

Nano Technology based Topical Semisolid Pharmaceutical Dosage Forms

¹B.Yuvan, ²C.Inniya

^{1,2}Research scholar,
Department of Biomedical Engineering,
Anna University, India

Abstract — The pharmaceutical semisolid dosages are normally present in the form of paste, creams, gels, ointments. Generally, these types of semisolid dosages are used only externally, such as skin allergies, injuries, etc. The bases used in the semisolid pharmaceutical dosage are more sensitive to the skin. The topical semisolid medical dosages are spread smoothly on the body surface. It will react with the cells and injuries for a long time because it adhered to a long time. The main advantages of the semisolid dosage are it does not create side effects. This paper proposes the Nanotechnology-based semisolid dosages, which are more effective than conventional semisolids.

Keywords — semisolids, cream, ointments, Nano semisolids.

I. INTRODUCTION

Topical semisolid pharmaceutical dosages are in the form of cream, paste, ointments, etc. It consists of drug and non-drug ingredients that are spread smoothly on the skin's surface and adhered to the long skin period as possible and healed the injuries and other skin problems. It can be used only for the external of our body, and it must support both skin types. It does not produce any side effects. The main disadvantage of this type of topical semisolid dosage is we cannot measure the accurate dosage. There are different kinds of pharmaceutical ingredients available. They are grinding with oily content to make semisolid like medical dosage. The waxy base is commonly used as a base content to melt the semisolid's medical contents on the body surface. The most applicable field of this semisolid medical dosage is on dermatology. For preparing the ointments based medical dosage, four types of bases are needed. They are water-soluble bases, adsorption bases, oleaginous bases, removable water bases. Generally, oleaginous and adsorption bases are not water-soluble. Some of the examples of water-insoluble bases are hydrocarbons, hydrophilic petrolatum. The remaining portion of this paper has described the novel Nano semisolid medical dosage.

II. PROPERTIES OF SEMISOLIDS

The semisolid is the formation of a state that is in-between the solid and liquid properties, and it is commonly applicable for the field of dermatology. Semisolid dosages are only applicable for external use. It adhered as long as possible and recovered the problem occurred area on the skin. The semisolid dosages' good properties are non-dehydration, elegant in appearance, smooth texture, and non-physiological properties of semisolid dosages are miscible with skin, it does not create the irritation on the applied area of the skin, it does not affect the functions of the skin. Generally, ointment based semisolid dosages are used in dermatology. The bases used for the ointment are as follows

- Absorption base
- Oleaginous base
- Water-soluble base
- Emulsion base

The most commonly used substances in semisolid dosages are mineral oil and petrolatum, the mixture of hydrocarbons, and the hydrocarbon waxes commonly used in ointment manufacturing. It increases the viscosity of the semisolid. Generally, the waxes for manufacturing semisolid dosages are conserved from vegetable oils such as peanut oil, olive oil, and almond oil and conserved from the honeycomb. There must be a need for more than one emulsifier to made the semisolid dosages. The chemical formation of semisolid dosages are given below.

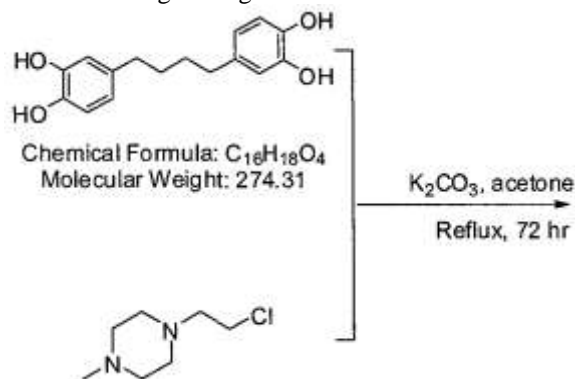




Fig.1 Semisolid Dosage

III. CONVENTIONAL SEMISOLID DOSAGES

Semisolids are available in different forms, such as creams, gels, ointments, pastes, etc.

A. Ointments

The ointment based semisolid dosages are mostly used in the field of dermatology. It is only applicable for external use. Ointment based semisolid dosage are adhered on the skin as long as possible to recover the problem occurred area of the skin. The combination makes it of fluid and solidly based hydrocarbons such as petrolatum and fatty oils. These ointments can apply to the affected area of the skin two or three times per day.

B. Creams

Creams based semisolids are made up of one or more semisolid agents; it may be water washable or emulsion. The cream-based semisolid dosage can be spread and remove easily from the applied area on the skin. It does not create irritation in the applied area of the skin. There are many cream-based semisolid dosages available to protect our skin, such as moisture cream, sun lotions, baby lotions, mosquito lotions, etc.

C. Gels

Gels are made up of a homogeneous mixture of different properties of pharmaceuticals. It is a clear and liquid-based base in most ingredients, which is perfectly mixed with suitable gel-based ingredients. There are two types of gel bases for making the gel-based one a hydrophobic gel, and another is the hydrophilic gel.

D. Pastes

Paste-based Semisolid dosages are a combination of different powder bases combined with other semisolid agents and form pasty medicine.

IV. INGREDIENTS USED FOR PREPARING SEMISOLID DOSAGES

There are some methods to prepare the semisolid dosages. The preparation method is as follows

- Triturating method
- Chemical reaction method
- Emulsification method
- Fusion method

The triturating method is the most commonly used semisolid preparation method. In this method, most of the ingredients are oils and fats. The bases used to make the semisolid are mixed well and suitable to get an accurate semisolid state. In this method, the ingredients are melted, and other ingredients are added to these melted ingredients periodically to form the paste like the state of semisolid dosage. In the emulsification method, the oil bases ingredients are supplied to the filters and then filtering the oil contents from the ingredients by supplying these ingredients through several phases. The different phases are then combined at the ratio of 50:50 at 70°C temperature. The mixing of different phases is done simultaneously. The ingredients used for preparing the Nano semisolid are as follows

- Preservatives
- Bases
- Active pharmaceutical agents
- Emulsifier
- Antioxidants
- Buffers
- Gelling agents

V. PREPARATION OF NANO BASED SEMISOLID DOSAGE

To prepare the Nanotechnology-based semisolid dosages, the silicon-based Nanoparticles are used. The silicon-based Nanoparticles are effectively worked as a vehicle of chemical components in pharmaceuticals. Generally, silicon is a gel-based material commonly used for polishing purposes on the different industrial processes. The properties of silicon are well suitable for preparing Nanosphere semisolid dosages. The medical ingredients are packed as a Nanosphere; these medical ingredients can easily spread inside the cell towards the skin. The adhesive particles and the medical particles can be separated easily while preparing the semisolid pharmaceutical dosage. After preparing the semisolid dosage, the semisolid must be tested to confirm whether its state of colloidal and the proportion of other properties are suitably mixed or not.

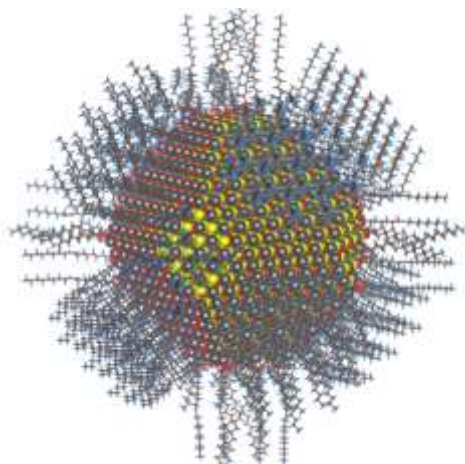


Fig.2 Nano based semisolid Dosage Form

VI. CONCLUSION

A lot of semisolid based pharmaceutical dosages are available, which are mostly used in the field of dermatology. The semisolid dosages never create the irritation on the applied area of the skin. But the bases used for preparing the semisolid dosages are not water washable, so the skin is spoiled due to more oil content of the dosages. This paper proposes the Nanotechnology-based semisolid dosages that are water washable because it separates the bases and medical ingredients of the semisolid. The Nanosphere gel is used for preparing the Nano semisolid pharmaceutical dosages, which are adhered to as long periods as possible so that the injuries can recover quickly and easily.

REFERENCES

- [1] The International Pharmacopoeia, World Health Organization 2013, 4th edition
- [2] Galderma Wins FDA Approval for Vectical(TM) Ointment: A Novel Topical Therapy for Mild-to-Moderate Plaque Psoriasis. FierceBiotech, The biotech industry's daily monitor 2008.
- [3] Pinedo G, Zarate AJ, Inostroza G, Meneses X, Falloux E, Molina O, Molina ME, Bellolio F, Zúñiga A: "New treatment for faecal incontinence using the zinc-aluminum ointment: a double-blind, randomized trial". *Colorectal Disease* 2012; 14(5):596-598
- [4] Süntar I, Akkol EK, Keleş H, Oktem A, Başer KH, Yeşilada E: "A novel wound healing ointment: a formulation of *Hypericum perforatum* oil and sage and oregano essential oils based on traditional Turkish knowledge". *J Ethnopharmacol* 2011; 134(1):89-96.
- [5] Carl O, Formulating with microspheres. Technical seminar, April 14, 2008.
- [6] Agalloco JP, Carleton FJ; Validation of Pharmaceutical Processes; 3rd edition, 2007: 417-428.
- [7] Idson B, Lazarus J; Semisolids. "The Theory and Practice of Industrial Pharmacy". In Lachman L, Lieberman HA, Kanig JL editors, Varghese Publishing House, Bombay, India, 1991: 534-563.
- [8] Block LH; "Medicated Applications. In Gennaro AR editor; Remington: The Science and Practice of Pharmacy". 19th edition, Mack Publishing Company, Easton, Pennsylvania, 1995: 1590-1597.
- [9] Lorenzo CA, Hiratani H, Concheiro A. "Contact lens for drug delivery. Achieving sustained release with novel systems". *Am J Drug Deliv.* 2006; 4(3):131-151.
- [10] Gibson M. "Ophthalmic Dosage Forms In Gibson M—Pharmaceutical Preformulation and Formulation". New York: Informa; 2007:459-489.
- [11] Ali Y, Lehmussaari K.— "Industrial perspective in ocular drug delivery". *Adv Drug Deliv Rev.* 2006; 58: 1258-1268.
- [12] Ansel HC — "Introduction to Pharmaceutical Dosage Forms". 4th ed. Philadelphia: Lea & Febiger; 1985:321-336.