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Journal of Pharmaceutical and Biological Sciences

Journal homepage: https://www.jpbs.in/

Review Article

A complete review on niosomal gel drug delivery system

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ARTICLE INFO

Article history:
Received 14-05-2023
Accepted 15-06-2023
Available online 19-07-2023

Keywords:
Niosomal gel
Topical
Ocular
Surfactant

ABSTRACT

Niosomal have an important part in medicine delivery because they can reduce toxin and modify pharmacokinetic and bio-availability. Topically applied niosomal can enhance the hearthstone time of medicines in the stratum corneum and epidermis, while reducing the systemic immersion of the medicine. Niosomal gel dermal medicine delivery act as medicine containing budgets and the revision of the vesicular compositions or face parcels can acclimate the medicine release rate and the affinity for the target point. Niosomal gel medicine delivery useful in the treatment of superficial and systemic fungal infections. Niosomal gel can be applied by optical route. new medicine delivery carriers have great significance for dermal delivery. The lipidic and nonlipidic vesicular systems like liposome, transfer some, ethosome, and noisome are used to reduce the problem related with topical conventional expression. optical delivery can be attained through different strategies that include the use of bioadhesive polymers, penetration enhancers and the advanced design of micro- and Nano particulate delivery systems. This composition presents an overview of the parcels of niosomal gel, ways of medication of niosomal gel, evaluation parameters.

1. Introduction

Novel Drug delivery carriers have great significance for dermal delivery. The lipidic and nonlipidic vesicular systems like liposome, transfer some, ethosome, and noisome are used to reduce the problem related with topical conventional expression. medicine delivery system using new vesicular carrier, similar as liposome or niosome, have further advantages compared to microspheres, nanoparticles, and other systems in terms of better ruse of medicines target point particularity, and handling unseasonable medicine release (burst effect). In 1985, niosomes were studied as an volition to liposome because niosomal have further benefits over liposome similar as they're more stable, nontoxic, and profitable due to low cost of nonionic surfactant as compared to phospholipids which are prone to oxidation. objectification of surfactants within niosomal may increase the efficacity of the medicine, conceivably by easing its uptake by the target cells. Noisome are biodegradable, biocompatible, fairly nontoxic, and an volition of liposome. They can be employed in the delivery of wide variety of medicines as it has capability to entrap hydrophilic, lipophilic, and amphiphilic medicines. Noisome proved to be a promising medicine carrier and has implicit to reduce the side goods of medicines and increased remedial effectiveness in colorful conditions. objectification of surfactants within noisome may increase the efficacity of the medicine, conceivably by easing its uptake by the target cells. 1 new medicine carriers intended for use in skin conditions are frequently designed to increase the cargo capability of APIs and reduce side effect.[1] optical delivery can be attained through different strategies that include the use of bioadhesive polymers, penetration enhancers and the advanced design of micro- and Nano particulate delivery

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https://doi.org/10.18231/j.jpbs.2023.003

systems.[2] This composition presents an overview of the parcels of niosomal gel, ways of medication of niosomal gel, evaluation parameters.

2. Characteristics of Niosomes

1. Niosomes can entrap solutes as like a similar to liposomes
2. Niosomes are bibulous supporter active and stable
3. Niosomes retain an infra- structure conforming of hydrophobic and hydrophilic substantially together and so also accommodate the medicine motes with a wide range of solubility.
4. Niosomes have inflexibility in their structural characteristics (composition, fluidity and size) and can be designed according to the demanded situation.
5. Niosomes may also ameliorate the performance of the medicine motes
6. Better vacuity to the particular point of administration by guarding the medicine from natural terrain.
7. Niosomes surfactants are biodegradable, biocompatible and non-immunogenic.[3]

2.1. Advantages

1. They're osmotically active and stable.
2. They enhance the stability of the entangled medicine.
3. While Handling and storehouse of surfactants don't bear any special conditions.
4. Niosomes carrier may also increase the oral bioavailability of medicines.
5. Niosomal gel can enhance the skin penetration of medicines.
6. Niosomal gel can be used as optical, topical route.
7. The surfactants are biodegradable, biocompatible, andnon-immunogenic.
8. Ameliorate the remedial exertion of the medicine by guarding it from the natural terrain and confining goods to target cells, thereby reducing the concurrence of the medicine.
9. The niosomal dissipations in an waterless phase can be emulsified in anon-aqueous phase to control the release rate of the medicine and administer normal vesicles in externalnon-aqueous phase.
10. Niosomal gel medicine delivery useful in the treatment of superficial and systemic fungal infections.

3. System of Medication of Niosomes

Thin film hydration system medicine- loaded niosomes can prepared by using the thin film- hydration system have slight variations Directly counted amounts of the surfactant and cholesterol in 73 molar rate, dissolved in a chloroform methanol admixture(21 v/ v) in a round- bottom beaker. The organic detergent removed by using a rotary flash evaporator under reduced pressure. The dried film also doused with 5 ml phosphate softened saline(PBS, pH7.4) with a gentle gyration in a water bath maintained at 55 °C for 30 twinkles also latterly left at room temperature for 6 hr for complete hydration. The niosomes sonicate to reduce vesicles size using a inquiry sonicator under an ice bath for 3 twinkles. The final niosomal suspense was stored at refrigerator temperature for farther studies.[4] phrasings of niosomal suspense fellow to 2 w/ w incorporate into the gel base composed of Carbopol 934), glycerol, Triethanolamine and distilled water.[5] Niosome medication using polyoxyethylene alkyl ether The size and number of bilayer of vesicles conforming of polyoxyethylene alkyl ether and cholesterol can be changed using an indispensable system. Rise the Temperature above r 60 °C transforms small unilamellar vesicles to large multilamellar vesicles (> 1 μm), while vigorous shake at room temperature shows the contrary effect, i.e., metamorphosis of multilamellar vesicles into unilamellar bones.

The metamorphosis from unilamellar to multilamellar vesicles at advanced temperature might be the characteristic for polyoxyethylene alkyl ether(ester) surfactant, since it's known that polyethylene glycol(cut) and water remix at advanced temperature due to breakdown of hydrogen bonds between water and cut halves. Generally, free medicine is remove from the reprised medicine by gel saturation chromatography dialysis system or centrifugation system. frequently, viscosity differences between niosomes and the external phase are lower than that of liposomes, which make separation by centrifugation veritably delicate. Addition of protamine to the vesicle suspense facilitates separation during centrifugation[5] phrasings of niosomal suspense fellow to 2 w/ w incorporate into the gel base composed of Carbopol 934, glycerol, Triethanolamine and distilled water. Trans membrane pH grade In this system, surfactant and cholesterol are dissolved in chloroform and dematerialize to form a thin lipid film on the wall of a round bottomed beaker. also being film is hydrate with a result of citric acid by whirlpool mixing and the performing product is snap- fused for niosome conformation. The waterless result of medicine is added to this niosomal suspense, after that add phosphate buffer to maintain pH between7.0 and7.2. According to this system, the innards of niosome has a more acidic pH value than the external medium. The added unionized medicine passes through the niosome membrane and enters into the niosome. The medicine ionizes in an acidic medium and cannot escape from the niosomal bilayer.[6] Rear Phase Evaporation system Niosomes are prepared using the rear- phase evaporation fashion. Weigh accurate quantiy of surfactant (span 20, 60, 80) and cholesterol fellow to medicine also mixed in 250 ml long-necked quick fit round bottom beaker and dissolved in 10 ml chloroform. The organic detergent sluggishly evaporates under reduced pressure, using a rotary evaporator, at 40 °C produce a thin lipid film. The lipid film re dissolve in 10

ml diethyl ether, and the medicine dissolve in 5 ml acetone mixed with 5 ml distilled water. The admixture sonicates for one nanosecond, curve by hand, and resonicate for another nanosecond. The organic detergents dematerialize on the rotary evaporator under reduced pressure for two hours. The niosomes allow regularizing at room temperature. The niosomal dissipation keep in the refrigerator to develop overnight (4 °C). named medicine- loaded niosomes) incorporate into different gel bases. Gels containing0.5 w/ w medicine dissolve in polyethylene glycol 600(20 w/ w) also prepare for comparison. The polymers can use carbopol 934, pluronic F- 127 and HPMC, sodium carboxy methyl cellulose and sodiumalginate. The needed volume of carbopol 934 weigh accuratey and dispersed in a small quantum of distilled water to prepare an waterless dissipation. The waterless dissipation allows to hydrate for 4- 5hours. Add medicine into dissipation and duly disperse it. Acclimate the pH to 6 by addition of 1(w/ v) triethanolamine result. The final weights of the gel acclimate to 10g with distilled water.

4. Evaluation Parameters of Niosomal Gel

1. *Particle size* - the niosomal suspense determine by optic microscopy. A drop of niosomal suspense place on a glass slide. A cover slip place over the niosomes suspense and estimate the average vesicle size by an ordinary optic microscope using a recalibrated optical eye piece micrometer.[7] pH measures The pH of the gel phrasings deliver by using digital pH cadence. Calibrate the pH cadence before dimension and take the readings by dipping the glass rod into the gel phrasings.[8]
2. *Stability Studies* - The niosomal expression on the base of ruse effectiveness and in vitro release studies. Keep niosomal suspense and niosomal gel in sealed glass vials for to assess the stability studies and store them in two different storehouse conditions, that is, refrigeration temperature and room temperature for a period of 30 days. Withdraw samples at different time intervals over a period of one month and the residual content determine spectrophotometrically.[8]
3. *In Vitro Drug Release Study of Niosomal Gel* - An in vitro medicine release study perform using modified Franz prolixity cell of capacity 60 ml. Dialysis membrane place between receptor and patron chambers. Niosomal gel(NG) original to 1 g is place in the patron cube and because of the veritably low solubility in water, metabolic phosphate buffer(pH5.6) IS use as receptor cube. The prolixity cells are maintained at37.2 C with glamorous shifting at 100 rpm throughout the trial. One milliliter of aliquots are withdraw at different time intervals up to 24 h from receiver cube and replace with the same quantum of fresh methanol phosphate buffer result(PBS) to maintain the Gomorrah conditions. The sample are dissect using UV spectrophotometry at wavelength236.5 nm.[9] Spreadability and density The spreadability of expression depends on its density. compliances of spreadability are indicating that the gel fluently spreadable in response to the when little force will apply. These assure that the expression can maintain a good wet contact time when applied at the target point. The density of all the gel phrasings can find to be in desirable range.[10] medicine Content The content of all the niosomal are determine at306.20 nm against blank by using the UV visible spectrophotometer. The results will in the sanctioned limits.[10]
4. *Entrapment Efficiency of Niosomes* -The ruse effectiveness of niosomes prepare by each of the styles determine by ultra centrifuging the niosomal dissipations at 40,000 × g for 30 min. The clear supernatant is assaying spectrophotometric supporter and give the quantum of entangled medicine. quantum of entangled medicine are gain by abating quantum of entangled medicine from the total medicine incorporated.[11] Chance ruse = entrapped medicine(mg)/ total medicine added (mg) × 100.

5. Conclusion

Delivery of antifungal drugs to target region of the skin is a great challenge in terms of therapeutic aspect. In this context, formulation of topical product Niosomal gel plays a key role for penetration of the drugs across skin. Besides, the physicochemical properties of drug molecules such as lipophilicity are also effective parameter. Generally, antifungal drugs are highly lipophilic compounds, which can affect the penetration of drugs across stratum corneum. Niosomal gel drug delivery is very useful in the treatment of superficial and systemic fungal infections. Niosomal gel can be applied by ocular and topical route. niosomal gel be apply by ocular, topical route niosomal gel have prolonged retention and enhanced penetration and that will automatically improve therapeutic properties.Niosomal gel will be used for treatment of eye diseases and fungal infections. Various formulation strategies have emerged over recent years to optimize new drug delivery carriers of antifungal drugs.[12]

6. Source of Funding

None.

7. Conflict of Interest

None.

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Cite this article: Pondkule AV, Nagrale SN, Babar VB. A complete review on niosomal gel drug delivery system. *J Pharm Biol Sci* 2023;11(1):14-17.