



PREPARATION AND EVOLUTION OF ANTI- INFLAMMATORY TRANSDERMAL PATCH

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1. ABSTRACT

The centuries-old discipline of traditional medicine has accompanied humanity in its struggle against illness and pursuit of a healthy lifestyle for a very long time. The Chinese, Indian, and African traditional systems of medicine are among the most well-known examples of how indigenous people have used their distinct approach to healing for ages. medical systems.

Traditional medicine is any age-old, culturally-based healthcare practice that deviates from modern science and is mainly passed down orally by groups of people from different cultural backgrounds. The World Health Organisation (WHO) notes that although it is challenging to give a single definition to the diverse variety of characters and components of traditional medicine, having one in place is crucial. This leads the author to the conclusion that traditional medicines diverse health practices, approaches, knowledge, and beliefs incorporating plant, animal, and mineral-based medicines, spiritual therapies, manual methods, and workouts used alone or in conjunction to promote health as well as to assist in the prevention, treatment, and diagnosis of disease.

Transdermal patches are medicated adhesive patches that are put on the skin to transport medication through the skin and into the bloodstream. A transdermal drug delivery system is characterized as topically delivered pharmaceuticals in the form of patches that, when placed on the skin, distribute the drug at a specified and regulated rate via the skin. Transdermal patches distribute the medicine via the skin in a regulated and predefined manner, increasing the therapeutic efficacy of the treatment while decreasing adverse effects. Transdermal drug delivery systems (TDDS) can transfer the medication via the skin portal to systemic circulation at a predefined pace over a lengthy period, allowing for controlled drug release. The drugs must be able to enter the skin and reach the target spot for an efficient Transdermal drug delivery device.

2. INTRODUCTION

2.1: NOVAL DRUG DELIVERY SYSTEM

The goal of the Novel Medicine Delivery System is to deliver a therapeutic dose of medicine to the proper spot in the body quickly and then Keep the target medication concentration constant. The drug-delivery system should administer the medicine at a pace controlled by the body during the course of treatment. These idealized goal shifts to the two most critical features of medication distribution are as follows:

- I. Spatial medication Delivery: The delivery of a medicament to a specific organ or tissue.
- II. Temporal medication Delivery: The pace at which the medication is delivered to the target tissue is regulated.

Novel drug delivery systems can be divided into classes:

1. Sustained diffusion drug delivery system
2. Controlled diffusion drug delivery system

Sustained diffusion drug delivery system It is a pharmaceutical dosage formulated to retard the diffusion of a therapeutic effect such that its look in the systemic circulation is delayed and or prolonged and the plasma profile is sustained in duration. The onset of its pharmaceutical action is often slow, and the duration of its therapeutic effect is sustained. (Eg: coated granules).

Controlled diffusion drug delivery system This system has a meaning that goes beyond the scope of sustained drug action. It Many fests predictability and reproducibility in the drug diffusion kinetics. The diffusion of drug substances from a controlled diffusion drug delivery system gains at a rate profile that is not only predictable kinetically but also reproduced from one unit to another.

They are classified as follows:

- I. Rate - preprogramed drug delivery system
- II. Activation - Modulated drug delivery system
- III. Feed - Back Regulated drug delivery system
- IV. Site - Targeting drug delivery system

Merits of drug delivery system:

1. Reduction in the prevalence and severity of adverse systemic side effects associated with high blood plasma drug concentrations.
2. Maintenance of the total quantity of medicine supplied during the dosing intervals.
3. Reducing the total amount of medicine provided during the course of treatment to decrease the onset of systemic and local adverse effects.
4. Improved treatment of several chronic diseases. For example, cancer, asthma, and arthritis.
5. Enhanced Bio-availability.
6. Avoidance of first-pass metabolism and gastrointestinal tract deterioration.
7. Improved patient compliance as a result of a reduction in the number and frequency of doses required to sustain desired therapeutic responses.

LIMITATION:

Factors that limit its usage is as follows

1. Physiological factors such as gastro intestinal enzyme, activates pH /gastric and intestinal transit rates, food and disease which often influence drug bioavailability from conventional dosage forms may interfere with the accuracy of control diffusion and absorption of drug from the system.
2. The products which remain intact may become accommodates at some sites results slow diffusion of the drug from the dosage form may produce a high localized concentration of the drug which produces local irritation.
3. Drugs with a half-life of 1hr or less are difficult to be formulated as sustained diffusion formulation. The high rate of elimination of such drugs from the body requires a highly large maintenance dose which provides 8-12 hrs of continuous diffusion.
4. Since these products contain a large number of drugs. There is a chance of unsafe dosage, if the product is improperly made and the total drug contained there is diffusion at one time or over too short time of an interval.
5. It is difficult to cease the therapy once after administration may be for reasons of toxicity or any other.
6. It may be not suitable to encompass potent drugs in such a system.

2.2: TRANSDERMAL DRUG DELIVERY SYSTEM

The (TDDS) are defined as self-contained, discrete dosage forms which, when applied to the intact skin, deliver the drug(s), through the skin, at a controlled rate to the systemic circulation. Transdermal drug delivery is a viable administration route for potent, low-molecular weight therapeutic agents which cannot withstand the hostile environment of gastrointestinal tract and/or subject to considerable first-pass metabolism by the liver.



Fig No.1: Transdermal Patch

Transdermal drug delivery systems are topically administered medicaments in the form of patches that deliver drugs for systemic effects at a predetermined and controlled rate. A transdermal drug delivery device, which may be of an active or a passive design, is a device which provides an alternative route for administering medication. These devices allow for pharmaceuticals to be delivered across the skin barrier.

In theory, transdermal patches work very simply. A drug is applied in a relatively high dosage to the inside of a patch, which is worn on the skin for an extended period of time. Through a diffusion process, the drug enters the bloodstream directly through the skin. Since, there is high concentration on the patch and low concentration in the blood, the drug will keep diffusing into the blood for a long period of time, maintaining the constant concentration of drug in the blood flow.

Advantages of TDDS

This approach to drug delivery offers many advantages over traditional method;

1. No interactions with gastrointestinal fluids.
2. Stable blood level.
3. Reduced Side-effect.
4. Steady infusion.
5. Improved patient compliance.
6. Best and alternative route for administration of drug.
7. Convenience.
8. Avoid first pass metabolism.
9. Self-administered.
10. Flexibility of termination.
11. Comfortable.
12. Suitable.
13. Pain less.

Disadvantages of TDDS

- The drug that requires high blood levels cannot be administered and may even cause irritation or sensitization of the skin
- The adhesives may not adhere well to all types of skin and may be uncomfortable to wear
- High cost of the product is also a major drawback for the wide acceptance of this product
- Properties that influence transdermal delivery diffusion of the medicament from the vehicle
- Penetration through the skin barrier activation of the pharmacological response

2.3: Pathway of Transdermal Permeation:

The permeation of drugs through the skin includes the diffusion through the intact epidermis and through the skin appendages, i.e., hair follicles and sweat glands, which form shunt pathways through the intact epidermis. However, these skin appendages occupy only 0.1% of the total human skin surface and the contribution of this pathway is usually considered to be small (with only a few exceptions having been noted). As stated above, drug permeation through the skin is usually limited by the Stratum corneum. Two pathways through the intact barrier may be identified (Fig No.4) the intercellular lipid route between the corneocytes and the transcellular route crossing through the corneocytes and the intervening lipids that is, in both cases the permeant must diffuse at some point through the intercellular lipid matrix, which is now recognized as the major determinate of percutaneous transport rate

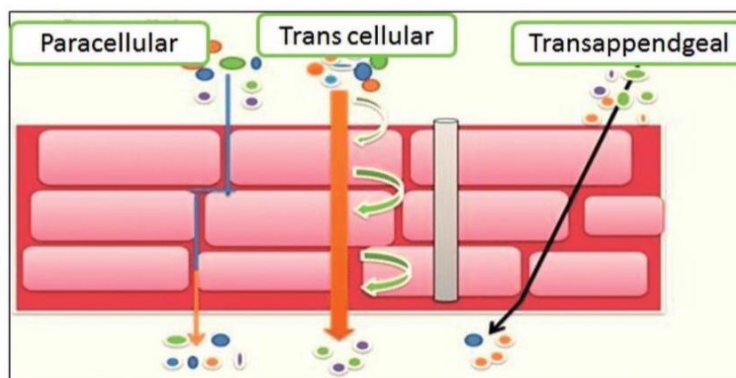


Fig No. 2: Drug Pathway of Skin

2.4: Basic Components of Transdermal Drug Delivery Systems:

1. Polymer matrix or matrices
2. The drug
3. Permeation enhancers
4. Other excipients

1. Polymer Matrix:

The Polymer controls the diffusion of the drug from the device. Possible useful polymers for transdermal devices are:

a. Natural Polymers: e.g., cellulose derivatives, Zein, Gelatine, Shellac, Waxes, Proteins,

Gums and their derivatives, Natural rubber, Starch etc.

b. Synthetic Elastomers: e.g., polybutadiene, Hydrin rubber, Polysiloxane, Silicone rubber, Nitrile, Acrylonitrile, Butyl rubber, Styrenebutadiene rubber, Neoprene etc

c. Synthetic Polymers: e.g., polyvinyl alcohol, Polyvinyl chloride, Polyethylene,

Polypropylene, Polyacrylate, Polyamide, Polyurea, Polyvinyl pyrrolidone, Polymethyl methacrylate, Epoxy etc.

2. Drug

For successfully developing a transdermal drug delivery system, the drug should be chosen with great care. The following are some of the desirable properties of a drug for transdermal delivery.

Physicochemical properties

- The drug should have a molecular weight less than approximately 1000 Daltons
- The drug should have affinity for both lipophilic and hydrophilic phases. Extreme partitioning characteristics are not conducive to successful drug delivery via the skin
- The drug should have low melting point
- Along with these properties the drug should be potent, having short half – life and be non-Irritating

3. Permeation Enhancers

These are compounds which promote skin permeability by altering the skin as a barrier to the flux of a desired penetrant. These may conveniently be classified under the following main headings:

A. Solvents:

These compounds increase penetration possibly by swelling the polar pathway and/or by fluidizing lipids. Examples include water alcohols – methanol and ethanol; alkyl methyl sulfoxides – dimethyl sulfoxide, alkyl homologs of methyl sulfoxide dimethyl acetamide and dimethyl formamide; pyrrolid- ones- 2 pyrrolidone, N-methyl, 2-pyrrolidone; laurocapram (Azone), miscellaneous solvents- propylene glycol, glycerol, silicone fluids, isopropyl palmitate.

B. Surfactants:

These compounds are proposed to enhance polar pathway transport, especially of hydrophilic drugs. The ability of a surfactant to alter penetration is a function of the polar head group and the hydrocarbon chain length. Anionic Surfactants: e.g. Dioctylsulpho - succinate, Sodium lauryl sulphate, Dodecyl- methyl sulphide etc. Non-ionic Surfactants: e.g. Pluronic F127, Pluronic F68, etc Bile Salts: e.g. Sodium taurocholate, Sodium deoxycholate, Sodium tauroglycocholate Binary system: These systems apparently open up the heterogeneous multilaminar pathway as well as the continuous pathways'. Propylene glycol-oleic acid and 1, 4-butane diol-oleic acid.

C. Miscellaneous Chemicals

These include urea, a hydrating and keratolytic agent, N, N-dimethyltoluamide, calcium thioglycolate, anticholin- ergic agents. Some potential permeation enhancers have recently been described but the available data on their effectiveness sparse. These include eucalyptol, di-omethyl- β -cyclodextrin and soyabean casein

4. Other Excipients

Adhesives: The fastening of all transdermal devices to the skin has so far been done by using a pressure sensitive adhesive which can be positioned on the face of the device and in the back of the device and extending peripherally. Both adhesive systems should fulfil the following criteria

- Should adhere to the skin aggressively, should be easily removed
- Should not leave an un washable residue on the skin
- Should not irritate or sensitize the skin

The face adhesive system should also fulfil the following criteria

- Physical and chemical compatibility with the drug, excipients and enhancers of the device of

which it is a part

- Permeation of drug should not be affected
- The delivery of simple or blended permeation enhancers should not be affected

Backing membrane: Backing membranes are flexible and they provide a good bond to the drug reservoir, prevent drug from leaving the dosage form through the top, and accept printing. It is impermeable substance that protects the product during use on the skin e.g. metallic plastic laminate, plastic backing with absorbent pad and occlusive base plate (aluminium foil), adhesive foam pad (flexible polyurethane) with occlusive base plate (aluminium foil disc) etc

3. Structure of skin:

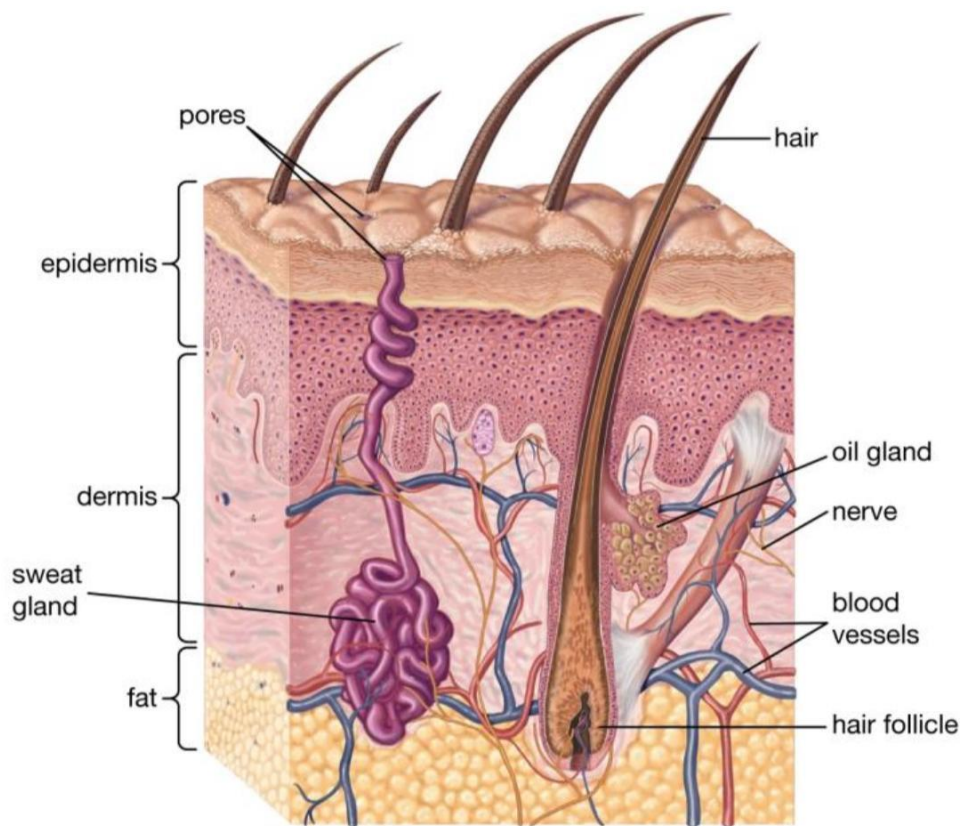


Fig No. 3: Structure of Skin

The area of your skin you'll see is thought because of the skin, that is that the layer on the skin. On a 28-day cycle, your cuticle unendingly produces contemporary skin cells that climb to the surface to switch the recent ones.

Melanin may be a chemical that's additionally created by the cuticle. The skin has color thanks to animal pigment. The additional animal pigment you have got, the darker your skin is going to be. These cells produce additional animal pigment once exposed to daylight to protect you from the ultraviolet, or UV, rays of the sun. owing to this, tanning happens after you pay heaps of your time in the sun.

The dermis is the lowermost layer. Your dermis is concealed beneath your epidermis, so you cannot see it. Blood veins, sweat glands, oil glands, and nerve endings can all be found in the dermis. Additionally, it includes elastin-containing collagen.

Your dermis's nerve endings allow you to feel how objects feel when you touch them. They connect with your nervous system and brain to send signals to your brain about what you are interacting with.

Your skin cells' health is maintained by tiny dermis blood vessels, which provide them with the oxygen and nutrients they require as well as remove waste.

Sebum, the natural oil produced by your skin, is continuously produced by the sebaceous glands in the dermis. It climbs to the epidermis' surface to keep your skin moisturized and protected. Your skin is also waterproofed by it.

The subcutaneous layer is the third and bottom layer of skin. It helps your body keep warm and absorb shocks and is primarily formed of fat. Additionally, the subcutaneous layer aids in holding your skin to all of the structures underneath it.

3.1: The layers of skin:

Epidermis:

- Epidermis is the outermost layer of skin mainly composed of the stratum corneum, stratum lucidum, stratum granulosum, and stratum germinativum. The stratum corneum is a multi-layered layer of 10-15 μm thickness, consisting of keratin (Protein blocks) embedded in extracellular lipids.
- Keratin-containing cells are arranged in an interlocking fashion in the stratum corneum.
- The interlocking arrangement is responsible for the barrier properties of the stratum corneum.
- The stratum corneum is a barrier for major topically applied drugs. The lipid portion of the stratum corneum mainly contains ceramides and neutral lipids such as free sterol, triglycerides, fatty acid, cholesterol, and glycosphingolipids.
- All these structures and chemical features are responsible for the tightness and impermeable characteristics of intact skin.

Stratum germinativum (basal layer or rowing layer): It contains column-shaped keratinocytes that attach to the zone of the basement membrane with their long-axis perpendicular to the dermis

Stratum spinosum (prickly cell layer or squamous cell layer): Its thickness varies from 5-10 cells. Intercellular spaces between spinous cells are bridged by abundant desmosomes (adhering spot) to promote coupling between cells of the epidermis and provide resistance to the physical stresses

Stratum granulosum (granular layer): It consists of living cells; these are responsible for further synthesis and modification of the proteins involved in keratinization. It is 1-3 cells layer in thickness

Stratum corneum (horny layer): the corneocytes are rich in protein and low in lipid content (hydrophilic nature) and are surrounded by a continuous extracellular lipid matrix

Dermis:

- Dermis is a 200 μm thick layer of skin mainly consisting of collagen fiber embedded in mucopolysaccharides. The mucopolysaccharides matrix contains, a rich network of blood capillaries, lymphatic nerve endings, and epidermal appendages like hair follicles, sebaceous glands, and sweat glands.
- Hair follicles associated with one or more sebaceous glands, which are filled with the soft lipoidal material called as sebum.
- The sweat gland is divided into eccrine and apocrine glands, which are widely distributed over the surface of the body.
- Sweat secret dilute salt solution thus serves as a control of body temperature.
- The network of blood capillaries in the dermis serves as an avenue for the systemic absorption of drugs.

Hypodermis:

- The muscles and bones are connected to your dermis layer by the hypodermis.
- The hypodermis insulates your body to protect you from the cold and produces sweat to regulate your body temperature, protecting you from the heat.
- The hypodermis allows your skin to move smoothly over the tissues and muscles underneath it. Without the hypodermis, your skin would rub against those tissues and muscles. It also acts as a shock absorber to protect your organs, muscles, and bones from harm.
- The hypodermis produces fat cells (adipocytes), which store energy.

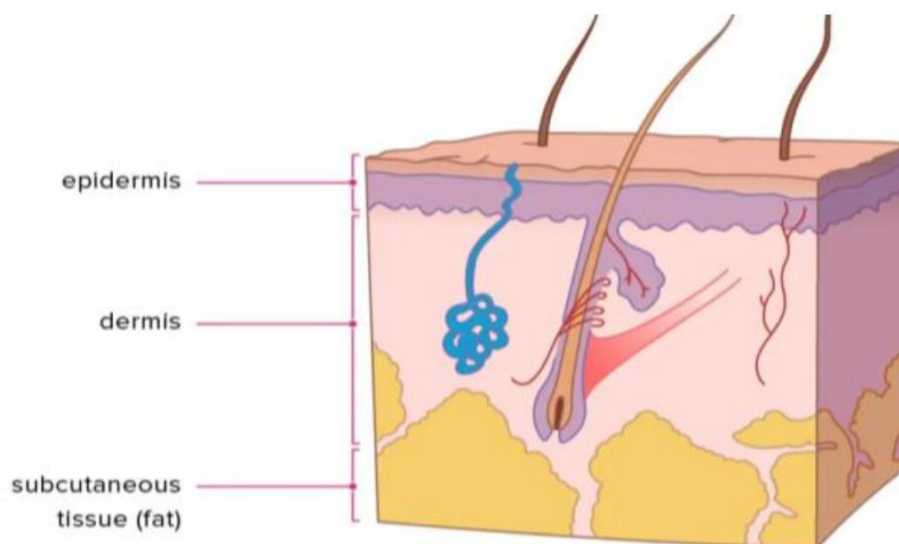


Fig No. 4: Structure of Skin

Function of Skin:

Following are a few important functions of the skin in the human body:

- Protection from the Environment

- This is the foremost and the most important function of the skin. It keeps the pathogens away so that they do not enter into the skin and cause any harm.

- Prevents Water Loss

- Humans possess thick skin that loses less water. In deserts, the human skin gets thicker to prevent water loss to dry air.

- Organisms with thin skin have the possibility of losing water all the time and need to stay near water to prevent it from drying.

- Sensation

Skin is the main sense organ that can sense touch, heat, pressure, cold, pain, and pleasure. A network of nerves transmits these signals to the brain. Thus we can respond appropriately to a particular stimulus.

- Regulation of Temperature

Our skin loses water through perspiration and cools itself, thereby, removing heat from the body. It also allows the hot blood to move to the surface of the skin, where its heat is radiated out of the skin. The phenomenon of “goosebumps” is also a temperature regulation response.

- Camouflage

Many animals exhibit the phenomenon of camouflage where their skin produces colours and patterns that blend in with the surroundings and protects them from predators. Also, it makes it easier for predators to catch their prey by making themselves invisible in the surroundings.

-Storage

The skin can store fats and water in its tissues. These provide extra insulation to our bodies. The animals found in colder regions develop thick layers of fat to prevent themselves from the outside cold.

- Excreting Scent Signals

The sweat secreted by our skin can also act as a signal to other organisms. Many animals mark their territories by secreting some scent from the glands in their skin which contains information about their age, health, gender, and availability to the mate.

Aim And Objective

Aim: To prepare and evaluate the Transdermal patch of alcoholic extract of Ipomra Carnea Jacq using different polymers (Excipient)

Objective:

- To transform the plant extract into a novel dosage form
- To allow for the direct administration of aqueous extract into the systemic circulation in order to provide prolonged activity.
- To create a unique topical formulation of alcoholic extract of Ipomra Carnea Jacq for the efficient treatment of skin infections.

LITERATURE SURVEY

Kansagra Hemanh et al., (2012) formulated and evaluated a transdermal patch of Tetraconazole nitrate. The permeation studies illustrated that the ratio of polyvinyl pyrrolidone and ethyl cellulose 1:5 showed good controlled release. Higuchi and Korsmeyer-Peppas models were used for optimizing the formulation.

Sunil R. Rathva et al., (2012) carried out a review on Herbal transdermal patches. It has been found that drugs of herbal origin can be utilized with enhanced efficacy by incorporating in transdermal patches. Herbal transdermal patches aid to quit smoking, relieving stress, increasing sexuality, insect repellent patches, detoxification, male energizer, postpone menopause are available in the market

Pawan Jalwal et al., (2010) The benefit of transdermal medication delivery is that it is comparatively painless. The large surface area of the skin, systemic accessibility through underlying circulatory and lymphatic networks, and the painless nature of drug administration all contribute to its allure as a gateway for drug entry. Transdermal drug delivery offers a controlled release of the drug into the patient, it enables a steady blood level profile, resulting in reduced systemic side effects and, sometimes, improved efficacy over other dosage forms.

Satish A. Bhalerao et al., (2016) Ipomoea Carnea Jacq., frequently referred to as Bush Morning Glory, is a plant that is native to the tropics of South America and is in the family Convolvulaceae. It is found growing in dense populations along river bottoms, river banks, canals, and other wetland environments. As a result, there is a great deal of potential for pharmacological properties such as anti-inflammatory, anti-fungal, hepatoprotective, anti-diabetic, antimicrobial, cardiovascular, anti-oxidant, anxiolytic, immunomodulatory, anti-bacterial, anti-cancer, and wound healing activities in this evergreen, flowering shrub. It is utilized in a variety of conventional medicinal practices, such as Ayurveda, Siddha, and Unani. It has an ingredient that is the same as marlin, an anticonvulsant and sedative. The effects of this plant on India's indigenous flora and wildlife are mostly unknown

Gore S.A. et al., (2017) Transdermal delivery system (TDS) advancements have improved the delivery of therapy using both conventional and innovative medications, which has had a major effect on medical practice. Approximately 74% of medications administered today are taken orally and are not as effective as expected. Transdermal medication delivery systems were developed to enhance such features. Transdermal drug delivery is different from conventional topical drug administration in that it involves delivering medication via the skin to have a systemic impact. Because medications are given via the skin at a predefined and regulated

pace, transdermal drug delivery systems can increase the therapeutic effectiveness and safety of the drugs. The important medication application location for both local and systemic effects is the skin.

DEIJY CHOUDHURY et al., (2021) Since it is a non-invasive drug administration technique with longer therapeutic impact, fewer side effects, enhanced bioavailability, higher patient compliance, and simple termination of medication therapy, the transdermal drug delivery system is well-accepted due to its many benefits. The most widely used medications for the treatment of pain and inflammatory reactions are non-steroidal anti-inflammatory drugs (NSAIDs), which include Diclofenac sodium, Lornoxicam, Aceclofenac, Ibuprofen, antihypertensive drugs like Repaglinide, Atenolol, and antiviral agents like Stavudine, zidovudine. However, their use may be restricted due to various side effects.

K.H. Shaltout et al., (2006) The South American Native *Ipomoea Carnea* grows in dense numbers in river bottoms, banks, canals, and other waterlogged (wetland) environments. It has become a naturalized species in the Nile Delta, invading canal and drain banks, roadsides, and field borders. This plant reproduces vegetatively by stems that can root in a matter of days or sexually via seeds. It is used by farmers as an ornamental and hedge plant along field edges, drains and canal banks. These attractive applications and seed reproduction have facilitated the plant's spread into new areas, particularly in terrestrial settings.

Plant Profile:

Ipomoea Carnea, the pink morning glory, is a species of morning glory that grows as a bush. This flowering plant has heart-shaped leaves that are a rich green and 6–9 inches (15–23 cm) long. It can be easily grown from seeds. These seeds are toxic and they can be hazardous to cattle; the toxicity is related to the swains nine produced by its endophytes, and to bioaccumulation of selenium in the leaves but mostly in the seeds.



Fig No. 5: *Ipomoea Carnea* Jacq

The stem of *I. Carnea* can be used for making paper. The plant is also of medicinal value. It contains a component identical to marlin, a sedative, and an anticonvulsant. A glycosidic saponin has also been purified from *I. Carnea* with anticarcinogenic and oxytocic properties. One selection of *I. Carnea*, 'Inducer', has been used as a rootstock for inducing flowering of sweet potato cultivars which otherwise prove reticent to produce flowers. Another common name is "bush morning glory", particularly in temperate North America, which usually refers to *I. leptophyllous*.

In Brazil, *I. Carnea* (in addition to other common names) is known as can-do-de-pito, literally "pipe-cane", as its hollow stems were used to make tubes for tobacco pipes. It thus became the namesake of Canudos, a religious community in the sertão of Bahia, over which the War of Canudos was fought from 1893–1897. The shrub *Ipomoea Carnea* (*I. Carnea*) is up to 2.5m tall, of which, branches are ascending, usually fistular, and contain milky juice. The stem of *I. Carnea* is erect, woody, hairy, more or less cylindrical in shape and greenish in colour, monopodial-ly branched, and bears alternate leaves. The seed is three-sided, with two flat ventral surfaces that may have a central depression and one convex dorsal surface. *Ipomoea Carnea* belongs to the class of Magnoliophyte and the family Convolvulaceae. The *I. Carnea* is highly distributed throughout the American

tropics, ranging from Argentina to the southern parts of the USA. This plant species has also been reported from South Asia, including Bangladesh, India, Pakistan, and Sri Lanka, and several African countries like Egypt, Kenya, and the coast of tropical East Africa. It is quite a common flower in the rural areas of Bangladesh and India as well as the roadside. In some parts of China, including Hainan, Guangxi, as well as Taiwan, the

I. Carnea sub-species *I. fistulosa* is cultivated. Ecological amplitude for *I. Carnea* is much wide, and they are observed to grow in xeric and hydric conditions. *I. Carnea* commonly grows in dense populations along river beds, drain banks, roadsides, field edges, banks, canals, and other waterlogged areas. *Ipomea Carnea* is a flowering plant and is cultivated in the garden as an ornamental plant. It is also cultivated as a hedge plant in crop fields, fences, and firewood (dry) due to its rapid propagating behaviour, wide ecological amplitude, and extraordinary competitive abilities.

A photograph of *I. Carnea* is presented in Figure 1. Before the recent flourishing of pharmacological properties, *I. Carnea* was used as a medicinal plant by several communities within the framework of folk medicine, mostly in the Indian subcontinent. The milky juice of this plant is used for the treatment of leukoderma and other related skin diseases, as well as topical anti-septic in lesions [16, 17], and the boiled roots are used as laxative and menstruation provocation [18]. In the central Himalayas, *I. Carnea* is used for rheumatism and gout treatment [19]. Among other traditional uses of this plant, treatments for venereal diseases, dysentery, hypertension, and immunodeficiency are notable [20]. This review summarizes the medicinal importance of *I. Carnea* with possible mechanisms of action, which have been evaluated by scientific studies. Also, the adverse effects of this plant and its chemical properties have been explored. This may be beneficial for the pharmacological establishment of *I. Carnea* from traditional use to modern health science

Scientific Classification:

Kingdom: Plantae

Sub-kingdom: Tracheobionta

Division: Spermatophyta

Subdivision: Magnoliophyta

Class: Magnoliopsida - Dicotyledons

Subclass: Asteridea

Order: Solanales

Family: Convolvulaceae

Genus: *Ipomoea*

Species: *Ipomoea Carnea* Jacq



Fig No. 6: Ipomoea Carnea Jacq

Pharmacological potential

Antioxidant activity:

It was studied that the methanolic extract of Ipomoea Carnea was dissolved in distilled water and partitioned with n-hexane, chloroform, ethyl acetate, and n-butanol consecutively. The antioxidant potential of all these fractions and the remaining aqueous fraction was assessed by four methods: DPPH free radical scavenging activity, total antioxidant activity, FRAP assay, and ferric thiocyanate assay, and total phenolics were also determined. It was found that the percentage inhibition of DPPH radical was highest for the n-Butanol fraction (91.11% } 0.68), and total antioxidant activity was highest for chloroform (0.9096 } 0.1). FRAP value was highest for ethyl acetate fraction (511.99 } 1.8 μ g of trolox equivalents). Total phenolic contents were maximum for chloroform fraction (113.05 } 1.2 mg of gallic acid equivalents) (Abbasi et al., 2010; Gaur et al., 2009; Adsul et al., 2012).

Wound healing activity:

Ambiga et al. (2007) reported when fresh flowers of Ipomoea Carnea were extracted with 95% ethanol and the extract was concentrated in a vacuum the aqueous concentrate was treated with successive fractions of various solvents viz., diethyl ether, chloroform, and ethyl acetate. The fresh flowers of Ipomoea Carnea contain Kaempferol and its 3-O- β -D glucoside. These were known to retain considerable wound-healing activity. Wound healing normally involves an initial inflammatory phase followed by fibroblast proliferation, formation of collagen fibres, and shrinking and drying of the scar. These phases are simultaneous but independent of each other. These activities are comparable to Sulphathiazole and considerably improved than untreated wounds.

Anti-inflammatory activity:

Aqueous extracts of mature green leaves of Ipomoea Carnea were tested for anti-inflammatory activity. The extracts were used at a dose of 250 mg/kg and 500 mg/kg body weight. The study concluded that Ipomoea Carnea leaves possess a strong anti-inflammatory activity at the dose of 500 mg/kg and possesses better result as compared to Etoricoxib 6 mg/kg (Khalid et al., 2011).

Antifungal activity:

Antifungal activity of Ipomoea Carnea has been demonstrated against *Alternaria alternate* and *Curvularia lunata* (Agarwal and Uppadhyay, 1997). Chloroform and Methanol extract of Ipomoea Carnea revealed antifungal activity against eleven pathogenic and non-pathogenic fungi (Ikeda, et al., 2003). Antifungal fractions of the leave of Ipomoea Carnea were attained using *Colletotrichum loeosporioide* sand *Cladosporium cucumerinum* as test organisms. Thea the activity of the purified fraction was further established by the dose-dependent inhibition of the spore germination of *Alternaria alternate* and *A. porri*. The active fraction was recognized as a mixture of (E) octadecyl p- coumarate and (Z)-octadecyl p-coumarate (Nidiry et al.,2011).

Antidiabetic activity:

The study revealed that when antidiabetic properties of Ipomoea Carnea leaves were carried out in normal rats and streptozotocin-induced diabetic rats; the aqueous extract of Ipomoea Carnea considerably reduces the blood glucose level of rats. It increases glucose tolerance in normal rats (Kadiyawala et al., 2012).

Hepatoprotective activity

Ipomoea Carnea can be a favourable bioactive substance for the prevention and treatment of liver injury (Gupta et al., 2012). Ipomoea Carnea holds good hepatoprotective activity using CCl₄-induced hepatotoxicity in rats. This hepatotoxicity is due to free radicals CCl₃ which is a metabolite. It lessens the alkalization of cellular proteins and other macromolecules with a simultaneous attack on polyunsaturated fatty acids to produce lipid peroxide (Bishayee et al.,1995).

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Need for Study:

Transdermal medication delivery is a multibillion-dollar industry, with the Federal Medication Administration approving one transdermal every 2.2 years on average. The Food and Medicine Administration authorized the first transdermal medicine patch around 40 years ago, necessitating a thorough examination of the technology, industry, and products. Patches are a novel technology that allows for on-demand transdermal medication delivery systems. The physicochemical and pharmacokinetic features of an active medication that allows distribution over the skin are the limiting variables for transdermal delivery methods. This research provides an overview of the skin structure and the natural barrier it provides for medications to be delivered transdermal. Clinical studies, patents, commercialization, and the benefits and limits of the invention are all investigated.

PLANT PROFILE

• Gelatine:

Gelatine (from Latin: gelatus 'stiff' or 'frozen') is a translucent, colourless, flavourless food ingredient, commonly derived from collagen taken from animal body parts. It is brittle when dry and rubbery when moist. It may also be referred to as hydrolysed collagen, collagen hydrolysate, gelatine hydrolysate, hydrolysed gelatine, and collagen peptides after it has undergone hydrolysis. It is commonly used as a gelling agent in food, beverages, medications, drug or vitamin capsules, photographic films, papers, and cosmetics. Substances containing gelatine or functioning in a similar way are called gelatinous substances. Gelatin is an irreversibly hydrolysed form of collagen, wherein the hydrolysis reduces protein fibrils into smaller peptides; depending on the physical and chemical methods of denaturation, the molecular weight of the peptides falls within a broad range. Gelatin is present in gelatine desserts, most gummy candy and marshmallows, ice creams, dips, and yogurts.[1] Gelatin for cooking comes as powder, granules, and sheets. Instant types can be added to the food as they are; others must soak in water before hand. Gelatin is a collection of peptides and proteins

produced by partial hydrolysis of collagen extracted from the skin, bones, and connective tissues of animals such as domesticated cattle, chickens, pigs, and fish. During hydrolysis, some of the bonds between and within component proteins are broken. Its chemical composition is, in many aspects, closely similar to that of its parent collagen.[2] Photographic and pharmaceutical grades of gelatine generally are sourced from cattle bones and pig skin. Gelatin is classified as a hydrogel.



Fig No.7: Gelatine

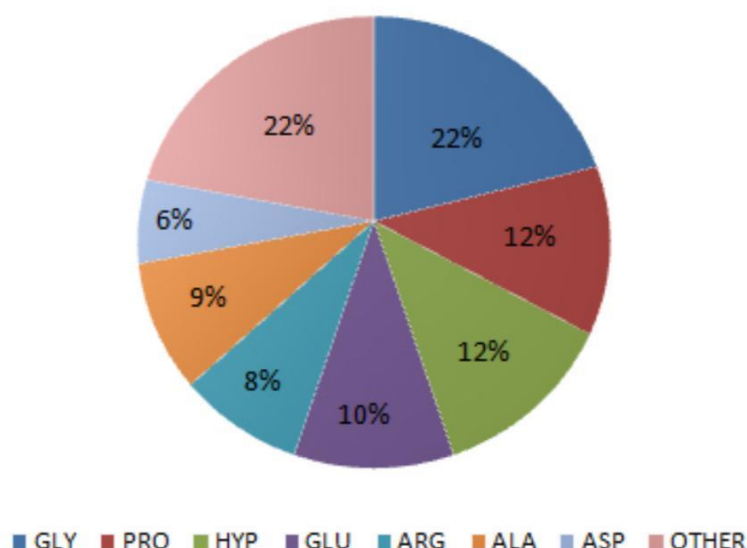


Fig No.8: Amino Acid Composition of Gelatin

Gelatin is nearly tasteless and odourless with a colourless or slightly yellow appearance.[3][4] It is transparent and brittle, and it can come as sheets, flakes, or as powder.[3] Polar solvents like hot water, glycerol, and acetic acid can dissolve gelatine, but it is insoluble in organic solvents like alcohol.[3] Gelatin absorbs 5–10 times its weight in water to form a gel.[3] The gel formed by gelatine can be melted by reheating, and it has an increasing viscosity under stress (thixotropic).[3] The upper melting point of gelatine is below human body temperature, a factor that is important for the mouthfeel of foods produced with gelatine.[5] The viscosity of the gelatin-water mixture is greatest when the gelatin concentration is high and the mixture is kept cool at about 4 °C (39 °F). Commercial gelatine will have a gel strength of around 90 to 300 grams Bloom using the Bloom test of gel strength.[6] Gelatine's strength (but not viscosity) declines if it is subjected to temperatures above 100 °C (212 °F), or if it is held at temperatures near 100 °C for an extended period of time.[7][8] Gelatines have diverse melting points and gelation temperatures, depending on the source. For example, gelatin derived from fish has a lower melting and gelation point than gelatin derived from beef or pork.[9] When dry, gelatin consists of 98–99% protein, but it is not a nutritionally complete protein since it is missing tryptophan and is deficient in isoleucine, threonine, and methionine.[10] The amino acid content of hydrolysed collagen is the same as collagen. Hydrolysed collagen contains 19 amino acids, predominantly glycine (Gly)

26–34%, proline (Pro) 10–18%, and hydroxyproline (Hyp) 7–15%, which together represent around 50% of the total amino acid content.[11] Glycine is responsible for the close packing of the chains. The presence of proline restricts the conformation. This is important for the gelation properties of gelatin.[12] Other amino acids that contribute highly include alanine (Ala) 8–11%; arginine (Arg) 8–9%; aspartic acid (Asp) 6–7%; and glutamic acid (Glu) 10–12%.[11]

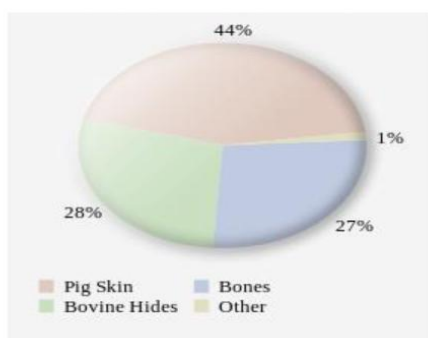


Fig. No 9: Material Used in Production

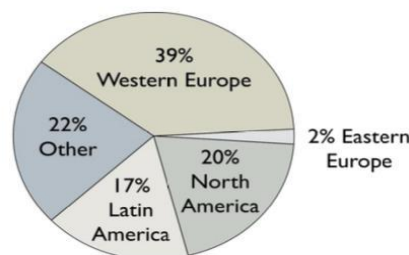


Fig No. 10: Gelatin Production by Geography

Fig. No 9: Material Used in Production. Fig No. 10: Gelatin Production by

GeoThe worldwide demand of gelatin was about 620,000 tonnes (1.4×10

9 lb) in 2019.[35] On a commercial scale, gelatin is made from by-products of the meat and leather industries. Most gelatin is derived from pork skins, pork, cattle bones, or split cattle hides.[36] Gelatin made from fish by-products avoids some of the religious objections to gelatin consumption.[5] The raw materials are prepared by different curing, acid, and alkali processes that are employed to extract the dried collagen hydrolysate. These processes may take several weeks, and differences in such processes have great effects on the properties of the final gelatin products.

Uses of gelatin

- Certain professional and theatrical lighting equipment use colour gels to change the beam colour. Historically, these were made with gelatin, hence the term, colour gel.
- Originally, gelatin constituted the shells of all drug and vitamin capsules to make them easier to swallow. Now, a vegetarian-acceptable alternative to gelatin, Hypromellose, is also used and is less expensive than gelatin to produce.graphy
- Some animal glues such as hide glue may be unrefined gelatin.
- It is used to hold silver halide crystals in an emulsion in virtually all photographic films and photographic papers. Despite significant effort, no suitable substitutes with the stability and low cost of gelatin have been found.
- Used as a carrier, coating, or separating agent for other substances, for example, it makes β -carotene water-soluble, thus imparting a yellow colour to any soft drinks containing β -carotene.
- Ballistic gelatin is used to test and measure the performance of bullets shot from firearms.
- Gelatin is used as a binder in matchheads [50]and sandpaper.[51]
- Cosmetics may contain a non-gelling variant of gelatin under the name hydrolysed collagen(hydrolysate).
- Gelatin was first used as an external surface sizing for paper in 1337 and continued as adominant sizing agent of all European papers through the mid-nineteenth century.[52] In modern times, it is mostly found in

watercolour paper, and occasionally in glossy printing papers, artistic papers, and playing cards. It maintains the wrinkles in crêpe paper.

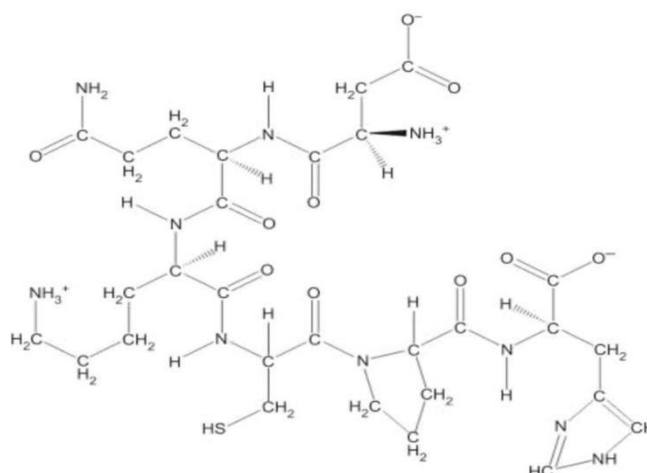


Fig No.11 Structure of Gelatine

Xanthan gum:

Xanthan gum is a polysaccharide with many industrial uses, including as a common food additive. It is an effective thickening agent, emulsifier, and stabilizer that prevents ingredients from separating. It can be produced from simple sugars using a fermentation process and derives its name from the species of bacteria used, *Xanthomonas campestris*.

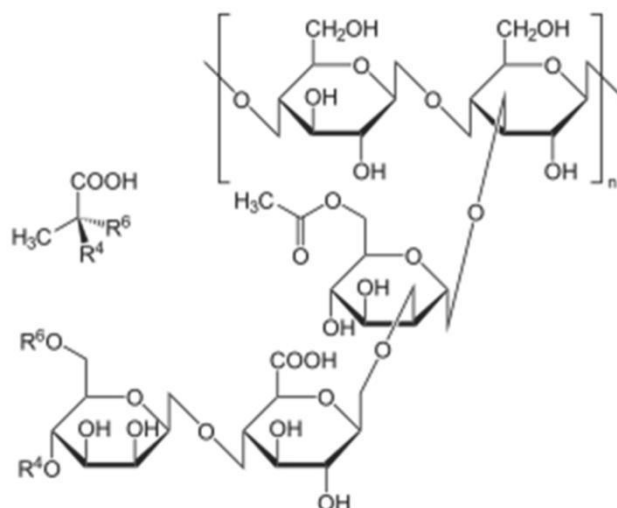


Fig No. 12: Structure of Xanthene

Xanthan gum was discovered by Allene Rosalind Jeanes and her research team at the United States Department of Agriculture and brought into commercial production by CP Kelco under the trade name Kelzan in the early 1960s.[2][3] It was approved for use in foods in 1968 and is accepted as a safe food additive in the USA, Canada, European countries, and many other countries, with E number E415, and CAS number 11138-66-2.

Uses:

Xanthan gum, 1%, can produce a significant increase in the viscosity of a liquid.[5] In foods, xanthan gum is common in salad dressings and sauces. It helps to prevent oil separation by stabilizing the emulsion, although it is not an emulsifier. Xanthan gum also helps suspend solid particles, such as spices. Xanthan gum helps create the desired texture in many ice creams. Toothpaste often contains xanthan gum as a binder to keep the product uniform. Xanthan gum also helps thicken commercial egg substitutes made from egg whites, to replace the fat and emulsifiers found in yolks. It is also a preferred method of thickening liquids for those with swallowing disorders since it does not change the colour or flavour of foods or beverages at typical use levels.[6] In gluten-free baking, xanthan gum is used to give the dough or batter the stickiness that would otherwise be achieved with gluten. In most foods, it is used at concentrations of 0.5% or less. Xanthan gum is used in a wide range of food products, such as sauces, dressings, meat and poultry products, bakery products, confectionery products, beverages, dairy products, and others. In the oil industry, xanthan gum is used in large quantities to thicken drilling mud.[7] These fluids carry the solids cut by the drilling bit to the surface. Xanthan gum provides great "low-end" rheology. When the circulation stops, the solids remain suspended in the drilling fluid. The widespread use of horizontal drilling and the demand for good control of drilled solids has led to its expanded use. It has been added to concrete poured underwater, to increase its viscosity and prevent washout.

Application:

- Because of its unique structure, xanthan gum has a thick consistency and functions as a stabilizer in a variety of industrial applications.
- Its application as a stabilizer and thickening in salad dressings is the most notable. Oiling off and separation of insoluble solid particles are inhibited by the three-dimensional network produced by the linked xanthan gum chains.
- Mixability, pump ability, and pourability of industrially manufactured dressings and sauces are further aided by the shear-thinning flow behaviour.
- In desserts, toppings, as well as in dairy products, xanthan gum is used as a stabilizer, generally in combination with other hydrocolloids.
- Frozen foods may show syneresis after one or two freeze-thaw cycles. Xanthan gum can improve product stability by binding free water. This limits ice crystal growth and provides the desired texture.
- In desserts, toppings, as well as in dairy products, xanthan gum is used as a stabilizer, generally in combination with other hydrocolloids. Glycerine/glycerol: Glycerol (/ˈɡlɪsərɒl/), [6] also called glycerine or glycerine, is a simple triol compound. It is a colourless, odourless, viscous liquid that is sweet-tasting and non-toxic. The glycerol backbone is found in lipids known as glycerides. Because it has antimicrobial and antiviral properties, it is widely used in wound and burn treatments approved by the U.S. Food and Drug Administration. Conversely, it is also used as a bacterial culture medium.[7] Its presence in blood can be used as an effective marker to measure liver disease. It is also widely used as a sweetener in the food industry and as a humectant in pharmaceutical formulations. Because of its three hydroxyl groups, glycerol is miscible with water and is hygroscopic in nature.

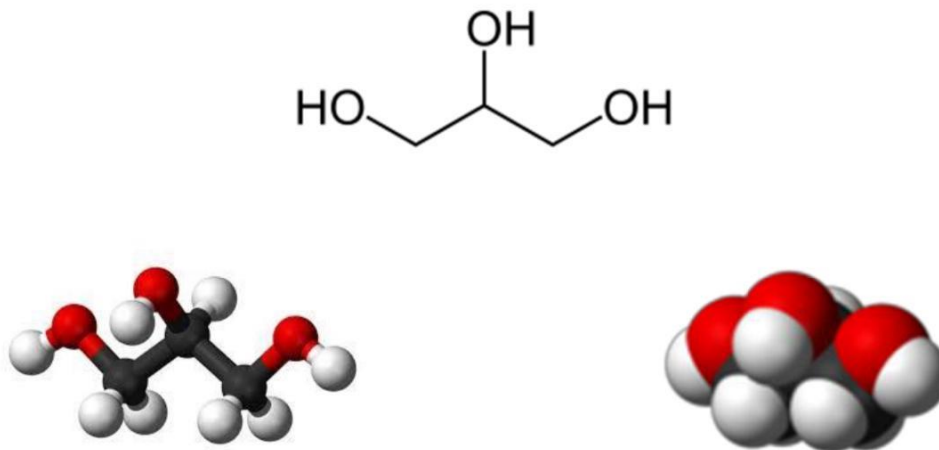


Fig No.13: Structure of Glycerine

Triglycerides can be saponified with sodium hydroxide to give glycerol and fatty sodium salt or soap.

Uses

- Swelling (inflammation) of membranes that protect the brain and spinal cord (meningitis). Taking glycerol by mouth doesn't reduce the risk of death or seizures in people with bacterial meningitis. But it might reduce the risk of deafness in children who survive the infection.
- Growth and development in premature infants. Giving glycerol into the rectum, as a suppository or as an enema, doesn't seem to help premature infants start to take food by mouth sooner.

MATERIAL AND METHOD

List of chemicals

Sr. No	Chemical Names
1	Ethanol
2	Gelatine
3	Xanthan Gum
4	Glycerine
5	Water

List of equipment's

Sr. No	Name Of Equipment	Purpose
1	Desiccator	Moisture content studies
2	Digital Vernier calliper	Patch thickness Studies
3	Electronic balance	Weighing purpose
4	Magnetic Stirrer	Diffusion Studies
5	Digital pH meter	Surface pH study
6	UV Spectrophotometer	Determination of Absorption maxima & concentration of active substances

Extraction Process:

Extraction is the isolation of medicinally active components of a substance. The plant using selective and standard procedures. It is the extraction of desired chemical components from plant materials for subsequent separation and analysis is a critical initial step in the investigation of medicinal plants characterization. There are several extraction methods for the separation of natural products from plants present. These methods can be called conventional (long been used) and modern (developed more recently). Conventional techniques are the ones using organic solvents or water and are traditionally performed at atmospheric pressure, whereas contemporary procedures employ pressure and/or extreme temperatures. Extraction methods include solvent extraction, distillation method, pressing, and sublimation according to the extraction principle. Solvent extraction is the most widely used method. The extraction of natural products progresses through the following stages: the solvent penetrates into the solid matrix; the solute dissolves in the solvents; the solute diffuses out of the solid matrix; the extracted solutes are collected. For extraction procedures, solvents such as water, ethanol, chloroform, dichloromethane, hexane, ethyl acetate, methanol, etc. are most commonly used. The conventional extraction methods generally use organic solvents and necessitate a significant number of solvents and a lengthy extraction time. Modern extraction techniques have also been used in natural product extraction and they offer some advantages such as lower organic solvent consumption, shorter extraction time, and improved extraction yield.

Methods of Extraction of Medicinal Plants

Maceration

In this method, the solvent is added to the entire or coarsely powdered crude drugs, which is then let to stand at room temperature for at least three days while being frequently stirred to dissolve the soluble materials. After pressing the marc (the damp solid material), the resulting mixture is next strained, and the mixed liquids are purified by filtering or decantation.

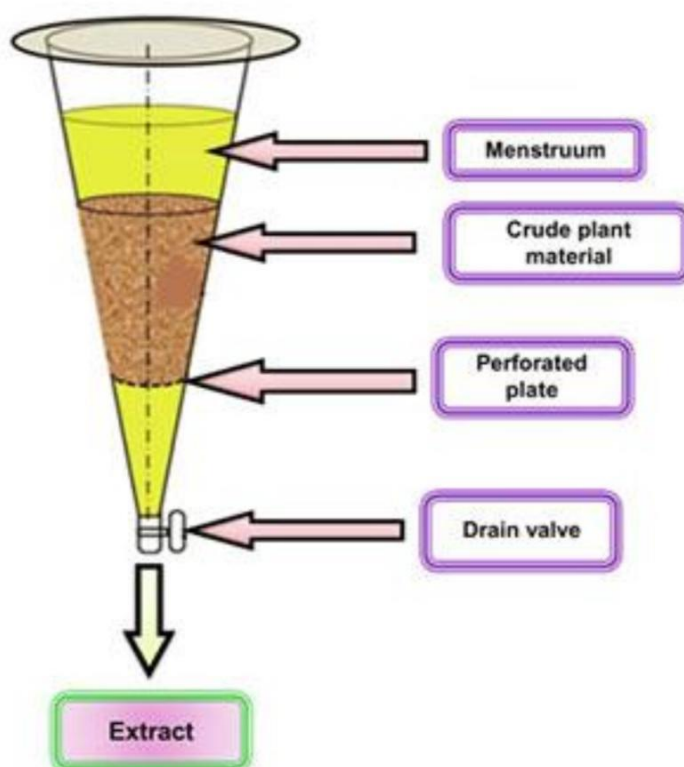


Fig No. 14: Maceration

Infusion:

By briefly macerating the raw medication with cold or hot water, fresh infusions are made. The readily soluble components of crude medicines are present in these diluted solutions.

Digestion:

In this type of maceration, the extraction process involves the usage of low heat. When the fairly high temperature is not offensive, it is employed. This improves the menstruum's ability to act as a solvent.

Percolation

The method most often employed to extract active components for tinctures and fluid

extracts is this one. In most cases, a percolator (a thin, conical vessel open at both ends) is utilized. A suitable amount of the prescribed menstruum is used to wet the solid components, which are then allowed to stand for about 4 hours in a tightly covered container before the mass is packed and the percolator's top is closed. The combination is mixed with a more menstrual fluid to create a thin layer over the bulk and is then allowed to macerate for 24 hours in a closed percolator. The percolator's outlet is then opened, allowing the liquid within to trickle gradually. When necessary, more menstruum is added until the percolate measures around a fifth of the end product's needed volume. The liquid from the squeezed marc is then added to the percolate. The necessary amount of menstrual fluid is added, and the resulting mixture is purified by filtration or by standing followed by decanting.

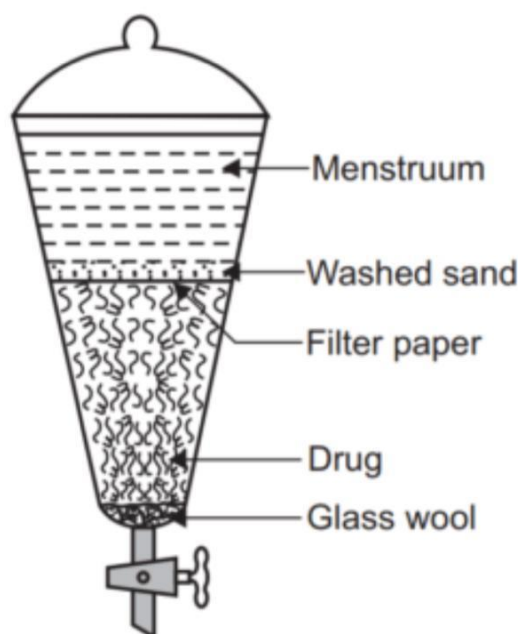


Fig No.15: Percolation

Identification Of Chemical Constituent:

The chemical constituent is present the Ipomea Carnea is identified by following identification test

1. Shinoda test: Dried Extract + Ethanol + Conc. HCL its gives pink colour.
2. Extract + 0.1g of Metallic zinc + 8 ml of conc. Sulphuric acid Orange colour.

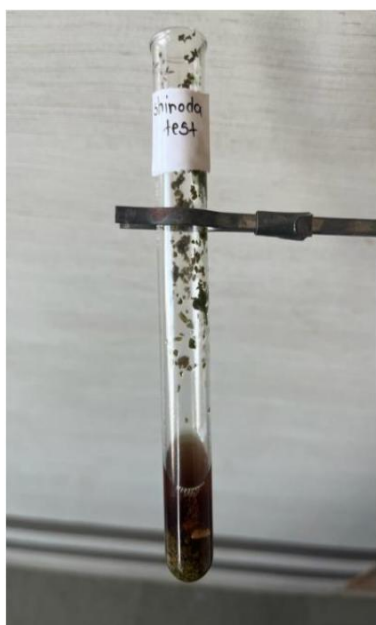


Fig No.16: Shinoda Test.



Fig No. 17: Pews Test.

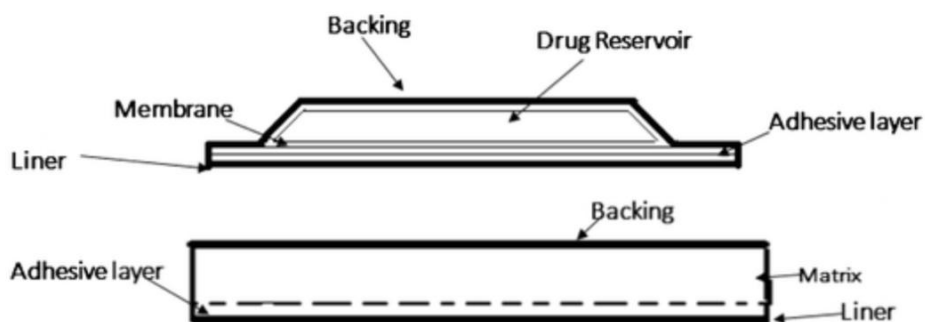
Raw material:

Fig No 18: Transdermal Patch Various Parts

Fig No 18: Transdermal Patch Various Parts

Backing – The outermost layer of the patch, which protects the formulation during the wear period.

Drug – The drug contained within the membrane or in the adhesive.

Membrane – The film that controls the rate of drug diffusion out of the patch, to the skin.

Adhesive – The skin-contacting layer that adheres the patch to the skin.

Overlaminates Tape – The external protective covering or functional layer which can be directly integrated into the patch design.

Release Liner – Protects the skin-contacting adhesive during storage and is removed prior to application of the patch.

STEP 1: CONSIDER THE DRUG PROPERTIES

The transdermal patch design is dictated by the properties of the drug. If you're working with an active ingredient, you've likely already characterized it. These are typically the main areas considered:

Molecular weight: The size of the drug molecule – only small molecules can penetrate the skin – typically less than 500 Daltons.

Lipophilicity: The lipophilicity of the drug will determine how readily the drug is absorbed into the body's oils.

Dosage form: In what form will the drug be administered?

Salt: The drug's salt form also determines how quickly it can be absorbed into the skin.

Length of time-worn: The dosage will depend on the duration of time the patch will be

worn. Administering 3 mg versus 10 mg is a big difference. You have to be reasonable as to how much drug you can get into the patch, and how long it can realistically be worn.

Melting point of the active ingredient: Not only must the active ingredient in the drug be suitable for the skin, but it can't be at a level where it prohibits the actual manufacture of the patch itself.

STEP 2: CHOOSE A TRANSDERMAL PATCH DESIGN

Transdermal patches are typically designed in four ways. The properties of the drug, the dosage level, and the time required to administer the drug typically influence which of these designs you choose:

1. **Matrix** – Blends an active ingredient directly into the patch. This is the most common method, which is frequently known as the drug-in adhesive, or DIA.
2. **Classic Reservoir** – Encases an island of the active ingredients. Typically a blister pouch with a rate-controlling membrane on one side and impervious backing on the other.
3. **Polymer Reservoir** – Semi-solid drug-containing polymer matrix, in direct contact with the skin, with an adhesive ring around the matrix to adhere to the skin.
4. **Multilaminate Solid-State Reservoir** – Delivers two drugs at different release times.

Commonly uses a bolus dose to begin, and follows with a maintenance dose. We can drill down further into variations of these four overall designs, but these typically comprise the starting point. The approach you choose will be based on the specifications of the drug and the dosage.

STEP 3: SELECTING THE MATERIALS AND THE EQUIPMENT

The next step is choosing the right materials. This includes the liner, backing, membrane, and overlamine tapes — all of which must be balanced with the drug properties and the chosen design. The production equipment also factors into the material consideration. If a patch manufacturer has materials that require processing under low tension, they must also have the right transdermal patch manufacturing equipment on hand.

Procedure:

- 1) The collected leaf is dried in air and sunlight.



Fig No. 19: Dried Leaves Of Ipomea Carnea

2) The dried leaves are converted into Fine and coarse powder.



Fig No. 20: Trituration Of Dried Leaves Fig No. 21: Fine And Coarse Powder

3) Filtration Process, The Fine And Coarse powder is soaked in the Funnel in the presence of the ethanol.



Fig No. 21: Extraction Process

4) Transdermal patches containing ipomoea Carnea were prepared by the solvent evaporation technique.

5) first Take 7.5 ml of water in the glass beaker and keep it for boiling in water bath for 5 min.

6) Weigh 1.25 gm of gelatine and add in the water with continuously stirring till the gelatine dissolves completely.



Fig no. 22: Dissolution Of Ingredient

7)After that Weigh 0.75 gm xanthan gum and mix in the gelatine.



Fig No. 23: Dissolution of Xanthene Gum and Gelatine

8)and then Cool down the mixture under the running water.

9)Once the mixture is cool down then add 1 ml of drug (ipomoea Carnea) extract in the above solution.

10)then which was lubricate by Adding 1.5 ml of glycerine and mix it by continuous stirring.

11)Prepare the petri plate by washing and drying.

12)Pour the solution into the petri plate without disturbance keep it for 24 hours for drying at room temperature.



Fig No. 24: Drying Of Prepared Transdermal Patch

13)After the complete drying remove the patch from petri plate by peeling and cut into squares.

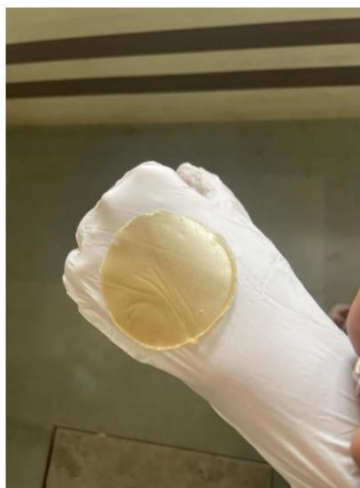


Fig No. 25: Transdermal Patch

Formulation Table:**Xanthan Gum**

Xanthan gum	0.5
Distilled water	7.5ml
Drug	1 ml
Glycerin	0.030

Cellulose

Cellulose	0.5
Ethanol	7 ml
Drug	1ml
Propylene glycol	0.030

Main Formulation Table

Xanthene gum	0.75g
Gelatin	1.25g
Water	7.5ml
Glycerin	1.5ml
Drug	1ml

Formulation Table:

No	Drug	Xanthan Gum	Gelatin	Water	Glycerin	Methane: chloroform 3:2
F1	1 ml	0.55	1.05	5.5 ml	0.25 ml	3:2
F2	1 ml	0.65	1.15	6.5 ml	0.5 ml	3:2
F3	1 ml	0.75	1.25	7.5 ml	1.5 ml	3:2
F4	1 ml	0.85	1.35	8.5 ml	2.5 ml	3:2
F5	1 ml	0.95	1.45	9.5 ml	3.5 ml	3:2

Evolution Parameter:

1) Thickness of Patch: The thickness of the drug prepared patch is measured by using digital micrometre at different point of patch and this determines the average thickness and standard deviation for the same to ensure the thickness of the prepared patch.

2) Weight uniformity: The prepared patches are to be dried at 60°C for 4 h before testing. A specified area of patch is to be cut in different parts of the patch and weighed in digital balance. The average weight and standard deviation values are to be calculated from the individual weights.

3) Folding endurance: A specific area of strip is cut and repeatedly folded at the same place till it broke. The number of times the film could be folded without breaking gave the value of folding endurance.

4) Percentage moisture: content The prepared patches are to be weighed individually and to be kept in a desiccator containing fused calcium chloride at room temperature. After 24 h, the films are to be reweighed and the percentage moisture content determined by below formula.

Percentage moisture content (%) = $[(\text{Initial weight} - \text{Final weight}) / \text{Final weight}] \times 100$.



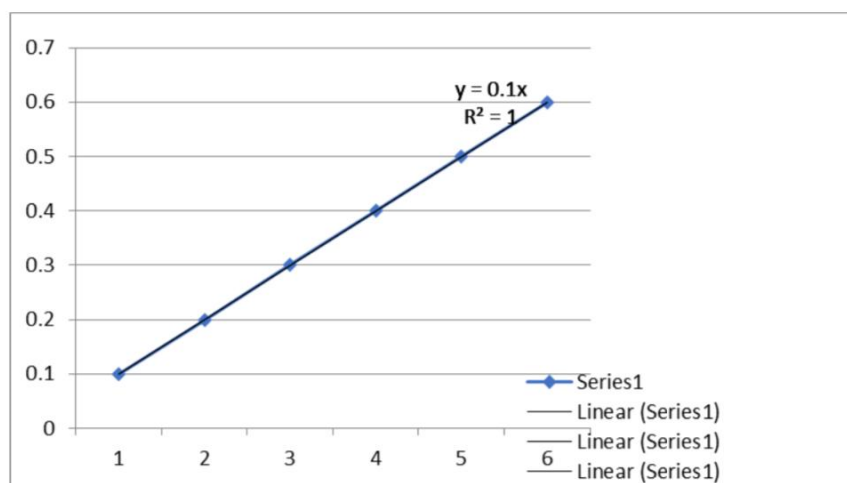
Fig No. 26: Desiccator

5) Percentage moisture: uptake The prepared patches are to be weighed individually and to be kept in a desiccators containing saturated solution of potassium chloride in order to maintain 84% Rhesus factor (RH). After 24 h, the films are to be reweighed and the percentage moisture uptake determined by the formula.

$$\text{Percentage moisture uptake (\%)} = (\text{Final weight} - \text{Initial weight} / \text{initial weight}) \times 100$$

6) Drug content: A specified area of patch is to be dissolved in a suitable solvent in specific volume. Then, the solution is to be filtered through a filter medium and the drug content analysed with the suitable method (UV or HPLC technique). Then, the average of three different samples is taken.

x	y
2	0.1
4	0.2
6	0.3
8	0.4
10	0.5
12	0.6
14	0.7
16	0.8
18	0.9
slope:	0.05
y-intercept:	0



7) Content uniformity test: Ten (10) patches were selected and content determined for individual patches. If 9 out of 10 patches have content between 85 to 115% of the specified value and one has content not less than 75 to 125% of the specified value, then transdermal patches pass the test of content uniformity. But if 3 patches have content in the range of 75 to 125%, then additional 20 patches are tested for drug content. If these 20 patches have range from 85 to 115%, then the transdermal patches pass the test.

8) Peel Adhesion: Properties Peel adhesion is the force required to remove all adhesive coating from test substrate, its important in transdermal devices because the adhesive should provide adequate contact of device with the skin of the adhesive polymer, the type and amount of adhesive and polymer composition. It's tested by measuring the force required to pull a single coated tape, applied to substrate, at a 180o angle, No residue on the substrate indicates adhesive failure which is desirable for transdermal devices, remnants on substrate indicates cohesive failure.

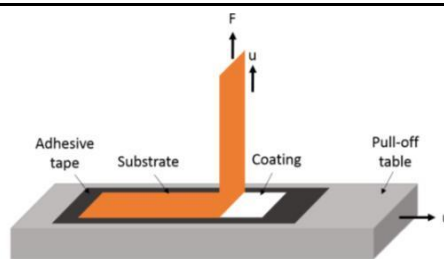


Fig No. 27: Peel Adhesion

9) Rolling Ball Tack: Test This test involves measurement of distance travelled by a stainless steel along the upward face of adhesive. The diameter of ball is 7/160 inches and it diffusion on inclined track having angle 22.5 or more the distance travelled, less the tacky polymer. Distance travelled by ball is measured in inches which determine the tackiness of polymer. It determines the softness of adhesive polymer.

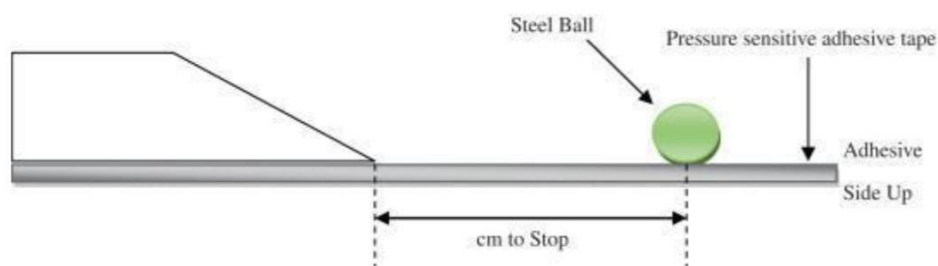


Fig No. 28: Rolling Ball Tack

10) Tack Properties: Tack is the ability of a polymer to adhere to substrate with little contact pressure. It is important in transdermal devices which are applied with finger pressure. Tack is dependent on the molecular weight and composition of polymer as well as use tackifying resins in the polymer.

11) Thumb Tack Test: This is subjective test in which evaluation is done by pressing the thumb briefly into the adhesive experience is required for using test.

12) Cell Diffusion: The most common technique for measuring dermal absorption in vitro is application of the test substance in an appropriate formulation (may be radiolabelled) to the surface of a skin sample, which is mounted as a barrier between the donor compartment and the receptor compartment of a diffusion cell. Diffusion cells may be of static or flow-through. Static diffusion cells sample this chamber and replace with new perfusate at each timepoint. Flow-through cells use a pump to pass perfusate through the receptor chamber and collect flux by repeatedly collecting perfusate. Static diffusion cells can be sub-divided on the basis of the skin orientation: The membrane can be place horizontally or vertically. The majority of skin absorption studies are conducted using horizontal cells, with the skin surface open to the air. The use of vertical (or side-by-side) cells is more common when evaluating drug delivery systems, such as sonophoresis, iontophoresis or electroporation etc., and requires immersion of both surfaces of the skin preparation, which may result in excessive hydration and possibly skin damage. Diffusion cells should consist of inert non-adsorbing material with receptor chamber volumes of about 0.5 – 10 ml and surface areas of exposed membranes of about 0.2 – 2 cm². The test should be carried out with an appropriate number (i.e. minimum six) of skin samples



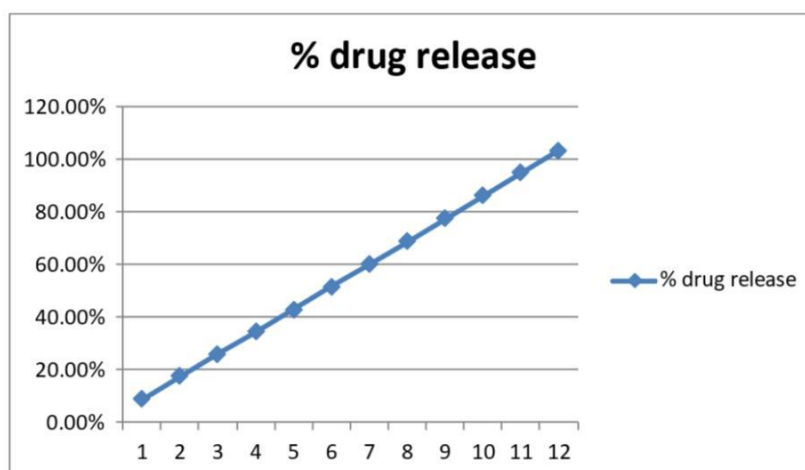
Fig No. 29: Cell Diffusion



Fig No. 30: Egg and Onion Used In Cell Diffusion (Membrane)

Drug Release and Cumulative Frequency:

time	abs	Conc.	Conc. Dilu.	Conc.	cum conc.	Conc. mg	% drug release
5	1.29089	25.8178	12.9089	11618.01	11618.01	11.61801	8.79%
10	1.28276	25.6552	12.8276	11544.84	23162.85	23.16285	17.52%
15	1.22851	24.5702	12.2851	11056.59	34219.44	34.21944	25.88%
20	1.24591	24.9182	12.4591	11213.19	45432.63	45.43263	34.37%
25	1.26255	25.251	12.6255	11362.95	56795.58	56.79558	42.96%
30	1.27369	25.4738	12.7369	11463.21	68258.79	68.25879	51.63%
35	1.25288	25.0576	12.5288	11275.92	79534.71	79.53471	60.16%
40	1.2588	25.176	12.588	11329.2	90863.91	90.86391	68.73%
45	1.27271	25.4542	12.7271	11454.39	102318.3	102.3183	77.40%
50	1.29161	25.8322	12.9161	11624.49	113942.8	113.9428	86.19%
55	1.27592	25.5184	12.7592	11483.28	125426.1	125.4261	94.88%
60	1.24276	24.8552	12.4276	11184.84	136610.9	136.6109	103.34%



Result and Discussion:

The purpose of the project that is anti-inflammatory transdermal patch of ipomoea carina was to make it a point about the extraction of drug by sun drying and crushing, the taken measures to conclude the chemical constituents such as flavonoid in large amount and even with respect to various test Performed to consider proper chemical content and various methods for the extraction of the materials which are proper extracting process such as percolation the crude drug is extracted the drug is thus mixed with the polymer such as gelatine and xanthan gum with it preservative as glycerine by double boiling method and allowed to settle down in petri plate for 24 hours even with that the proper therapeutic index and drug content was measures even with that the dissolution apparatus concluded the drug release also with addition to it the daily dose content was measured for the better dose enhancement with the project for the patch, transdermal patch was made

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