for the treatment of inflammatory disorders and painful conditions such as rheumatoid arthritis, gout, has pH dependent solubility and permeability. Although Meloxicam is highly permeable through stomach, its poor water solubility (log P value 3.6) limits its entry into systemic circulation before gastric empting meloxicam enters the small intestine, where it cannot permeate through the membrane despite being solubilize. Since dissolution is the rate –limiting step during drug absorption, the poor water solubility in oral forms of meloxicam results in low bioavailability due to erratic or incomplete absorption from the gastrointestinal tract.

Therefore, there is a need to develop topical dosage forms of meloxicam to minimize the gastrointestinal side-effects of oral meloxicam, and to provided relatively consistent drug levels at the application site for prolonged periods. Transdermal and topical deliveries also provide and increased bioavailability by avoiding first-pass metabolism by liver and a consistent delivery for an extended period. Topical drug administration is a localized drug delivery system anywhere in the body through ophthalmic, rectal, vaginal and skin as topical routes. Skin is one the most readily accessible organ on human body for topical administration and is main route of topical drug delivery system. The skin of an average adult body covers a surface area approximately 2 m and receives about one third of the blood circulation through the body. Topical delivery vehicles (creams, gels) and transdermal delivery agents(dermal patches) can improve patient compliance due to decrease in the dosage frequency. However, meloxicam poor permeability through the human skin makes transdermal delivery difficult. The stratum corneum, the external layer of the epidermis chracterized by a lipid-rich rich lamellae, serves as a formidable permeability barrier for tranmsdermal absorption of meloxicam. The permeability problems at the skin surface may be oviated by the use of drug carrier, and penetration enhancers.

The percutaneous absorption of drug involves two consecutive process; the release other drug from the topical formulation, and its absorption into the skin at the site of application,increasing the release rate of the drug from the dosage forms might therefore improve percutaneous absorption. The release rates of drugs from topical preparations depends directly on the physiochemical properties of the carrier and the drug employed.Topical application of anti-inflammatory agents at the site of inflammation can overcome their systemic side-effects and improve their therapeutic activity.

EXPERIMENT

Material & Method

Meloxicam was a gift sample from Prashanti formulation Ltd., Hoshiarpur, HPMC, carbopol 934,carbopol-940,Poloxamer-188, Propylene-glycol,Tri-ethanolamine from Bright way chemical store, Amritsar and other chemical were used in analytical grade.

Preparation of carbopol gel [11]

Required amount of Meloxicam was dissolved in solvent mixture, and then the required quantity of Polymer was added to the solution with constant stirring at 500 rpm for about 2 hours. Later the speed was reduced to avoid air entrapment. Then the solution was neutralized with Triethanolamine.

Preparation of HPMC gel

Required amount of Meloxicam was dissolved in solvent mixture, and then the required quantity of Polymer was added to the solution with constant stirring at 500 rpm for about 2 hours. Later the speed was reduced to avoid air entrapment. Then the solution was neutralized with Triethanolamine.

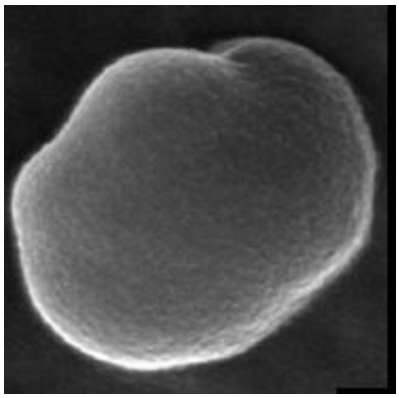

Fig.1: Image of Gel formulation of HPMC

Evaluation

Homogeneity[12]

All developed gels tested for Homogeneity by visual inspection after the gels have been set in the container. They were tested for their appearance and presence of any aggregates.

Grittiness[12]

The four formulations were evaluated microscopically for the presence of particles if any no appreciable particulate matter was seen under light microscope. Hence obviously the gel preparation fulfils the requirement of freedom from particular matter and from grittiness as desired for any topical preparation.

Extrudability[13]

A good gel extrude optimally form the gel with slight pressure applied. The Extrudability of formulations from aluminium collapsible tubes, was determined using universal tube filling machine. Aluminium collapsible tube filled with 10 g gels were held between two clamps. A tube was compressed and Extrudability of formulation was determined in terms of weight in grams required to extrude a 0.5 cm ribbon of gel in 10 seconds.

pH Determination[13]

The pH of gel formulations was determined by using digital pH meter. 1gram of gel was dissolved in 100 ml of distilled and stored for 2 hours. The measurement of pH of each formulation was done in triplicate and average values were calculated.

Viscosity[13-14]

The measurement of viscosity of the prepared gel was done with a Brookfield Viscometer. The gel were rotated at 20 and 30 rpm using spindle no.64 at each speed, the corresponding dial reading was noted**.**

Drug content determination[13-14]

Drug content was studied by an accurately weighing a gel (about 100 mg) and was dissolved in 100 ml of Phosphate buffer 7.4 and then the solution was stirred continuously for 24 h on magnetic stirrer. Then the whole solution was sonicated. After sonication and subsequent filtration, drug in solution was estimated spectrophotometrically by appropriate dilution.

Skin irritation study[13-14]

Guinea pigs (400-500g) of every sex were used for testing of skin irritation. The animals were

maintained on standard animal feed and had free across to water. The animals were kept under standard conditions. Hair was shaved from back of guinea pigs and area of 4 cm^2 was marked on both the sides one side served as control while the other side was test. Gel was applied (500 mg/guinea pig) twice a day for 7 days and the site was observed for any sensitivity and the reaction if any.

***In -vitro* permeation studies**

The diffusion studies of the prepared gels were carried out in Keshary-Chien diffusion cell for studying the dissolution release of gels through a cellophane membrane. Gel sample (0.5g) was taken in cellophane membrane and the diffusion studies were carried out at 37±1° using 25 ml of phosphate buffer (pH 7.4) as the dissolution medium. 5 ml of each sample was withdrawn at constant interval of time 1,2,3,4,5,6,7,8and 9 h and each sample was replaced with equal volume of fresh dissolution medium. Then the sample wereanalyzed for through content at 362 nm using phosphate buffer as blank[13].

Table 1: Different gel formulations

Ingredients.	Formulation of gels							
	F1	F2	F3	F4	F5	F6	F7	F8
Meloxicam	3	3	3	3	3	3	3	3
Carbopol-940	0.5	1	1.5	2.0	-	-	-	-
HPMC	-	-	-	-	1	1.5	2	2.5
Propylene-glycol	10	10	10	10	10	10	10	10
Tri-ethanolamine	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Oleic acid	1	2	2.5	3	-	-	-	-
Tween 85								
Water	-	-	-	-	1	2	2.5	3
	80.5	80.5	85.2	85.5	80.5	80.5	85.2	85.5

Table 2: Physiochemical Evaluation data of meloxicam gel.

Formulation code	Homo-genity	Grittiness	Extrudability	Skin irritation	Drug content (%)± S.E	Viscosity (cps)± S.E	pH
F1	***		***			14216.05±98.151	
F2	**	--	**	--	89.54±2.090.1	14312.22±101.11	6.32±0.486.41
F3		--		--	0±3.293.32±1.	14412.34±58.947	±0.407.21±0.2
F4	***	--	***	--	696.62±1.595.	14514.44±467.97	66.72±0.146.8
F5	**	--	**	--	12±2.493.54±	14321.66±565.97	1±0.376.52±0.
F6	***	--	***	--	4.398.36±4.7	15211.23±780.17	397.26±0.41
F7	**	--	**	--		15371.28±645.60	
F8	***		***				

Keys: *** Excellent
** Good
-- No irritation

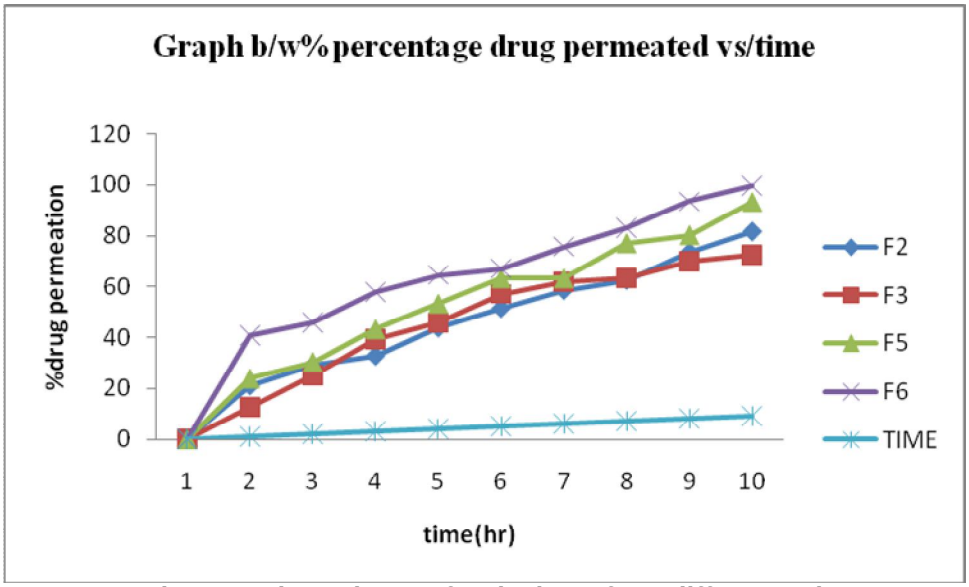

Fig. 2: In-vitro release of Meloxicam from different gel formulations through cellophane membrane

RESULT AND DISCUSSION

In this study we used a two polymers carbopol-940 and HPMC in different concentration were employed for the preparation of topical gel of meloxicam shown in table no.1. for the good permeation through the stratun corneum we were used the permeation enhancers they increase the permeation rate through the skin seasam oil and oleic acid in different concentation.Evaluation of gel formulation Homogenity, Grittiness, Drug content,Extrudability,drug permeation parameters were performed result was shown in table no.2. The drug release of patteren of meloxicam the maximum release was produced in F5 and F6 formulation due to permeation enhancers. Skin irritation studiese there is no any dermatological rections are determinded.

REFERENCES

1. Mizumoto T, Masuda Y, Yamamoto T, Yonemochi Eand Tarada K. formulation design a novel fast disintegrating tablet. Int J Pharm. 2005;306:83-90.
2. Patel R, Patel N, Patel NM and Patel MM. A novel approch for dissolution enhancenent by ibuprofen by preparing floting granules. International journal of research in pharmaceutical sciences. 2010;1(1):57-64.
3. Greenhalgh DJ, Williams AC, Timmins Pand York P. Solubility parametrs as predicators of miscibility in solid dispersions. Journal of Pharmaceutical Sciences. 1999;88(11):1182-1190.
4. Vasconcelos T, Sarmeto B and Costa P. Solid dispersions as strategy to improve oral bioavailability of poor water soluble drugs. Drug discovery Today. 2007;12(23-24):1068-1075.
5. Robinson JR and Lee. Vincern HL. Controlled drug delivery, 2nd edn, vol.29. Marcel dekker.inc.Madison Avenne, New York. 524-526.
6. Mehlisch DR, Ardia Aand Pallotta T.A controlled comparative study of ibrprofen arginate versus conventional ibuprofen in the treatment of postoperative dental pain. Journal of clinical pharmacology. 2002;42(8):904-911.
7. Ibuprofen epidermal level after topical application in vitro-effect of formulation, application time, dose variation and occlusion. British journal of dermatology. 1993;129(3):286-291.
8. Shima K, Matsuska C, Hirose M, Noguchi T and Yamahira Y. Biopharmaceutical chracteristic of indomethacin gel ointment, Chemical and Pharmaceutical Buletin. 1981;29(8):2338-2343.
9. Uekaman K, Hirayama F and Irie T. Cyclodextrin drug carrier systems. Chemical Reviews.1009;98(5):2045-2076.

10. Rasool BKA, Abu-Gharbieh EF, Fahmy SA, Saad HS and Khan SA. development and evaluation of Ibuprofen transdermal gel formulations. Tropical Journal of Pharmaceutical Research. 2010;9(4):355-363.
11. Yoshioka T, Sternberg B and Florence AT. Int J Pharm.1994;105:1.
12. Martinez MAR, Gallardo JLV, Benavides MMD, Duran JDGL and Lara VG. Rheologicalbehavior of gels and meloxicam release. Int J Pharm. 2007;333:17-23.
13. Garg A, Aggarwal D, Garg Sand Singla AK. Spreading of semisolid Formulations; An update. Pharm Tech. 2002:84-104.
14. Yamaguchi Y, Sugibayashi K and Morimoto Y. Drug release test to asses quality of topical formulations in Japenese market. Drug Dev Ind Pharm. 1996;22(7):569-577.