Review Article

Artimisia princeps emulgel: a herbal approach to enhanced topical therapy

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Abstract
Herbal-based topical formulations are gaining prominence as safe and effective alternatives to synthetic drugs. Artemisia princeps, a medicinal plant rich in flavonoids, terpenoids, and essential oils, exhibits notable anti-inflammatory, wound healing, and dermatological properties. Emulgels, combining the dual advantages of emulsionAs and gels, provide enhanced stability, spreadability, and controlled release, making them ideal carriers for plant-derived bioactives. This review highlights the phytochemical profile of A. princeps, its pharmacological activities, and the potential of emulgel formulations in topical therapy. Current evidence suggests that A. princeps emulgels can accelerate tissue repair, reduce inflammation, and improve skin health, though further clinical validation and formulation standardization are required for widespread therapeutic use. Further literature survey also provides the other potentials of phytoconstituents present in Artemisia princeps.

Keywords: Emulgel, Topical drug delivery, Emulsion, Artimisia princeps, Incorporation method

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Introduction

Topical drug delivery (TDD) is a route of drug administration that allows the topical formulation to be delivered across the skin upon application, hence producing a localized effect to treat skin disorders . The topical drug delivery system has the advantage of negotiating the first pass metabolism. 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 [1]. Emulgel is prepared both in oil- in- water and water- in- oil type emulsion mixed with gel. Oil- in- water type is used for lipophilic drugs and water- in- oil type is used for hydrophobic drugs' delivery [2]. The emulgel have many advantages like thixotropic, greaseless, easily spreadable, easily removable, emollient, non-staining, bio-friendly, pleasing appearance, transparent and cosmetically acceptable, which also have a good skin penetration and long shelf- life [3]. The emulsion and gel preparations have their own properties. But the gels show some limitations as hydrophobic drug delivery. This limitation is overcoming by emulgel. By the use of gelling agent classical emulsion can be converted in to emulgel [4].

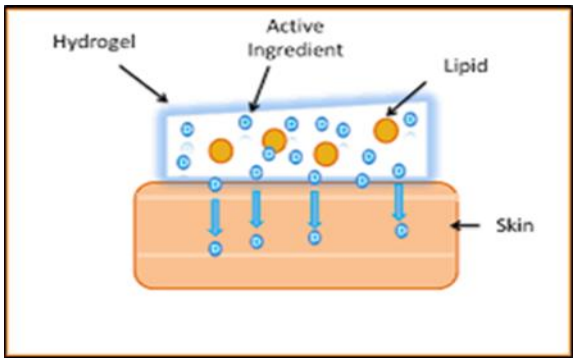

Fig 1:. EMULGEL STRUCTURE

ADVANTAGES OF EMULGEL -

-Delivery of hydrophobic drugs

Due to the solubility problem, most of hydrophobic drugs cannot be introduced directly into gel base and thus problem arises during the release of the drug. With the help of Emulgel hydrophobic drugs are incorporated into the oil phase and then oily globules are dispersed in aqueous phase resulting in o/w emulsion. And this emulsion can be well mixed into gel base. This may be providing better stability and release of drug.[5]

-Better stability

Other transdermal preparations are comparatively less stable than emulgel. Like powders are hygroscopic, creams show phase inversion or breaking, and ointment shows rancidity due to oily base. Such problems are not encountered in emulgel. [6]

-Improve Patient Compliance

They are less greasy and easy to apply and more selective to a specific site. It increases the contact time and mean residence time of the drug. It is a non-invasive mode of drug delivery with no trauma, or risk of infection. Emulgel are used even for the cosmetic purposes.[7]

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-Better loading capacity

Emulgel due to vast network have better loading capacity comparatively to other novel approaches like niosomes and liposomes. As they are of nano size and due to vesicular structures may result in leakage and result in lesser entrapment efficiency.

-Controlled release

Provides sustained drug delivery for prolonged therapeutic effect.

- Versatility

Suitable for hydrophobic and hydrophilic drugs.

PLANT PROFILE(ARTEMISIA PRINCEPS):

Taxonomy:

Kingdom- Plantae.

Class- Tracheophytes.

Order- Asterales.

Family- Asteraceae.

Genus- Artemisia.

Species- A. princeps.

Fig 1:.Artimisa princeps leaves

The genus Artemisia (family Asteraceae) comprises nearly 500 species distributed worldwide, many of which hold significant ethnopharmacological, phytochemical, and therapeutic importance. Artemisia princeps is a perennial and vigorous plant belonging to family Astaeracae. Artemisia princeps is native to mainly China and Japan. It is commonly known as Japanese, Korean Mugwort, and First Wormwood. The yomogi comes from the hugely varied Artemisia genus of between 200 and 400 plants belonging to the Asteraceae family. This family is known as the daisy family and is among the most prominent flowering plant families. It is a hugely impressive perennial, growing up to 5 feet and spreading swiftly via underground stolons.This can make the Artemisia princeps invasive. Just like any other herbal plant this plant also possesses various medicinal activities. General morphological features of the genus Artemisia are described as leaves alternate, capitula small, usually racemosus, paniculate or capitated, inflorescence, rarely solitary; involucral bracts in few rows, receptacle flat to hemispherical, without scales and sometimes hirsute; florets all tubular, achenes ovoid, pappus absent or sometimes a small scarious ring[8]. Recent research has demonstrated the potential of this herb as a potent antibacterial. Researchers have discovered that Artemisia princeps extracts exhibit antibacterial, antifungal, and antiviral action against a variety of species. Sesquiterpene lactones, which are known to have antibacterial, antifungal, and antiviral activity, are thought to be the active ingredients in mugwort. The anti-inflammatory, antioxidant, and immunomodulatory effects of mugwort have also been discovered. For these reasons, Artemisia princeps is being researched as a possible infection therapy and Recently Artemisia princeps has been found as an Anti-inflammatory[9], Anti-coagulant, Anti-platelet[10], Anti-oxidant[11],[12], Anti-obesity, Anti-diabetic[13].

COMPONENTS INFLUENCING TOPICAL ABSORPTION OF DRUG

Following are few physiological and physiochemical factors that affect the topical absorption of the drug molecules [14].

Physiological factors: Hydration of the skin, the density of the sweat glands, amount of blood flow, pH of the skin, thickness, and inflammation are few physiological variables that influence the retention of the drug topically [15].

Physiochemical factors: The absorption rate is affected by various physicochemical factors,such as if the molecular weight is <400 Dalton, it affects the absorption level. Similarly, partition co-efficient, degree or extent of ionization, as well as the effect of vehicles being used [16].

Material and methods

Herbal Leaves: Dried leaves of the Artimisia Princeps .

Oil:. For externally applied emulsions, mineral oils, either combined or alone with hard or soft paraffin's are widely used. In oral preparations castor oils and non-biodegradable mineral that provide a local laxative effect and various fixed oils of vegetable origin (e.g., arachis, cottonseed, and maize oils) or fish liver oils as nutritional supplements.[17]

Emusifier: To promote emulsification and to control stability at the time of manufacturing. Tween-20, 40, 60, 80, PEG-40, stearic acid, sodium stearate is commonly used.

Gelling agent: These are the agents used to increase the consistency of any dosage form can also be used as thickening agent e.g. HPMC, Sodium CMC, Xanthum gum etc.

Permeation Enhancers: These are agents that partition into, and interact with skin constituents to induce a temporary and reversible increase in skin permeability. e.g. Oleic acid, Urea, Eucalyptus oil etc.

Aqueous material: This forms the aqueous phase of the emulsion. Water and alcohols are commonly used agent.

Preservatives: E.g. methyl paraben, Propyl paraben, Benzalkonium chloride, Benzyl alcohol,Benzoic acid etc. Antioxidants: e.g. Butylated Hydroxy Toluene (BHT), Ascorbyl palmitate, Butylated hydroxyanisole (BHA), etc.

Humectant: E.g. Glycerin, Propylene gylcol, etc

Methodology

1. Extraction of Plant material:

Powder of the dried leaves of the Artimisia Princeps macerated 70% alcohol for 48 hours. The marc extract can be collected y using Soxhlet apparatus.

Preparation of emulsion phase:

The oil phase of the emulsion was prepared by dissolving Span 80 in glycerine and aqueous phase was prepared by dissolving Tween 80 in purified water. The oily phase was mixed with the aqueous phase with continuous stirring until cooled at room temperature.

Preparation of Gel phase

The gel phase is prepared by dispersing polymer in purified water with constant stirring at a moderate speed using mechanical shaker, An additional amount of herbal extract was added to the above

mixture and mixed correctly with a continuous stirring then the pH was adjusted to 6- 6.5 using triethanolamine (TEA).

Mixing of emulsion and gel phase to form Emulgel

To obtain an emulgel, combine the gel phase with emulsion phase in a ratio of 1:1.

EVALUATION OF EMULGEL

1. Physical appearance

The Physical appearance includes study of color, consistency, appearance, etc. Color was noted by visual observation. The appearance of emulgel was checked by visual observation. Emulgel was applied to skin to check its consistency.

2. Spreadability

The emulgel was sandwiched between 2 petri plates and the diameter of circle of spreaded emulgel was used to determine the spreadability. 1 gram of emulgel was weighed and placed on a petri plate. Other petri plate was placed on its top and weight of 50 grams was placed on the top of petri plate for about 60 seconds. After completion of 60 seconds the diameter of circles formed from the spreaded emulgel were measured in triplicate. The average of the reading was calculated. The reading was put into the following formula. S = M x L T

3. Determination of pH: pH of the formulation was determined by using digital pH meter. pH meter electrode was washed by distilled water and then dipped into the formulation to measure pH and this process was repeated 3 times.

4. Homogenity: The formulation is tested for its homogeneity by visual appearance after emulgel was applied on a slide as a thin layer.

5. Swelling index : One gram of emulgel is taken on permeable aluminum foil, and it is at that point put in a 50ml container independently containing 10ml of 0.1 NaOH. Further, the samples were expelled from the containers at different periods and were placed at a non-hydrated surface. After a specific time, it is reweighed

6. Rheological study:The viscosity of emulgel was estimated using Brookfield viscometer. 1 gram of emulgel sample was taken. The spindle was rotated at the speed of 50 rpm. Readings were taken in triplicate and average of readings were calculated. [17]

7. Drug content determination: Take 1 gm of emulgel. Mix it in suitable solvent. Filter it to obtain clear solution. Determine its absorbance using UV spectrophotometer. Standard plot of drug is prepared in same solvent. Concentration and drug content can be determined by using the same standard plot by putting the value of absorbance.

Drug Content=(Concentration × Dilution Factor × Volume taken) × Conversion Factor.

Conclusion

Topical drug delivery systems are widely valued for their ability to improve patient compliance and provide localized therapy with minimal side effects. Emulgels, by combining the advantages of emulsions and gels, offer superior spreadability, adhesion, viscosity, and extrusion, making them more effective than conventional creams or ointments. Their unique ability to incorporate hydrophobic drugs into water soluble gel bases enhances penetration and therapeutic outcomes. Incorporating Artemisia princeps into emulgel formulations further strengthens this approach, as the plant's anti inflammatory, antioxidant, and wound healing properties align perfectly with dermatological needs. Thus, Artemisia princeps emulgel represents a promising next generation topical system that bridges traditional herbal medicine with modern pharmaceutics.

Commercial potential: With growing demand for herbal-based dermatological products, Artemisia princeps emulgel holds promise for translation into market-ready formulations.

Conflict of Interest:Nil Source of support:None

References

1. Lachman, L.; Lieberman, H.A. The Theory and Practice of Industrial Pharmacy. 3rd Ed. Varghese Publishing house; 1990; 534
2. Vyas, S.P.; Khar, R.K. Controlled Drug Delivery. 1st Ed. Vallabh Prakashan; 2002; 416-417.
3. Curr AEB. Transdermal Drug Delivery: Penetration Enhancement Techniques Heather. Drug Delivery. 2005; 2: 23-33.
4. Mortazavi SA, Aboofazeli R. An investigation into the effect of various penetration enhancers on percutaneous absorption of piroxicam. Iranian Journal of Pharmaceutical Research. 2003; 135-140.
5. Baibhav J, Singh G, Rana A C, Saini S, Singla V. Emulgel: A comprehensive review on recent advancement on topical drug delivery. International Research Journal of Pharmacy 2011; 2(11): 66-70
6. Prajapati MN, Patel MR, Patel KR, Patel NM. Emulgels: a novel approach to topical drug delivery. International Journal of Universal Pharmacy and Bio sciences. 2013; 2(1): 134-148.
7. Panwar AS, Upadhyay N, Bairagi M, Gujar S, Darwhekar GN, Jain DK. Emulgel: A review. Asian Journal of Pharmacy and Life Sciences. 2011; 1(3): 333-343
8. Garg A, Aggarwal D, Garg S, and Singla AK. (2002). Spreading of Semisolid Formulations: An Update. Pharmaceutical Technology. Circle/eINFO 74.
9. Khalil YI, Khasraghi AH, Mohammed EJ. Preparation and evaluation of physical and, rheological properties of clotrimazole emulgel. Iraqi Journal of Pharmaceutical Sciences. 2011; 20(2): 1927.
10. Baibhav J, Singh G, Rana A. C, Saini Seema, Singla Vikas,: Emulgel: A comprehensive review on the recent advances in topical drug delivery, International Research Journal of Pharmacy.2011; 2(11): 66-70
11. Singla V, Saini S, Joshi B, Rana AC. Emulgel: A new platform for topical drug delivery. International Journal of Pharma and Bio Sciences. 2010; 3(1):21-29.
12. Nahla Salah Barakat. Evaluation of glycofurol-based gel as a new vehicle for topical application of naproxen. AAPS Pharmaceutical Science and Technology. 2010;11(3): 1138-1146
13. Ranga Priya M, Sellakumar V, Natarajan R, Mohan Kumar K. Formulation and In-Vitro evaluation of ciprofloxacin loaded topical emulgel. International Journal of Pharmaceutical and Chemical Sciences. 2012; 1: 237-242.
14. Joshi Baibhav, Singh Gurpreet, Rana AC, Saini Seema. Development and characterization of clarithromycin emulgel for topical delivery. International Journal of Drug Development & Research. 2012; 4: 310-323.
15. ICH Harmonized Tripartite Guidelines, Stability Testing of New Drug Substances and Products. ICH Committee 2.
16. Abhijeet Ojha, Mini Ojha, Satheesh Madhav NV. Recent advancement in emulgel: A novel approach for topical drug delivery. International Journal of Advances in Pharmaceutics. 2017; 06(01): 17-23
17. Davinder Kumar, Jasbir Singh, Mamta Antil and Virender Kumar. Emulgel-Novel topical drug delivery system–Acomprehensive review. International Journal of Pharmaceutical Sciences and Research. 2016; 7(12): 4733-474