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A REVIEW ON CURRENT DRUG DELIVERY EMULGEL

Shweta Yadav*[1&2], Shashikant Singh[3], Pragya Mishra[2], Navneet Kumar Verma[2], Uma Srivastava[4]

[1] Research Scholar, Mahayogi Gorakhnath University, Gorakhpur (U.P.)-273007
[2]Buddha Institute of Pharmacy, GIDA, Gorakhpur (U.P.), India-273209
[3]Department of Pharmaceutical Chemistry, Faculty of Pharmaceutical Sciences, Mahayogi Gorakhnath University, Gorakhpur (U.P.)-273007
[4]Department of Mathematics & Statistics, DDU Gorakhpur University, Gorakhpur, UP, India-273009

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Abstract

Topical medication administration is an efficient way to treat both systemic and localized illnesses. Topical medications come in a variety of dose forms, such as creams, ointments, gels, pastes, and lotions. One of gel's main drawbacks is how hydrophobic drugs are delivered. Emulgels can help you get through this. The dosage form created by mixing gels and emulsions is known as an emulgel. Emulgel, a topical medication delivery device with dual release control gel and emulsion is an intriguing option. Thixotropic, greaseless, readily spreadable, easily washable, emollient, non-staining, long-lasting, clear, and aesthetically pleasing all of these properties make emulgels useful for use in dermatology.

Keywords: *Emulgel, Emulsifier, Gel, Topical Drug Delivery*

INTRODUCTION

Topical drug administration refers to the localized delivery of medication through the skin, vaginal, ophthalmic, and rectal channels to any part of the body. They employ a broad range of dermatological and cosmetic preparations to their skin, whether it is healthy or sick [1].

The physicochemical character of these formulations varies from solid to semisolid to liquid. Drug ingredients are rarely given on their own; instead, they are usually given as a formulation with one or more non-medicinated compounds that have a variety of specific pharmaceutical uses. In order to achieve systemic effects or to act locally, drugs are applied topically [2].

If the drug is in solution, has a favorable lipid/water partition coefficient, and is a nonelectrolyte, its absorption via the skin is improved. Pharmaceutical preparations administered topically are primarily designed to have a localized effect; as such, they are designed to offer extended local contact with little systemic drug absorption. Drugs used topically for their localized effects on the skin include protectants, emollients, antiseptics, and antifungal agents. Bypassing first-pass metabolism is one of the topical delivery system's primary benefits. Other benefits of topical preparations include avoiding the hazards and hassles of intravenous therapy as well as the various circumstances of absorption, such as pH changes, the presence of enzymes, and gastric emptying time [3–4].

Topical medication delivery is typically employed in cases where other drug administration methods are ineffective, or it is primarily used to treat fungal infections. The human skin is a specially designed organ that allows life on Earth by controlling body temperature and moisture loss while blocking the entry of harmful substances or microbes. It is also the largest organ in the human body, making up 10% of the typical person's body mass and occupying an area of 1.7 m^2. Human skin is an extremely effective self-repairing barrier made to keep the outside world out while the organ appears to offer optimal and multiple sites to administer therapeutic substances for both local and systemic activities[5].

Large volumes of aqueous or hydroalcoholic liquid are trapped in a network of colloidal solid particles to generate gels, a relatively novel class of dosage forms. These particles can be organic polymers derived from natural sources or inorganic compounds like aluminumsalts[6]. Compared to the ointment or cream basis, they feature a larger aqueous component that allows for better drug solubility and easier drug migration via a vehicle that is basically a liquid[7]. They are better in terms of patient acceptability and ease of usage. Gels have many benefits, but one significant drawback is their inability to distribute hydrophobic medications. In order to get over this restriction, emulgels are made and applied, enabling even a hydrophobic medicinal moiety to benefit from the special qualities of gels. In actuality, an emulgel is created when a gelling ingredient is present in the water phase of a traditional emulsion[8]. Different medications are delivered to the skin using water-in-oil and oil-in-water emulsions. Thixotropic, greaseless, readily spreadable, easily removable, emollient, nonstaining, long shelf life, bio-friendly, clear, and aesthetically pleasant are just a few of the advantageous qualities of emulgels for dermatological use[1]. Emulsion gels have been more significant in the realm of pharmaceutical semisolid dosage forms since the mid-1980s.

Drug delivery across the skin

The stratified keratinized squamous epithelium that makes up the epidermis, the skin's outermost layer, varies in thickness depending on the area of the body. With elastic fibers, it is thickest. The deeper and more fragile structures are shielded from the elements by a layer of skin that is comparatively waterproof. There are many different types of blood veins under the skin. A continuous venous plexus that receives blood flow from skin capillaries is particularly significant.

Blood is also directly fed to the plexus from the tiny arteries in the most exposed parts of the body—the hands, feet, and ears—through extremely muscular arteriovenous anastomoses. The direct accessibility of the skin as a target organ for diagnosis and therapy is one of the special features of dermatological pharmacology. The skin functions as a bidirectional barrier to stop the loss or absorption of electrolytes and water. Topical medication absorption occurs through three main mechanisms: follicular, intercellular, and transcellular. The majority of medications travel through the arduous route that surrounds corneocytes and the lipid bilayer to reach the skin's viable layers. The pilosebaceous route is the next most popular (and possibly underappreciated in the clinical setting) administration method.

About identical rates of chemical penetration via isolated stratum corneum or entire skin indicate that the barrier is located in the outermost layer of the epidermis, the stratum corneum. For years, medications to treat pain and combat infections have been applied to the skin using creams and gels that are massaged into the affected area. These consist of, among other things, topical creams for skin infections, gels and creams for vaginal yeast infections, and creams to relieve arthritis pain. Other medications can now be absorbed through the skin (transdermal) thanks to advancements in technology. These can be used to treat the entire body, not just the afflicted regions (like the skin)(structural)[9].

Factors Affecting Topical Absorption of Drug [10-11]
Physiological Factors

1. Skin thickness.
2. Lipid content.
3. Density of hair follicles.
4. Density of sweat glands.
5. Skin pH.
6. Blood flow.
7. Hydration of skin.
8. Inflammation of skin

Physiochemical Factors

1. Partition coefficient.
2. Molecular weight (<400 dalton).
3. Degree of ionization (only unionized drugs gets absorbed well).
4. Effect of vehicles

Considerations for Selecting a Topical Preparation [12–13]

1. The vehicle's effect: for example, an occlusive vehicle increases the active ingredient's penetration and boosts its effectiveness. The car itself may act as a coolant, emollient, dryer, or shield.
2. Align the preparation kind with the lesions type. For severe weepy dermatitis, for instance, stay away from greasy ointments.
3. Align the site-appropriate level of preparation.(For hairy regions, use lotion or gel.)
4. Potential for irritation or hypersensitivity. In general, gels are irritating, whereas ointments and w/o creams are

less so. If an allergy to preservatives or emulsifiers is a worry, ointments don't contain these ingredients.

Method to Enhance Drug Penetration and Absorption [14]

1. Chemical enhancement
2. Physical enhancement
3. Biochemical enhancement
4. Supersaturation enhancement

Need of Emulgel:

Numerous popular topical products, such as ointments, creams, and lotions, have a variety of drawbacks. When used, they are extremely sticky and give the afflicted person anxiety. Furthermore, they require rubbing and have a lower spreading coefficient. Additionally, they highlight the issue of equilibrium. The use of clear gels in cosmetics and pharmaceutical formulations has increased as a result of these types of components in the leading semisolid arrangement organization.

A gel is a collloid that is typically 99% water by weight, trapped by surface tension between it and a macromolecular fiber community made of a tiny amount of gelatin. Gels have many benefits, but one major drawback is their inability to convey hydrophobic medications. In order to overcome this challenge, an emulsion-based strategy is being employed, allowing for the effective integration and addition of a hydrophobic medicinal moiety via gels[15].

Emulsion

When two or more typically incompatible liquids are combined, an emulsion is created. Using an emulsifying agent, the oil phase and the aqueous phase in this system are miscible. Emulsion stabilization is achieved through the application of emulsifying agents. They penetrate well and are simple to remove[16].

Gel

The term "gel" describes a method of increasing a liquid preparation's viscosity without affecting its other characteristics. Gels can be added to a formulation to thicken it and to help with uniformity and homogeneity. Emulgel is produced by combining this ingredient with emulsion to form a gel base. A polymer that expands when exposed to fluid and perhaps within its structure makes up a gel. The gel's stiffness is based on the volume of fluid trapped within it. These gels have a smooth, moist texture and seem substantial. These have the capacity to undergo substantial physical deformation, changing from a solid to a liquid state[17].

Introduction to emulgel

An emulsion that has been gelled with the aid of a gelling agent is referred to as emulgel. They can be produced in w/o or o/w types. Embulgel is a steady, superior technology that works with less effective water soluble medications. Emulgel, to put it briefly, is emulsion mixed with gel. Gels have several benefits, but one major drawback is how hydrophobic medicines are delivered. Therefore, this restriction is being addressed by using an emulsion-based solution, which enables even hydrophobic medicinal moieties to profit from the special qualities of the gel.

Emulgel's ability to distribute medicines in both hydrophilic and lipophilic forms is attributed to its dual aqueous and non-aqueous phases. They have been employed as a control release formulation in recent years. These are biphasic systems with improved stability and drug loading capacity[18–19]. Compared to traditional topical formulations, emulgel has a number of advantageous qualities, including better spreadability, greaselessness, thixotropy, high shelf life, odorlessness, and a pleasing look. Emulgel is a dual control release method that possesses both gel and emulsion properties[20].

Emulgel system= Emulsion + gel

Types of emulgel

Microemulsion

Isotropic mixes of a biphasic o/w systemic stabilized with an optically transparent, thermodynamically stable surfactant constitute microemulsions. Droplets don't agglomerate and range in size from 10 to 100 nm. It is composed of water, surfactant, co-surfactant, and oil in certain proportions. Extremely low interfacial tension, a wide interfacial region, and the capacity to dissolve both aqueous and oil-soluble substances are some of the distinctive characteristics that microemulsions may possess. By reducing the diffusion barrier in the stratum corneum, the components of the microemulsion may facilitate a higher rate of drug penetration. Microemulsions have a low skin retention ability because to their low viscosity, which limits their use in the pharmaceutical business. In order to overcome this restriction, the microemulsion is modified by adding gelling agents such as guar gum, HPMC K100M, and Carbopol 940 to make it suitable for topical application[21–23].

Nanoemulgel

A nanoemulsion is a transparent (translucent) oil-water dispersion with globule sizes ranging from 1 to 100 nm that is thermodynamically stable because it contains surfactant and cosurfactant molecules. The phrase "Nanoemulgel" refers to the mixture of emulsion and gel. Compared to conventional formulations like emulsions and gels, several medicines exhibit greater transdermal penetration when applied as nanoemulsions. Both in vitro and in vivo, the nanoemulsion exhibits improved transdermal and dermal

transport capabilities. The medication penetrates the skin easily and has a short half-life due to its small globule size and high loading capacity[20].

Macroemulsion gel
Emulgel containing particles larger than 400 nm in the emulsion droplet size. The individual drops are vividly visible under a microscope, but they are literally invisible. Despite their thermodynamic instability, macroemulsions can be stabilized with the use of surface-active agents[21].

Advantages of emulgel
1. It is possible to incorporate hydrophobic medications into the gel basis rapidly by using water/oil/water emulsions.
2. Increased load capacity and stability.
3. A low-cost and simple technique to produce.
4. Steer clear of sonication.
5. One avoids the initial metabolism.
6. Steer clear of gastrointestinal incongruity.
7. Target the body's medication delivery system.
8. A rise in patient adherence.
9. Increased applicability and acceptability for self-medication among patients.
10. The ease with which medication can be stopped[24].

Disadvantages of emulgel
1. In patients with contact dermatitis, the medication and/or excipients may cause skinirritation.
2. Some drugs don't pass easily through the skin.
3. The potential for allergic responses.
4. Drugs with larger particle sizes are more difficult to absorb via the skin[25].

The rationale of emulgel as topical drug delivery
There are numerous semisolids and other preparations on the market that can be used to change an operation to the underlying tissue pharmacologically or to restore the basic function of the skin18. Lotions, ointments, and creams are examples of formulations with a number of disadvantages, such as being sticky, having a low spreading coefficient, and experiencing stability problems. Due to general restrictions within the semisolid preparations, only translucent gels are exposed in medicinal and cosmetic preparations[26].

To overcome this restriction, an emulsion-based approach is employed. Gels should therefore be used to integrate and provide the drug's hydrophobic moiety. Hydrophobic medications can be included into emulgel using drug/oil/water emulsions. The majority of medications cannot be directly injected into gel bases due to solubility acting as a barrier, which might cause issues with drug release. An oil/water emulsion is produced when oily globules are easily distributed into the aqueous phase following the incorporation of a hydrophobic medication into the oil phase with the aid of the emulgel system. It is possible to combine the emulsion and gel basis. Compared to just adding the medication to the gel foundation, this could lead to improved drug stability and release[15].

Materials used in emulgel preparation
Aqueous material:
In the emulsion, this creates the aqueous phase. A frequent combination of agents is water and alcohol[27].

Oils: The oily phase is formed by these agents. Mineral oils are commonly utilized in combination or alone with hard or soft paraffins for externally applied emulsions. Castor oils, non-biodegradable minerals with a local laxative effect, and different vegetable-origin fixed oils (such as arachis, cottonseed, and maize oils) or fish liver oils are used as nutritional supplements in oral preparations[24].

Emulsifier: During production, emulsifying agents are employed to enhance emulsification; during shelf life, they serve as a stability controller. Examples include sodium stearate, polyethylene glycol 40 stearate, sorbitan mono-oleate (Span 80), stearic acid, and polyoxyethylene sorbitan mono-oleate (Tween 80)[28].
Preservatives: Such as propyl paraben, methyl paraben, benzoic acid, benzoalkonium chloride, and so forth.

Antioxidants: Such as Ascorbyl palmitate, Butylated Hydroxyanisole (BHA), Butylated Hydroxy Toluene (BHT), etc.

Humectants: Glycerin, propylene glycol, and so forth

Gelling agents: These are added to dosage forms to improve consistency and to act as thickening agents. For instance, sodium CMC, HPMC, HPMC-2910, carbapol 934, and carbapol 940
Permeation enhancers: These are substances that interact and partition into the components of the skin to provide a brief, reversible increase in permeability. Enhancers of permeability ought to be non-toxic, non-irritating, and non-allergic. These penetration enhancers shouldn't have any pharmacological action in the body and shouldn't bind to receptor sites. They should have a proper skin "feel" and be aesthetically pleasing. Drugs and excipients should work well together with permeability enhancers[29–34].

Properties of penetration enhancers
1. They ought to be non-allergic, non-toxic, and non-irritating.
2. They should preferably operate quickly and have predictable and repeatable effects interms of both activity and duration.
3. They must not bind to receptor sites or have any pharmacological activity within the body.

4. The penetration enhancers have to function in a unidirectional manner, permitting the infusion of therapeutic compounds into the body while averting the extrusion of native material from the body.
5. The penetration enhancers should be suitable for incorporation into a variety of topical formulations, meaning they should work well with both medications and excipients.
6. They should have a suitable skin "feel" and be aesthetically acceptable.

Mechanism of penetration enhancer
Three primary mechanisms are possible for penetration enhancers to function through:
1. Disruption of the stratum corneum lipid's highly organized structure.
2. Interaction with the protein found inside cells.
3. Better medication, co-enhancer, or solvent distribution inside the stratum corneum.

Emulgel formulation [35–36]
Step 1: Using the gelling agent to prepare the gel:A sufficient amount of Carbopol 940 (1% w/w) was weighed, then constantly stirred while being sprinkled upon warm distilled water. For one to two hours, the dispersion was left to hydrate. Subsequently, additional components such as 10% w/w propylene glycol and 10% w/w glycerol were added to the aqueous dispersion while being constantly stirred. The necessary amount of medication (1% w/w) was added and evenly distributed. Triethanolamine was used to neutralize the dispersion to pH 6, and distilled water was used to adjust the final weight. To get rid of air bubbles, the gel was sonicated for fifteen minutes and then left overnight.

Step 2: Emulsion Preparation: The formulation of the emulsion depends on whether it was made of water in oil or oil in water.

Step 3: Emulsion incorporation into gel base: At last, the emulsion was mixed with the gel baseto create emulgel.

Evaluation of Emulgel
Physical appearance: The color, homogeneity, and consistency of the prepared emulgel are examined[37].

pH: A digital pH meter was used to measure the pH values of the produced gels' 1% aqueous solutions. After fully submerging the electrodes in the semisolid formulations, the pH was measured[38].

Spreadability: In order to examine the spreadability of formulations, specialized equipment was created. When a specific load is applied, spreadability is measured in terms of the number of seconds it takes for two slides to separate from formulations. The faster the two slides separate, the more spreadability there is. Two 6 x 2 centimeter glass slides were chosen. One of the slides, whose 500 mg spreadability needed to be assessed, had the formulation applied to it. The arrangement of these two slides was such that the formulation was wedged between them. Because the formulation between the two slides was continuously squeezed to create a thin layer, the upper slide was given 100 grams of weight.

Once the weight was removed, the excess formulation that stuck to the slides was scraped off. The upper slide was fastened to a string, while the lower slide was secured to the apparatus's surface. A basic pulley might be used to apply this sting load (20 grams).

The amount of time it took the upper slide to travel 6 cm and split off from the lower slide under the weight applied was recorded.

The study was conducted again with three participants, and the mean of these results was computed for every formulation. where M is the weight (20gm) that is connected to the upper slide. T= Time taken (seconds) and L= Length (6 cm) of the glass slide The formulation's spreadability has a significant impact on the drug's ability to be delivered at the appropriate dose[39].

Swelling Index: One gram of the gel is taken on porous aluminum foil and then placed separately in a 50 ml beaker containing 10 ml of 0.1 N NaOH in order to determine the swelling index of the created emulgel using the method used. After it was reweighed, samples were removed from beakers at various times and placed in a dry area for a while. The formula for the swelling index is as follows:
Whereas Wo = Emulgel's initial weight at time zero Wt = Weight of emulgel that has swelled after time t (SW) % = Index of percentage swelling [40]

Extrudability study of topical emulgel (Tube Test): Measuring the force needed to remove the substance from the tube is a common experimental test. The composition was put into neat, lacquered aluminum collapsible metal tubes once its extrudability was verified. The substance was extruded by pressing the tubes with the aid of a finger. The amount in the percentage of emulgel serves as the basis for the evaluation of the emulgel formulation for extrudability in the current investigation. Emulgel is applied in grams to a lacquered aluminum collapsible tube in order to extrude a minimum of 0.5 cm of ribbon of emulgel in 10 seconds[41].Three replications of the experiment were conducted, and for each formulation, the average of these results was computed.

Bio-adhesive strength measurement: The bioadhesion was measured using a modified balance method. Physical balance was restored by removing the two pans. A glass slide was hung on the left side, and the right side pan was replaced with a 100 ml beaker. On the left side, a 20 g weight was suspended in order to balance the assemblage. Beneath the suspended slide was another glass slide. Sections of fresh, hairless rat skin were adhered to both slides. Two rat skin faces were separated by one gramme of gel. In order to create a bioadhesion connection, a small amount of pressure was used, and water was gradually introduced to the right side beaker until the gel split from the connected rat skin on one face. The mass of the added water was converted to volume. In grams, this provided the gel's bioadhesive strength[42].

Drug Content Determination: One gram of the gel formulation was dissolved in an appropriate solvent. To get a clear solution, filter it. The UV Visible spectrophotometer was used to measure the absorbance of the resultant solution. The drug calibration curve was used to determine the drug content[43].

***In-vitro* drug release studies:** The drug's in vitro release behavior from emulgel formulations was studied through the use of egg shell membrane. Egg membrane was employed in an intriguing study; similar to human stratum corneum, it is primarily composed of keratin[44]. The outer shell of the entire egg was dissolved with 0.5M hydrochloric acid, producing a membrane. After that, the egg's contents can be removed, and the membrane can either be vacuum-sealed in isopropyl myristate to saturate the keratin matrix or cleaned and chilled. It is believed that adding this lipid to the membrane in place of the water will make it more similar to the biochemistry of the stratum corneum.

The Keshary-chien cell was used for release and permeation study. One gram of gel was applied on 9.8 cm2 area of the surface of egg membrane tied to the lower end of donor compartment. The volume of the receptor fluid was reserved 37.5 ml. The temperature condition of the receptor fluid maintained at 37˚ C and stirred continuously at 100 rpm on a magnetic stirrer. Aliquots of 3.0 ml were withdrawn and analyzed for the drug content after suitable dilutions by spectrophotometric method. The volume of fluid which was withdrawn for analysis be replaced with the same volume of the fresh buffer after each sampling. The cumulative amount released across the egg membrane was calculated and plotted against time. The best batches showing high percent release were selected further for *ex-vivo* studies using rat skin..The Keshary-chien cell was employed in the research of release and penetration. On a 9.8 cm2 section of the egg membrane surface that was attached to the bottom end of the donor compartment, one gram of gel was applied. A 37.5 ml reserve was made for the receptor fluid volume. The magnetic stirrer is used to continually swirl the receptor fluid at a speed of 100 rpm while maintaining a temperature of 37˚ C. 3.0 ml aliquots were taken out and subjected to spectrophotometric analysis to determine the drug content following appropriate dilutions. After each sampling, replace the fluid volume that was removed for analysis with an equal volume of new buffer. We computed and showed the total amount released across the egg membrane against time. Rat skin was used for ex-vivo investigations, with the best batches exhibiting high percent release being chosen for further analysis.

***Ex-vivo* skin permeation and retention studies:** A 200–250 g albino rat that was 10–12 weeks old was used. After the skin was removed, it was wrapped in aluminum foil and the dermal side was carefully peeled off to reveal any underlying fat and/or subcutaneous tissue. Next, using a magnifying glass, the skin was carefully examined to ensure that the specimens were free of any surface irregularities, such as tiny cracks or gaps in the area used for transdermal permeation tests. Fresh skin was utilized for all studies after it was cleaned with physiological buffer saline.

Using Keshary-chien cells, the ex vivo skin penetration of medication from various formulations was investigated. The diffusion cell's effective permeation area measured 9.8 cm^2. The volume of the receptor compartment is 37.5 milliliters. Between the donor and receptor compartments, which included an epidermal site in the donor compartment, was firmly encased albino rat skin. The donor compartment was stirred continuously and kept at 37±1oC. The rat skin's epidermal surface was treated with the emulgel formulation. To establish sink condition, 3.0 ml of aliquots were removed and replaced with an equivalent volume of fresh receptor compartment solvent at specified intervals for 24 hours (0.5, 1, 2, 4, 6, 8, and 24 hours).
At every sampling site, the cumulative proportion of the medication that had diffused across the skin was computed. The amount of drug content in the skin was determined by subtracting the initial drug content of the formulation applied from the amount of free drug content in the receptor compartment and the amount of drug that was still on the skin's epidermal surface. The permeability characteristics of the commercialized emulgel and the ex-vivo permeation investigation are compared. Every decision was made in triplicate, and an ANOVA was used to compare the data.

Stability Studies: For the stability investigation, the ideal emulgel formulation was chosen. A sufficient amount of emulgel formulation was triple-sealed in a 10-gram collapsible tube and tested for stability over a three-month period at four different temperatures: 5°C, 25°C, 60%RH, 30°C, 65%RH, and 40°C/75%RH. The samples' pH,

physical characteristics, rheological characteristics, and drug content were examined at predefined intervals[45].

Kinetics Modeling: For the purpose of evaluating drug release kinetics, data from ex-vivo permeation studies were fitted into zero order, first order, Higuchi, and mathematical models; the model that fit the data the best was determined by predicting the value of R2. A higher value of R2 indicated a better fit, and the model that fit the data the best was the one that gave the R2 value closest to 1 explains the ideal medication release sequence [46].

Various marketed Emulgel formulation

Commercial emulgels are accessible in markets; a list of their preparations is provided in the Table. A topical analgesic gel that relieves back and shoulder pain and minimizes swelling is called Voltaren Emulgel. Diclofenac sodium 1% w/w (also known as diclofenac diethylamine) is the active ingredient in Voltaren Emulgel, a non-greasy, white gel with a pleasant scent that comes in a 100g tube. Another emulgel that is made by Torrent Pharma is called DiclomaxEmulgel. It is intended to treat inflammation of the tendons, ligaments, muscles, and joints. The active ingredients of Medical Union Pharmaceuticals' Miconaz H emulgel, hydrocortisone and miconazole nitrate, have anti-inflammatory, antifungicidal, bactericidal, and antipruriginous qualities.

Future prospective

During formulation & development of any novel formulation the most typical challenges experienced from hydrophobic nature of pharmaceuticals which leads to poor water solubility and bioavailability problems. Many drugs are hydrophobic, which makes it difficult to deliver them to the biological system. Creams, ointments, and lotions are among the several drug delivery systems that can be administered topically. They have good emollient qualities, but the presence of oleaginous bases slows down the release of the medications. As opposed to other topical systems gel promotes quicker release of medicine because gel gives aqueous environment to pharmaceuticals. Drugs that are hydrophobic can be incorporated into oily bases and applied topically with emulgel. Because Emulgel has all these advantages over existing topical drug delivery systems, it is more efficient and profitable. In the future, additional topical treatments will be delivered using Emulgel's features.

Conclusion

A topical medicine delivery device has the benefit of improved patient compliance. Emulgel is a brand-new method that has been shown to be the most effective, superior, and convenient mode of transportation. In contrast to conventional topical transport architectures, it provides excellent drug release and gel-like properties due to its lack of oily bases. Emulgel is efficient in delivering drugs to the target website online and has a high medication loading capacity. A drug's ability to penetrate the skin is facilitated by its small particle size. Emulgel has a twin controlled release effect and is created by mixing emulsion with the gel base. Special difficulties including creaming, segment separation, and improved balance can be resolved with the emulgel technique. Emulgel can be used to deliver hydrophobic tablets, which can then be mixed with gel and incorporated into the emulsion's oil phase. This methodology enhances adherence by the affected individual and will augment the drug's bioavailability in particular areas.

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