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TRANSDERMAL ORGANOGEL FOR NSAIDS CONTAINING DRUG IBUPROFEN

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ABSTRACT

Topical administration via the dermal route can bypass disadvantages of the oral route. Therefore, transdermal drug delivery has been considered to be an ideal route for administration of NSAIDs. Drugs can be delivered across the skin to have an effect on the tissues adjacent to the site of application or to have an effect after distribution through the circulatory system (systemic delivery). While there are many advantages to delivering drugs through the skin the barrier properties of the skin provide a significant challenge. By understanding the mechanisms by which compounds cross the skin it will be possible to devise means for improving drug delivery.

KEYWORD: Ibuprofen, Pluronic F-127, Potassium sorbate.

INTRODUCTION

Transdermal drug delivery systems are defined as self-contained, discrete dosage forms which, when applied to intact skin, deliver the drug(s), through the skin, at controlled rate to systemic circulation. Beneath the epidermis, the dermis contains the system of capillaries that transport blood throughout the body. If the drug is able to penetrate the stratum corneum, it can enter the blood stream thus stratum corneum is rate limiting step for permeation of transdermal preparation.

Furthermore, topical administration via the dermal route can bypass disadvantages of the oral route. Therefore, transdermal drug delivery has been considered to be an ideal route for administration of NSAIDs.[1]

MATERIAL AND METHOD

Material

5.1. Equipment

Table 5.1 List of instruments given below.

Equipment	Company name
UV/visible Double beam spectrometer	Shimandzu 1800
pH meater	MK VI
Brookfield Viscometer	Brookfield
Electronic balance	Citizen
Optical microscope	Labomed
Melting point apparatus	Rolex
Dhona balance	Dhona instruments
Dessicator	SD
Mechanical stirrer	Remi motors

5.2. Glasswares

Table 5.2: List of glasswares given below.

S. no.	Glassware
1.	Beakers
2.	pipette
3.	volumetric flask
4.	conical flask
5.	measuring cylinder
5.	test tubes
7.	capillary
8.	funnel
9.	glass rod
10.	Separating funnel

5.3. Reagents

Table 5.3: List of chemicals required.

S. No	Chemical	Company
1	Ibuprofen	Alpa Laboraties
2	Pluronic F-127	HIMEDIA
3	Soya Lecithin	HIMEDIA
4	Isopropyl myristate	SDFCL
5	Carbopol 940	SDFCL
6	Potassium sorbate	HIMEDIA
7	Citric acid	SDFCL
8	Triethanolamine (TEA)	SDFCL
9	Ethanol	SDFCL
10	PEG 400	SDFCL
11	n-Octanol	CHEMCO
12	Acetone	HIMEDIA
13	methanol AR	SDFCL

14	NaOH-Pellete	SDFCL
15	Potassium di hydrogen phosphate	SDFCL
16	Di sodium hydrogen phosphate	SDFCL
17	Sodium Chloride	SDFCL

Method

Pluronic lecithin organogel is mainly composed of Pluronic F-127, soya lecithin, and IPP/IPM. In general, it is made up of two phases, first pluronic phase (aqueous phase) and second lecithin phase (oil phase), i.e., pluronic gel combined with a lecithin based oil. Pluronic lecithin organogel gel looks and feels like a cream but is actually a gel.

When the aqueous phase (pluronic gel) is combined with the lecithin oil base creates an emulsion that forms together due to the pluronic gel and the viscosity of that gel at room temperature.

Chilling of PLO converts the gel in to liquid, which later gets separated in to oil and aqueous phases (usually takes weeks for separation to occur).

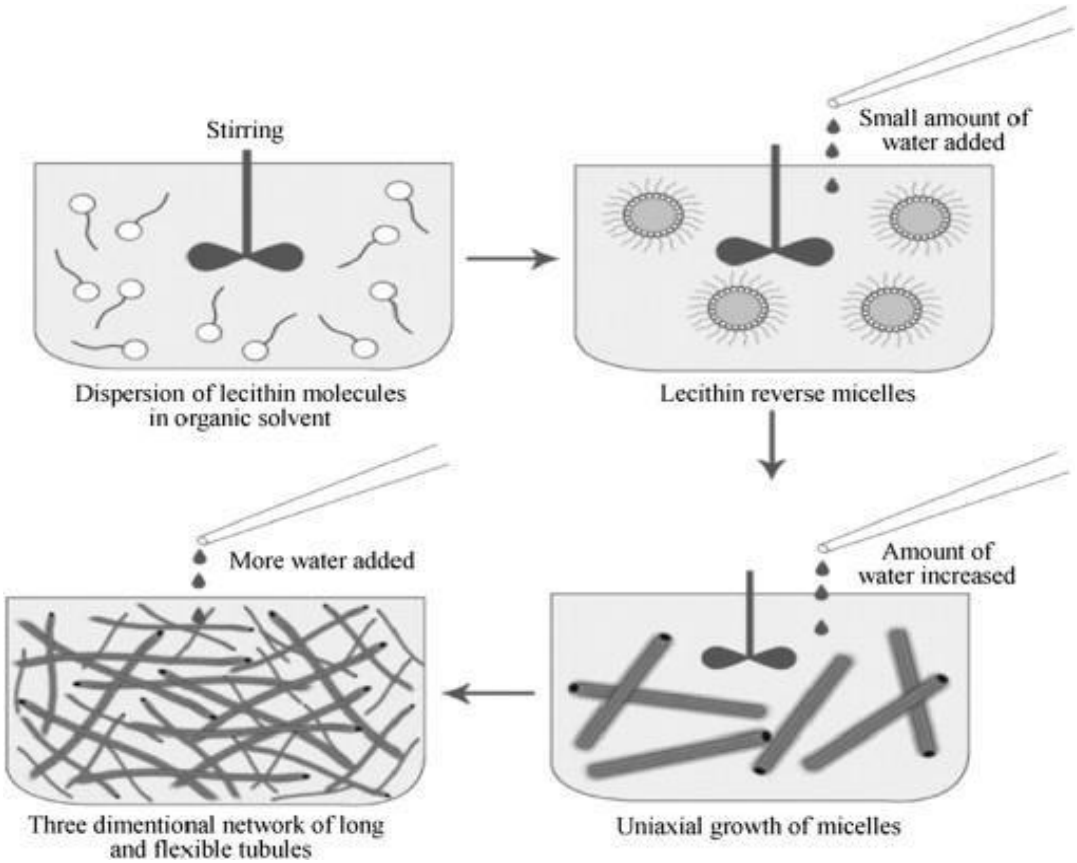

Figure 1.6: Step of micelles formation.

Process of preparation of organogel

- **Aqueous phase:** Pluronic gel is prepared by taking specified amount of Pluronic F-127 NF in ice cold water, agitating continuously and placing the mixture overnight for complete dissolution of Pluronic F-127. About 0.2% w/w potassium sorbate is added as preservative.
- **Oil phase:** Lecithin phase is prepared by taking specified amount of lecithin, IPP/IPM, and 0.2-0.3% w/w sorbic acid as preservative, then keeping the mixture overnight for complete dissolution of lecithin. Lastly, the PLO gel is being prepared by mixing lecithin: IPP liquid phase and the Pluronic phase together well. Incorporation of air should be minimized.[6]

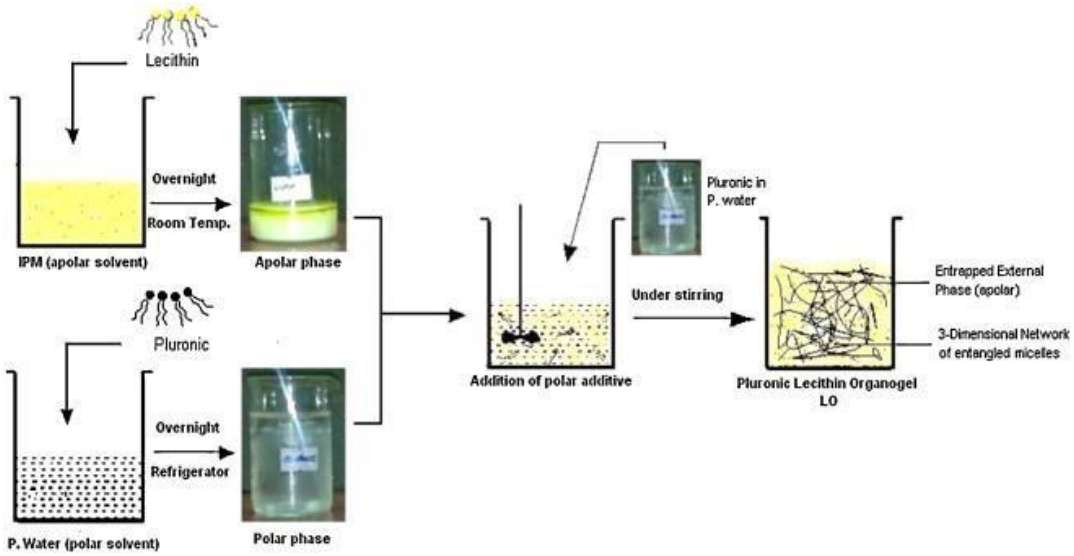

Figure 1.8: Method of Preparation of Organogel.

RESULT AND DISCUSSION

8.1.) Physical evaluation

Formulation	Colour	Synerisis	Homogeneity	Grittiness
F1	Transparent	NO	Yes	No
F2	Shiny transparent	NO	Yes	No
F3	Shiny transparent	NO	Yes	No
F4	Transparent	NO	Yes	No
F5	Transparent	NO	Yes	yes
F6	Opaque	NO	Yes	No
F7	Opaque	NO	Yes	No
F8	Opaque buff	NO	NO	yes
F9	Opaque buff	NO	NO	No
F10	Opaque buff	NO	NO	No

8.2.) Measurement of pH.

Formulation code	pH of organogel
Marketed product	6.8
F1	5.96
F2	6.21
F3	6.04
F4	5.93
F5	6.27
F6	6.14
F7	6.30
F8	5.86
F9	6.43
F10	6.96

8.3). Rheological study (Viscosity).

Formulation Code	Spindle no.	rpm	Viscosity (Centipoises)
Marketed Product	7	50	6948
F1	7	50	7294
F2	7	50	7120
F3	7	50	7194
F4	7	50	6570
F5	7	50	6624
F6	7	50	8057
F7	7	50	8312
F8	7	50	10131
F9	7	50	8943
F10	7	50	11054

8.4.) % Drug content.

Formulation code	% Drug content of gel
Marketed Product	98.25
F1	97.48
F2	98.76
F3	98.41
F4	99.49
F5	99.15
F6	96.22
F7	97.66
F8	98.46
F9	98.85
F10	98.15

8.5.) Spread ability testing.

Formulation Code	Diameter (cm)
Marketed Product	3.2
F1	3.6
F2	2.5
F3	2.0
F4	1.8
F5	1.6
F6	3.0
F7	2.8
F8	2.6
F9	3.2
F10	2.4

8.6. In-vitro release study

Table 8.6. In-vitro drug release study in PBS 7.4.

		% Drug release from organogel formulations									
S. No.	Time (Min)	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
1.	0	0	0	0	0	0	0	0	0	0	0
2.	30	6.20	7.05	9.28	5.90	5.70	6.22	9.57	5.93	8.06	6.28
3.	60	15.97	17.19	21.19	16.37	13.97	9.76	17.19	18.75	16.78	14.70
4.	90	26.41	29.62	32.59	23.62	22.96	11.87	22.87	28.08	34.91	24.23
5.	120	35.09	40.71	46.73	36.49	35.86	19.49	39.49	34.58	46.99	36.89
6.	150	49.03	54.37	53.56	43.08	40.03	29.13	48.13	48.71	54.01	48.08
7.	180	56.01	67.27	68.37	55.09	44.65	37.70	54.50	53.74	68.30	52.27
8.	210	67.10	79.82	83.62	63.18	59.26	48.60	68.81	55.79	73.98	65.43
9.	250	80.94	88.57	92.03	78.28	70.50	67.04	84.06	69.65	81.62	74.71

From the above In-vitro % drug release data given in table 8.6, a curve is plotted, to demonstrate the In-vitro drug release profile of all the Gel formulations. The curve is given below in Figure 8.1-A and 8.1-B

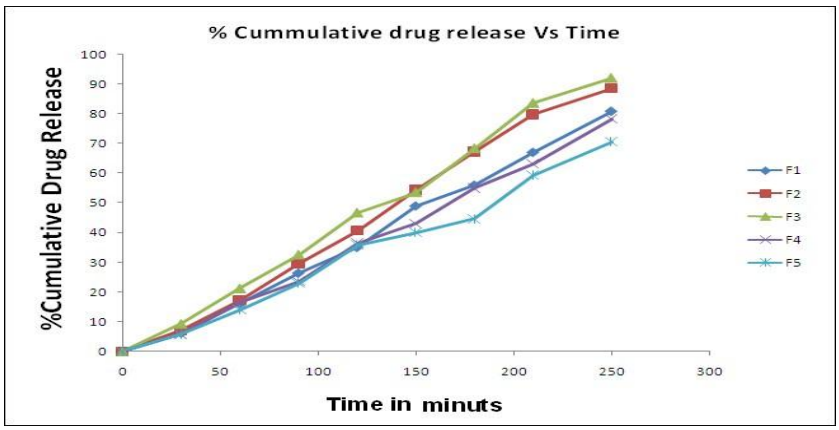

Fig. 8.1-A % Cummulative drug release profile of formulation 1 to 5.

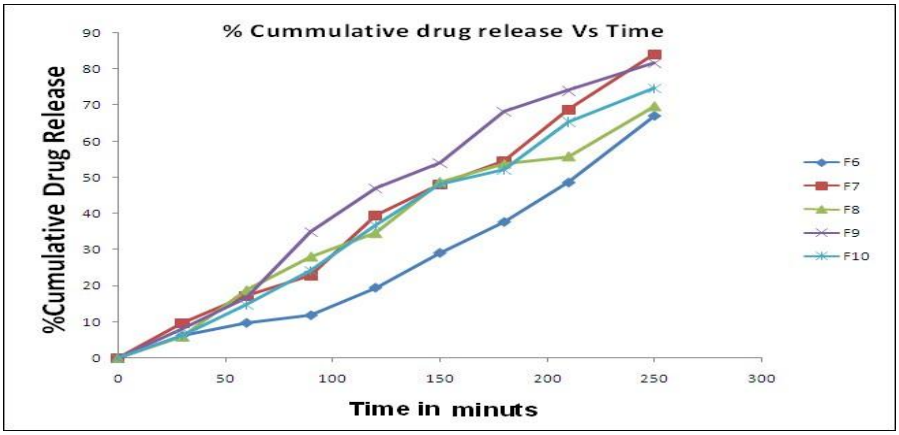

Fig. 8.1-B % Cummulative drug release profile of formulation 6 to 10.

CONCLUSION

The transdermal drug delivery is one of the promising route of drug delivery system, since it by passes the first pass metabolism, avoids inactivation of drugs by pH effects and enzymes present in GI tract .It provides a continuous mode of administration at rates approaching zero order similar to that provided by an intravenous infusion, bioavailability of the drug is increased. The delivery is non-invasive, no hospitalization is required, and improves patient compliance.

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