

Medistick: The Imminent Antifungal Topical Preparation

Zunjare Prashant Gyanba^{1*}, Dr. Moholkar Aparark V.², Dr. Vijayendra Swamy S.M.³, Shinde Vijay⁴, Kombade Rohit⁵

Students^{1,4,5} Channabasweshwar Pharmacy College, (Degree) Latur, Maharashtra, India

Principal³, Channabasweshwar Pharmacy College, (Degree) Latur, Maharashtra, India

Assistant professor², Channabasweshwar Pharmacy College, (Degree) Latur, Maharashtra, India

ABSTRACT: The major goal of manufacturing medistick is to cure topical infection and also for beauty purposes by natural additives. Medistick is combination of both branches i.e. drug and cosmetics. For the formulation of medicated stick self emulsion drug delivery system can be used. This formulation is formed by combination of beeswax, isopropyl myristate and carnauba wax, etc. Evaluation parameters like pH, skin disturbance test, melting Point, breaking load test, stability study, Thixotropy character, etc. are applicable for this drug delivery system.

KEYWORDS: Medistick, Topical infection, Cosmetics, Cosmeceuticals, SEDDS, Thixotropy.

INTRODUCTION

A cosmetic product plays an important role in daily human life. Today, worldwide consumers are looking for personal care products that provide wide benefits with less effort. As per D and C 1940 act cosmetics are defined as articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into or otherwise applied to the human body for cleansing, beautifying, promoting attractiveness or altering the appearance. Cosmetic products include are moisturizers, perfumes, lipsticks, fingernail polishes, cleanser shampoo, hair colour, and spray.[1]

Cosmeceuticals: It is the fastest-growing field in pharmaceuticals. Cosmeceuticals are cosmetic products that have medication-like advantages and beautifying agents which helps beautification of the skin. The greater part of cosmeceuticals utilizes vitamins, herbs, different oils and plant part.[2,3]

Topical application of antifungal is intended to achieve higher local drug concentration and avoid first-pass metabolism or adverse effects of systemically administered formulation. To achieve good therapeutic effect of topical drug delivery for antifungal needs to occupy at the sites of infection for extended periods. Hence there is a need to develop an effective drug delivery system that should prolong the contact of drug with infected part. Many antifungal drugs are BCS class II i.e. they have low solubility and high permeability. It is

easily but incompletely absorbed after oral administration and is highly inconsistent due to its poor aqueous solubility leading to shorter half life hence Self emulsifying drug delivery system (SEDDS) have been used as drug carriers for topical treatment of antifungal diseases. This system allows for a high accretion of drug in the skin. SEDDS increases surface area and so it enhances solubility of drug, thus drug is easily soluble in a formulation that's why SEDDS are used in medistick formulation, also it enhances bioavailability.

The Main aim is to prepare a solid self-emulsifying drug delivery system containing antifungal drug using appropriate oil, surfactant and co-surfactant to improve solubility. The formulation of the antifungal medicated stick is intended for the purpose of beautification of lips and curing lips from fungal infections. And the major advantage of medistick is we cannot go outside by applying antifungal cream on lip but applying antifungal stick is much better. Medistick contain oil soluble colour pigment which does not interfere with formulation. Colourless medistick used for other body parts like eyebrows, neck, back side of ear etc. Medistick is cosmetic preparation and prepared by moulding a dispersion of colour in a waxy base, in the form of stick. [4]

Topical drug delivery system: Semi solid preparation generally meant for the topical drug delivery, but spray, foam, medistick, medicated powder, and solution are also in use.

i) External delivery that are applied on to epidermal tissue to cover the infected area.

ii) Internal delivery that are applied to the mucous membrane orally, vaginally or rectal tissue for local activity.

This topical formulation enters through underline layer of skin or mucous membrane and produce localized effects.

Pros:

- i) It is suitable to apply and use.
- ii) Avoid first pass metabolism.
- iii) Avoid GIT hindrances.
- iv) It is convenient for self medication and is easy to terminate the medication, when needed.
- v) It is applied on a large area as compared to buccal or nasal cavity.
- vi) It eludes changes in drug levels, inter and intra patient variations.
- vii) It have ability to deliver drugs more selectively to specific sites.
- viii) Utilization of drug with short biological half life, narrow therapeutic window and improves physiological and pharmacological response and patient compliance.

Cons:

- i) Skin irritations may causes due to drug or excipient.
- ii) Due to poor permeability of some drugs possibility of allergic reaction may occur.
- iii) Enzyme present in epidermis may alter the nature of drugs.

Material:

a. For SEDDS

i) Oils

Long chain triglyceride and medium chain triglycerides oils with proportionate degree of saturating uses in the design of SEDDS. newer semi synthetic, medium chain triglyceride oils have enough property and vastly replace regular chain triglyceride. Oleic acid can be used in formulation.

ii) Surfactant

High number of hydrophobic drugs can be dissolve in naturally obtained surfactant due to its amphiphilic nature. But the emulsification process needs two big issues to be satisfied, HLB and Safety. If one wants higher emulsification then HLB value should be larger (high hydrophilicity). elevated emulsification of SEDDS preparations prevents drug precipitation in gastro intestinal lumen (due to raped o/w droplet formation). Also prolong duration of action would be assure. Non-ionic surfactants are also well thought-out as safer than the ionic ones.

But high quantity of surfactant can irritate GI lumen that could be a big challenge for pharmaceutical scientist.

iii) Co surfactant

The fabrication of an optimal SEDDS requires relatively high concentrations (generally more than 30% w/w) of surfactants. Organic solvents such as,

ethanol, propylene glycol (PG), and polyethylene glycol (PEG) are preferred for topical drug delivery, and they enable the dissolution of large quantities of either the water lovable surfactant or the drug in the lipid base. These solvents can even serve as co-surfactants in SEDDS systems.

b. For Medistick

i) Waxes

The gloss and hardness are generally depends on characteristics and quantity of waxes. Best characteristic is obtained by using blend of waxes of different melting Point and adjusting the final melting point by incorporating a enough quantity of high melting point wax: beeswax, carnauba wax, hard paraffin wax, soft paraffin, lanolin etc.

ii) Oils

The oil mixture is required to mix properly with the waxes to provide a suitable film on the applied lip skin. Oils also acts as solvent in some formulations, and acts as a dispersing agent for insoluble pigments. The ideal mixture of oil should produce the product that easily spread and produce a thin film with good covering power. Examples: Castor oil, Tetrahydrofurfuryl alcohol and esters, Isopropyl myristate, Isopropyl palmitate, Butyl stearate.

iii) Preservatives

Preservatives used to avoid microbial growth in formulation. Example: 0.1% Propyl parahydroxybenzoate, higher concentration of preservative can cause slightly burning sensation or allergic reaction.

iv) Fragrance

Fragrance is Essential component of medistick used to mask unpleasant odour of fatty acid or wax. They are used to impart attractive flavour. 2-4% concentration of fragrance is required. Fragrances must be free from irritating effect and bad taste Qualities for selection: Free from irritating effect and Free from bad taste.

v) Colours

From a commercial and appearance point of view colours are very essential additive. In olden days, carmine was widely used, but nowadays various others are available. Colour in lipstick is imparted by two ways. Soluble dyes: By staining the skin with a solution of dyestuff which can penetrate the outer layer of skin. Insoluble dyes: by covering the lips with a colored layer which serve to conceal any skin roughness & give a smooth appearance.

vi) Antioxidants

Antioxidants Incorporated to prevent Rancidification of oily bases during storage.

Generally antioxidants used in combination
Example: BHA, BHT, Propyl gallate, Citric acid, Surfactants and Other Additives.

Surfactant: used to promote wetting and stabilize the dispersion of insoluble pigments in medistick base

Additives: used for various purposes

Oil-Soluble sunscreen: filter the sun rays and protect lip skin from sunburn.

Silicon fluid: gives soft finish to the skin and prevents blend of colours on lips.

PVP: film former on lips and reduce allergic reaction in medistick.

Isopropyl linoleate: avoiding drying effect.

METHOD

Firstly check the solubility profile of antifungal drug then use which one is of higher solubility. Then prepare SEDDS because the drug is not directly incorporated in formulation. SEDDS are used in preparation of Medistick.

Preparation of liquid SEDDS formulation:

For making 2% antifungal Medistick requires 200mg API. The plans are set up by dissolving the 2% API (0.2g) in the blend of oil (Oleic Acid), surfactant (Tween 80), co-surfactant (Transcutol-P) at 37 °C. The blend homogenized with the help of a magnetic stirrer until the drug is completely soluble. It is liquid SEDDS. Then Optimize the SEDDS.

Preparation of Medistick [5]

	Ingredient	Remark
Wax mixture	White Beeswax Carnauba wax, Lanolin	Binds oil and high melting point Impart rigidity and hardness and As blender
Oil mixture	Castor oil, High grade cow ghee	As solvent for eosin, Natural penetration enhancer
Drug	SEDDS	Drug

Solvent	Isopropyl Myristate [IPM]	Effective gloss
Opacity agent	Titanium dioxide	Shade modify basic pigment
Antioxidant s, Preservative	Vitamin C and BHA	Protect formulation
Colour, Flavours'	Insoluble dyes, lake Colour	Appearance, good taste And odour

i. Accurately weigh the wax mixture, oil mixture, solvent, antioxidant, preservatives, TiO₂, flavour and colours.

ii. Take wax mixture in a china dish and put on the water bath till wax mixture dissolves and take a beaker onto another water bath for warming oil mixture.

iii) Add wax mixture and SEDDS into oil mixture with continues stirring.

iv)Take the solvent of IPM, colours, flavours, antioxidants and preservatives and TiO₂ in another beaker and mix properly.

v) Pour the iv) into iii) with continuously stirring and then mould it in medistick moulders. First Cool it at room temperature then freeze and scrap it out.

Evaluation parameters[6-9]

- Colour: Visual technique.
- pH parameter: The pH resolves using a computerized pH meter.
- Skin distribution test: It is followed by applying medicated stick on the skin for 10 min.
- Solubility test: To test the solubility of medistick in diverse solvents.
- Perfume test: The medistick were tested after 30 days, to record scent.
- Melting Point: The resolve of melting point is done in order to decide the storage characteristics of the product. The method of determination is called as capillary tube method. In this method, about 50 mg medistick is taken and is placed into a glass capillary tube open at both ends. The capillary tube is ice cooled for about hours and then placed in a beaker containing hot

water and a magnetic stirrer. The temperature at which material start moving through the capillary is said to be the melting point temperature. The inciting point of medistick base should be between 60^o to 65^o C. Another main factor is the droop point which determines the temperature at which the product starts oozing out the oil and becomes flattened out.

- g) **Breaking Load test:** Breaking point is done to determine the strength of medistick. The medistick is placed horizontal position 1 inch from the base of socket. The weight has been continuously expanded by a specific value (10 gm) at a specific interval of 30 second and weight at which medistick breaks is considered as the breaking point.
- h) **Softening Point:** The medistick should withstand the range of condition. it will subjected in the consumers handbag so it should be resistant to varying temperature and just as easy to apply in the hot as in cold condition. Softening point is done by using Ring and Ball softening point method. Ring and Ball softening point is defined as the temperature at which a disk of the sample held within a horizontal ring is forced downward a distance of 1 inch under the weight of steel ball as the sample is heated at a prescribed rate in water bath. Softening point range 50-55°C.
- i) **Stability Studies:** The medistick should be placed for stability studies at room temperature, Refrigerator and 40 ± 2 °C/75 ± 5% RH and observe for any physical changes.
- j) **Permeability Study:** Cellophane membrane has been soaked in ethanol and allowed to evaporate. 50 mg of medistick mass has been applied on the membrane and it has been placed on the diffusion cell. Hydro alcoholic Mixture (30% ethanol in distilled water %v/v) has been used as receptor media. This has been magnetically stirred (600rpm). The experimental temperature has been kept up at 32 °C by circulating thermostatic water inside the cell jacket. Sampling done at 1hr interval and analysed under UV at 283 nm for 6hrs.
- k) **Thixotropy character:** It is a sign of thixotropic quality and is done by utilizing a penetrometer. A standard needle of specific diameter is allowed to penetrate for 5 seconds under a 50 gm load at 25 °C. Measure the penetration it should be 10.5mm. A product of high droop point with soft thixotropic structure assures good application characteristics.
- l) **Antifungal activity:** standard (Drug dissolved in 30% v/v of ethanol) was determined using Candida albicans as a representative fungus; by the cup plate method. It determines antifungal activity of the inhibition zone.
- m) **Force of application:** It is a test for comparative measurement of the force to be applied for application. A piece of coarse brown paper keep on a shadow graph balance and medistick can be applied at 45^o angle to cover a 1 sq. inch area until fully covered. The pressure reading is a sign of force of application and it depends on the operator.
- n) **Surface anomalies:** It is the study of surface defects, such as development of crystals on the surface, contagion by fungus etc. No surface anomalies must be recorded in the prepared medistick.
- o) **Rancidity:** Rancidification is the decay of fats, oils and other lipids by hydrolysis or oxidation. It leads to flamboyant odour, bad taste and sticky product and sometimes changes of colour of the product. By determining peroxide number rancidity test is done
- p) **Rupture Test:** In the rupture test, the medistick is placed in two holders, in the extended position. Then weight is added to the holder on the medistick portion at 30 second interval until the lipstick ruptures. The pressure required to rupture the medistick is then checked against the manufacturer's standard. Since there are no industry standards for this test, each manufacturer sets its own standards.
- q) **Spreadability Test:** Medistick spread over transparent glass at an angle of 45°. Then the surface is observed and the picture is taken with a dark background. Good spreadability will be seen.
- r) **Calibration curve:** Accurately weigh 100mg of drug, and then transfer to a

100ml volumetric flask. Then make up the volume up to 100 ml with methanol. (1000mcg/ml) ; then pipette out 10 ml from this and dilute it with methanol up to 100 ml(100mcg/ml) then make up 10,20,30,40,50 mcg/ml dilution with the help of methanol. Absorbance of each solution measures at required nm against a reagent blank solution prepared similarly without drug. By UV spectrophotometer. Then plot the graph concentration versus absorbance graph.

CONCLUSION

Medistick have several advantages in beauty & fungal diagnosis. Medistick is combination of two fields Cosmetic and Drug. One cannot go outside applying antifungal cream on lip but applying antifungal medistick is better. Medistick work within a second. It use on specific site. Medistick is not simply removed as compare to other preparation like cream, ointment, gel. This medistick is quicker, safer and easy to carry.

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