International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 289-294 www.ijprajournal.com ISSN: 2456-4494

Formulation and evaluation of Ibuprofen Emulgel

Ms. N.S.Keerthanadevi*[1], R. Ashwin*[2], G.K.Bharathvaj*[3], S.Monisa*[4]

Date of Submission: 01-01-2025 Date of Acceptance: 10-01-2025

ABSTRACT:
The aim of this study was to formulate and evaluate an emulgel of ibuprofen for enhanced topical delivery and therapeutic efficacy. Emulgels, a combination of emulsions and gels, offer the advantages of both gel and cream forms, providing a smooth, non-greasy texture while facilitating improved drug penetration. Ibuprofen, a nonsteroidal anti-inflammatory drug (NSAID), was selected due to its widespread use in the treatment of pain and inflammation. Various emulgel formulations were developed using different concentrations of carbopol 940 as a gelling agent, and an oil-in-water emulsion system as the base. The emulgels were characterized for physical appearance, pH, viscosity, drug content, spreadability, and stability. The in vitro release profile was assessed using Franz diffusion cells, while the ex vivo permeation studies were conducted on rat skin to determine the extent of ibuprofen absorption. The formulations exhibited good spreadability, high drug content, and appropriate viscosity, and showed significant improvement in drug release compared to conventional gel forms. The stability studies indicated that the formulation remained stable under various storage conditions. The study demonstrates that ibuprofen emulgel can be a promising alternative for topical application, offering controlled release, enhanced skin permeation, and better patient compliance in managing inflammatory conditions.

KEYWORDS: Emulgel,Ibuprofen,AntiInflamatory ,Tropicaldelivery,carbopol 940.

I.INTRODUCTION

•Topical drug delivery system is the dosage form which is administered on the skin and other routes of drug delivery get failed or for skin disorders. It also helps to avoid the risk and inconvenience of i.v route therapy.

•Topical formulations are prepared in different consistency such as solid, semisolid, and liquid. The topical delivery system is failed in the administration of hydrophobic drug.

•In each formulation with the active ingredients many excipients are used. Sometimes more than one formulation can be combined to enhance the drug delivery; emulgel is such type of combination. It is the combination of emulsion and gel. The spectrum of drugs/agents applied directly to the skin ranges from anti-inflammatory, antiseptic, antibacterial, antifungal, antiviral, anti-acne, antipigmentary, anesthetic compounds to skin emollients and protectants.

•The topical route has the main advantage of the direct delivery of drug to the target tissue

•Dermatological products are diverse in the formulation and varied in consistency from liquid to powder but the most popular products are semisolid preparations. Within the major group of semisolid preparations, the use of clear, translucent gels has expanded both in cosmetics and in pharmaceutical preparations.

II. MATERIAL AND METHODS

Ibuprofen, carbapol 940, tween 20, span 20, liquid paraffin, propyl paraben, triethanolamine are get used for prepared IbupropfenEmulgel.

FORMULATION OF IBUPROFEN EMULGEL

S.N	FORMULATION	F1	F2	F3
1	Ibuprofen	0.2	0.2	0.2
2	Carbapol 940	200	150	100
3	Ethanol	**q.s**	**q.s**	**q.s**
4	Liquid paraffin	**5**	**5**	**5**
5	Triethanolamine	q.s	q.s	q.s
6	Tween 20	5	3	1
7	Span 20	1	1.5	2

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 289-294 www.ijprajournal.com ISSN: 2456-4494

8	Propyl paraben	1	1	1
9	water	q.s	q.s	q.s

TABLE : constituent of different formulation

- Three formulation of Ibuprofen Emulgel Tropical Formulation (F1-F3) were prepared using different concentration of polymers.
- Carbopol 940 of different concentration and purified water were taken in a beaker and allowed to soak for 24 hrs.
- To this required amount of drug was dispersed in Ethanol and then Carbopol 940 was then neutralized with a sufficient quantity of Triethanolamine which act as a gelling agent.
- Polyacrylic acid polymer (Carbopol 940), cellulose polymers (HPMC) were prepared by dispersing the calculated amount of polymers in calculated amount of warm water with constant stirring using magnetic stirrer at a moderate speed.
- Span 20 and Liquid paraffin is act as a oil phase for the Emulsion preparation.
- Aqueous phase for the Emulsion is prepared by addition of Tween 20 with adequate amount of water.
- Then Emulsion is prepared by mixing the oil phase and aqueous phase at 70-80^{0}c and cool at room temperature.
- Methyl paraben or Propyl paraben sodium as preservatives were added slowly with a continuous gently stirring until the homogenous Emulgel was formed.
- The composition of Ibuprofen Emulgel Tropical formulae are shown in table 1.
- Then add the previous mixture gelling agent containing the drug with the Emulsion at 1:1 ratio Gel : Emulsion to form Emulgel.

EVALUTIONOFIBUPROFEN EMULGEL

1.Organoleptic properties:

The desired organoleptic properties qualities such as color, odour, and taste can be determined by visual inspection of the created emulgel composition.

2.Drug content:

Weighted 10 gm of each gel formulation were transferred in 250ml of volumetric flask containing 20 ml of alcohol and stirred for 30 minutes. The volume was made up to 100 ml and filtered. 1 ml of the above solution was further diluted to 10 ml with alcohol and again 1 ml of the above solution was further diluted to 10 ml with alcohol.

3.Measurement of pH:

Weighted 50 gm of each gel formulation were transferred in 1 ml of beaker and measure it by using the digital pH meter.

4. Determination of viscosity:

The viscosity of the formulated batches was determined using Brookfield Viscometer with spindle 07. The formulation whose viscosity was to be determined was added to the beaker and was lowered perpendicular in to the centre of emulgel taking care that spindle does not touch bottom of the jar and rotated at a speed of 12 rpm for 10 minutes.

5.Spreadability:

The spreadability of the emulgel was determined by placing 1gm of the gel between horizontal plates. Above the plates, standardized weight of 125 gm was placed and left for 1 minute.

6.Grittiness and Homogeneity

The developed emulgel were tested for homogeneity by visual inspection after the gel have been set in the container. They were tested for their apperence and presence of any aggregates. Similarly, it was applied in the skin and observed for the presence of grittiness or all the emulgel formulation is checked microscopically for the presence of any particulate matter.

III. RESULTS AND DISCUSSION OF PRE-FORMULATION STUDY

1. Organoleptic Properties :

Colour :White to Off White crystalline powder
Odour : Slight odour
Taste : Bitter

2. Determination of Melting point :

According to IP melting point of ibuprofen

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 289-294 www.ijprajournal.com ISSN: 2456-4494

S.NO	MELTING POINT	CONCORDANT VALUE
1.	168	170
2.	172	
3.	170	

TABLE :Determination of melting point

3. Determination of solubility :

S.NO	SOLVENT	SOLUBILITY
1.	Water	Insoluble
2.	Ethanol	Very soluble
3.	Methonal	Very soluble

TABLE : Determination of solubility.

4. Determination of Ph:

Commonly PH of the ibuprofen emulgel formulation should be present between 5.35 – 7.44.

Formulation code	pH
F1	5.45
F2	7.0
F3	6.8

TABLE : Determination of PH

5. Determination of viscosity:

The measurement of all formulation batches of Emulgel was mesured by using viscometer.

Formulation code	Viscosity (cps)
F1	9,360
F2	11,481
F3	12,500

TABLE : Determination of viscosity

ANALYTICAL METHOD:

1. Determination of λmax by using ethanol:

The maximum absorption for ibuprofen in ethanol was found to be 222 nm and it shows in following graph.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 289-294 www.ijprajournal.com ISSN: 2456-4494

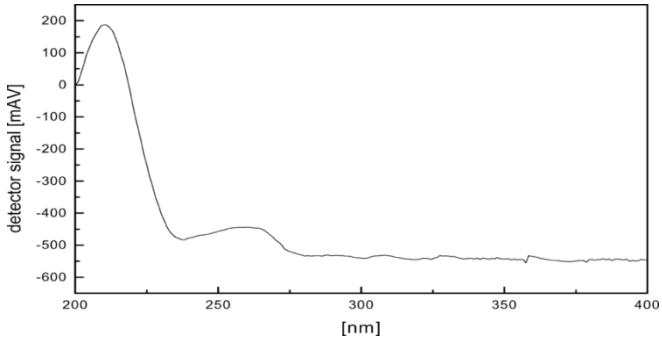

FIGURE : ƛ max observation for ibuprofen in ethanol

2. Preparation of standard curve of Ibuprofen in ethanol:

UV absorption spectrum of Ibuprofen in ethanol showedƛmaxat 222 nm. Absorbance obtained for various concentration of Ibuprofen in ethanol is given below. The graph of absorbance vs concentration for ibuprofen was found to be linear in the concentration and obeys Beer's Lambert's law in various ranges of 10 – 80 µg /ml.

S.NO	CONCENTRATION	ABSORBANCE
1	10	0.02
2	25	0.04
3	35	0.06
4	50	0.08

TABLE: Data of absorbance vs concentration

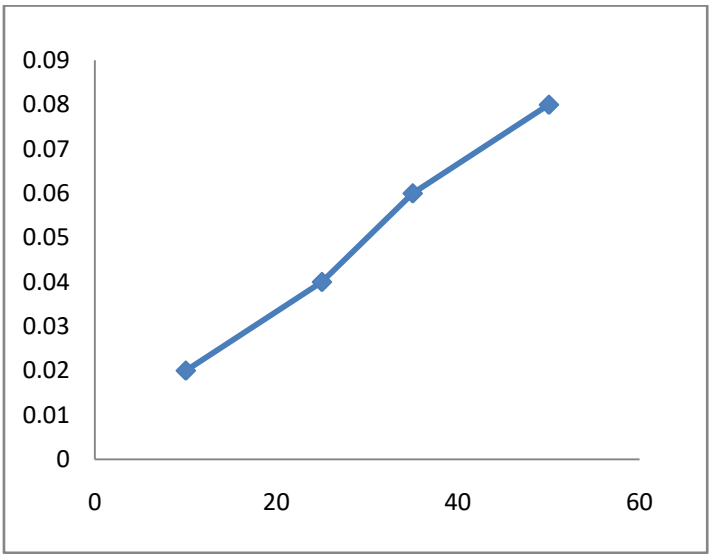

FIGURE: Calibration curve of Ibuprofen

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 289-294 www.ijprajournal.com ISSN: 2456-4494

1. FTIR Specter Analysis:

IDENTICATION OF IBUPROFEN BY FTIR SPECTROSCOPY

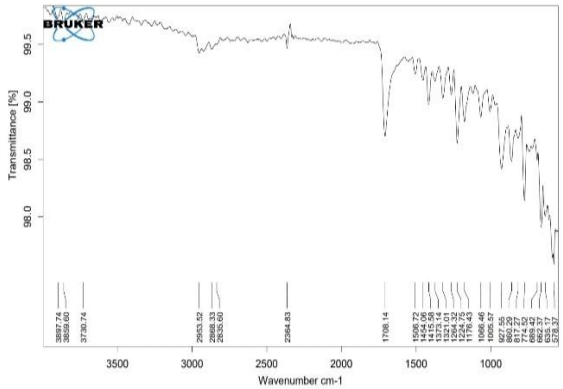

FIGURE : FTIR spectrum of pure drug Ibuprofen

2. DRUG EXCIPENT COMPATABILITY STUDIES

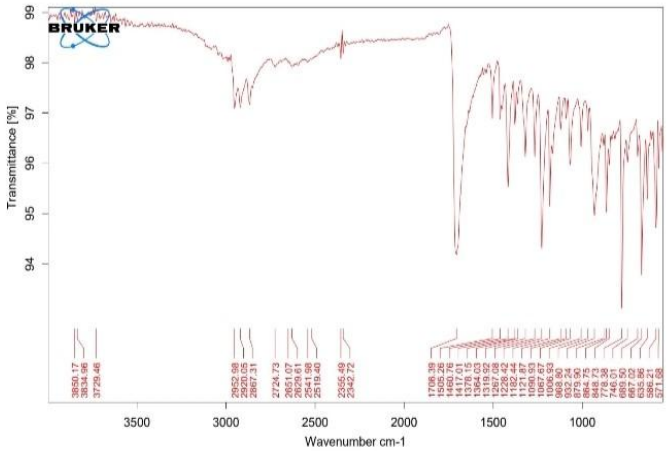

FIGURE : FTIR spectrum of pure drug Ibuprofen and Carbapol 940

IV. CONCLUSION

Ibuprofen was choosen as a drug for the treatment of anti-inflammatory action (reduced pain). Melting point evalution, FTIR scan and UV scan of Ibuprofen was performed. The developed Ibuprofen emulgelcontaing Carbopol 940 polymer is satisfied in term of good bioadhesive characteristics and controlled drug release thereby reducing the dosing frequency.

REFERENCE

[1]. Abd El-Bary A, Shalaby S, Abd El-Aal S. Formulation and stability of chloramphenicol gel and Emulgel.Bull fac Pharm 2001;39:89-99.

[2]. Al-Saidan SM, Transdermal self-permiation enhancer of ibuprofen, Journal of Controlled Release, 2004;100(2), p199-209.

[3]. ASTM F719 – 81 Standard practice for testing biomaterials in rabbits for primary skin irriyation. West Conshohocken, Philadelphia; 2007:178-179.

[4]. Babu VR, Areefulla SH, Mallikarjun V, Solubility and Dissolution Enhancement: An overview, Journal of Pharmacy Research, 2010;3(1),p131-144.

[5]. Basha BN , Prakasam K , Goil D. Formulation and Evaluation of gel containing Fluconazole –Anti fungal Agent . Int J Drug Dev Res 2011; 3(4) :119-127.

[6]. Busson MJ. Update on ibuprofen : review article . J Int Med Res 1986;b14: 53- 62.

[7]. Costa P, Manuel J, Lobos. Modelling and comparison of dissolution profiles. Eur J Pharm Sci 2001;13:123-133.
[8]. Chilcott R , Price Sed ., Physicochemical Properties In: Principles and Practice of skin Toxiucology . Illustrated ed .England , John Wiley and Sons, Inc., 2008 ; p71-83.
[9]. Chiou WL, Riegelman S, Pharmaceutical application of solid dispersion system . Journal of Pharmaceutical sciences. 1971; 60 (9) , p1281-1303.
[10]. Craig DQM , The mechanism of drug releases from solid dispersion in water – soluble polymers. International Journal of Pharmaceutices, 2002;231(2),131-144.
[11]. Cross SE, Roberts MS, Physical enhancement of trancederm,al drug application: is delivery technology keeping up with pharmaceutical development? Current Drug Delivery, 2004;1(1),p81-92.
[12]. Daniels R Knie U. Galenics of dermal products-vechicles, properties and drug release. JDDG 2007;5:367-381.