STUDY OF PIROXICAM GEL STABILITY USING HPMC AND *ACUPEC HV-505* BASES

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ABSTRACT

An investigation on piroxicam gel formulation using HPMC base (1.5, 2.5 and 5%) and other formula using Aqupec HV-505 bases (0.5, 1 and 1.5%, respectively, had been carried out to find out the best formula. The stability testing was conducted on organoleptic, pH, viscosity and, consistency for 28 days of storage. The result showed that the formula with 1% Aqupec HV-505 bases (F_{C2}) was the best one. Further investigation was conducted with variation of of Piroxicam concentrations to know it's influence to gel stability. The additional investigation conducted to the best formula were microbiology, qualitative and quantitative stability testing using Thin-Layer Chromatography (TLC) and High Performance Liquid Chromatography (HPLC) for 56 days of storage. The result showed that the best gel formula was that with 1% Aqupec HV-505 with 0,5% piroxicam ($F_{C2.2}$).

Keywords: Piroxicam, Gel, HPMC, *Aqupec* HV-505.

INTRODUCTION

Piroxicam is one of the most potent Non Steroidal Antiinflammatory agents that also have antipyretic activity. Piroxicam is well absorbed following oral administration; however, its used has been limited by a number of side effect, including bleeding and ulceration. Transdermal adnministration of piroxicam can overcome this side effect, and higher local concentration can be maintained at the target site, which is desirable for the antiinflammatory agent (Banakar, 1992; Panchagnula, 1997; Doliwa, 2001). Transdermal drug delivery system has the additional advantages of avoiding hepatic first-pass metabolism and providing the controlled delivery of the drug for an extended period (Dallas, 1987).

In light of the side effect assoctiated with the oral use of piroxicam, it was proposed to the developed the various topical dosage forms of the drug and to study its stability. The objective of this study was to develop the best topical gel formulation of piroxicam using HPMC and *Aqupec* HV-505 as a gelling agent. To optimize the

formulation, the effects of concentration of gelling agent, the effect of concentration of the drug, the pH and viscosity of the gel and drug content were evaluated.

METHODOLOGY

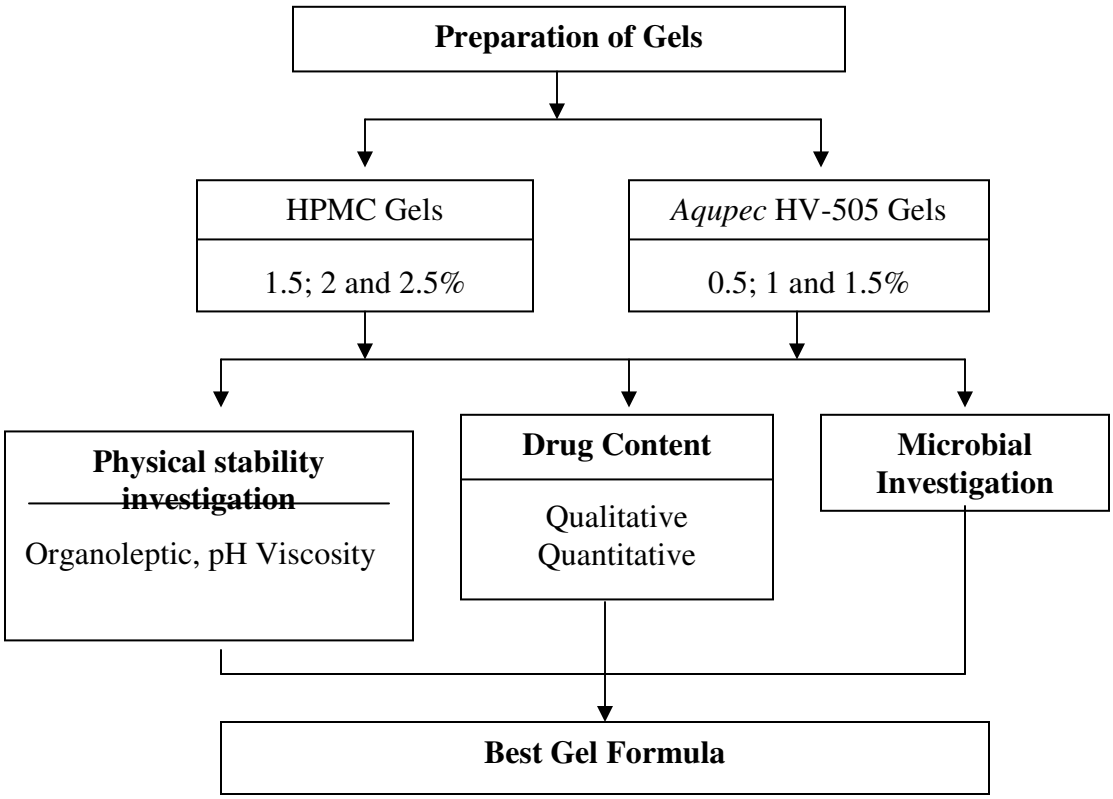


Table 1. Formula of Piroxicam Gels with Various Base

INGREDIENTS	FORMULAS *)					
	F_{B1}	F_{B2}	F_{B3}	F_{C1}	F_{C2}	F_{C3}
HPMC (%)	1.5	2	2.5	-	-	-
Aqupec HV-505 (%)	-	-	-	0.5	1	1.5
Piroxicam (%)	0.5	0.5	0.5	0.5	0.5	0,.5
TEA (%)	3	3	3	3	3	3
Propylenglycol (%)	20	20	20	20	20	20
Methyl Paraben (%)	0.2	0.2	0.2	0.2	0.2	0.2
Propyl Paraben (%)	0.05	0.05	0.05	0.05	0.05	0.05
Ethyl Acetat (%)	5	5	5	5	5	5
Aquadest ad	100	100	100	100	100	100

*) F_{B1} = Piroxicam gel with HPMC 1.5%, F_{B2} = Piroxicam gel with HPMC 2%, F_{B3} = Piroxicam gel with HPMC 2.5%, F_{C1} = Piroxicam gel with *Aqupec HV-505* 0.5%, F_{C2} = Piroxicam gel with *Aqupec HV-505* 1%, F_{C3} = Piroxicam gel with *Aqupec HV-505* 1.5%

RESULTS AN DISCUSSION

Physical Stability of Gel Base

Based on organoleptic investigation, both HPMC and *Aqupec HV 505* gel were pale yellow, clear, transparent and well spreadable. Ideal pH for piroxicam gel was 6-8. HPMC gels which fulfilled the pH requirements was only F_{B1} while others had too high pH value. The pH of gel base exhibited in Figure 1 while Figure 2 showed the viscosity of gel base during storage periods.

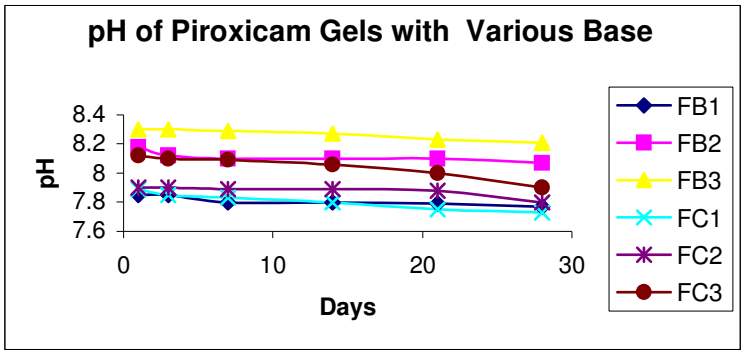


Figure 1. pH of Piroxicam Gel with Various Base

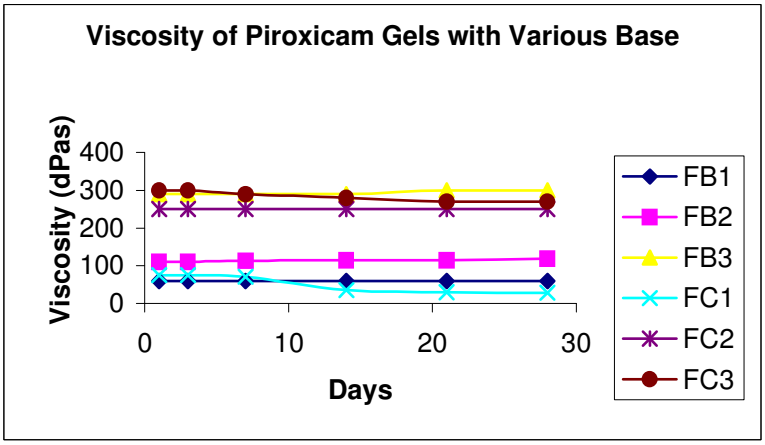


Figure 2. Viscosity of Piroxicam Gel with Various Base

Further investigation were conducted by variating the piroxicam concentration on 1% *Aqupect HV-505*. All Piroxicam with *Aqupec HV–505* gels fulfilled the pH requirement. In general, the viscosity was significantly changed during the 56 days of storage. The results showed that increasing piroxicam concentration caused the

significant decrease on gel viscosity. The pH of Piroxicam gels in Aqupec HV-505 Base during 56 days of storage time exhibited in Figure 3, while Figure 4 showed the viscosity of gels during storage periods.

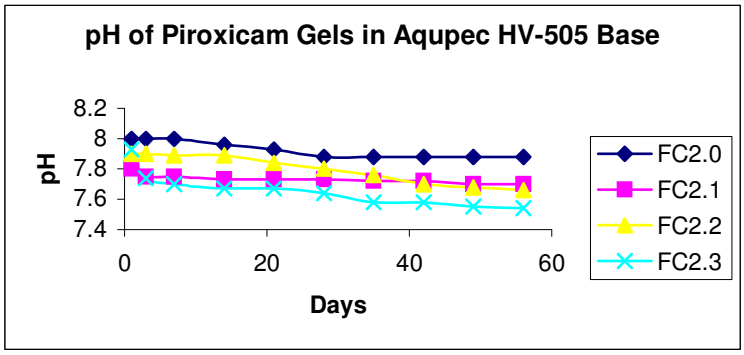


Figure 3. pH of Piroxicam Gels in Aqupec HV-505 Base during storage time (FC2.0 = 1% *Aqupec HV-505* Gel base without Piroxicam, FC2.1 = 1% *Aqupec HV-505* Gel base with 0.25% Piroxicam, FC2.2 = 1% *Aqupec HV-505* Gel base with 0.5% Piroxicam, FC2.3= 1% *Aqupec HV-505* Gel base with 1% Piroxicam)

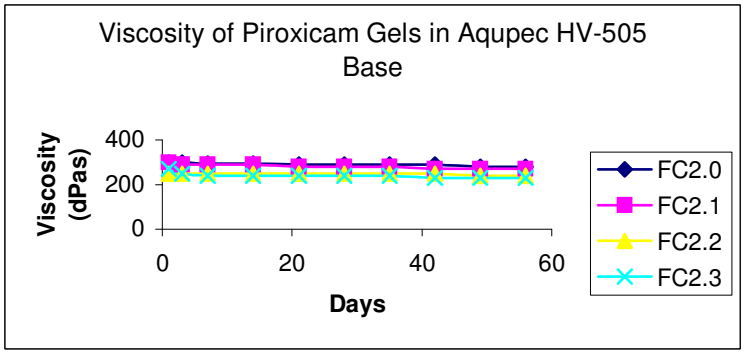
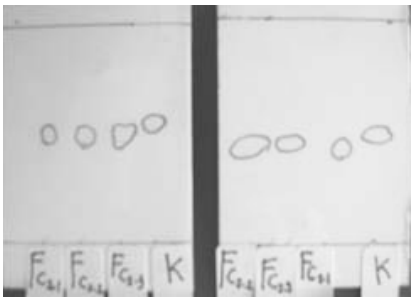


Figure 4. Viscosity of Piroxicam Gels in Aqupec HV-505 Base during storage time time (FC2.0 = 1% *Aqupec HV-505* Gel base without Piroxicam, FC2.1 = 1% *Aqupec HV-505* Gel base with 0.25% Piroxicam, FC2.2 = 1% *Aqupec HV-505* Gel base with 0.5% Piroxicam, FC2.3= 1% *Aqupec HV-505* Gel base with 1% Piroxicam)

Qualitative and Quantitative determination of piroxicam in Gels



A B

Figure 5. TLC Chromatograms of Piroxicam Gels at first day of formulation (A) and after 56 days of storage (B) (FC2.1 = 1% *Aqupec HV-505* Gel base with 0.25% Piroxicam, FC2.2 = 1% *Aqupec HV-505* Gel base with 0.5% Piroxicam, FC2.3= 1% *Aqupec HV-505* Gel base with 1% Piroxicam, K = Piroxicam)

Table 2 . R_f of Piroxicam in Gels

Formula	R_f (Room Temp.) at days of:	
	1^{st}	56^{th}
Piroxicam control	0.5393	0.4719
Piroxicam $F_{C2.1}$	0.5169	0.4494
Piroxicam $F_{C2.2}$	0.5169	0.4719
Piroxicam $F_{C2.3}$	0.5169	0.4494

Table 3. Piroxicam Content in Gels

Formula	Piroxicam content (%) at days of:	
	1	56
$F_{C2.0}$	0	0
$F_{C2.1}$	120.55	113.51
$F_{C2.2}$	115.23	114.47
$F_{C2.3}$	107.86	115.45

HPLC Chromatograms showed no additional peaks, indicating stability of the drug in the gel system. But addition in concentration of piroxicam after storage happened. It was interpreted that these change were due to secretation of gel base which caused unhomogenity in the drug content.

Microbial Investigation

It was found that no bacterial growth happened after 14 days of investigation which can be concluded that the preservative are effectively worked in the gels.

CONCLUSION

Among all the formulation, the 0.5% Piroxicam in 1% *Aqupect-HV* 505 gave the highest stability and quite preferable. The study support the evidence that stability was exhibited in physical, qualitative, quantitative and microbiological characteristic. This can serve as the basis for developing topical formulation of piroxicam with the best stability.

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