WORLD JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES
ISSN 2278 – 4357 Impact Factor 8.025
Volume 15, Issue 2, 334-343 Research Article Coden USA: WJPPAJ

# FORMULATION AND EVALUATION OF PASSIFLORA INCARNATA TRANSDERMAL PATCH

**[1*]B. Sandhya Rani, [2]Misba, [3]Kadapal Gopal**

[1]Assistant Professor, Safa College of Pharmacy, Kurnool.

[2]Associate Professor, Safa College of Pharmacy, Kurnool.

[3]Assistant Professor, St. Johns College of Pharmaceutical Sciences, Yerrakota.

Article Received on 31 Dec. 2025,
Article Revised on 21 Jan. 2026,
Article Published on 01 Feb. 2026,

https://doi.org/10.5281/zenodo.18425924

***Corresponding Author**

**B. Sandhya Rani**

Assistant Professor, Safa College of Pharmacy, Kurnool.

**How to cite this Article:** *[1]B. Sandhya Rani, [2]Misba, [3]Kadapal Gopal. (2026). Formulation and Evaluation of Passiflora Incarnata Transdermal Patch. World Journal of Pharmacy and Pharmaceutical Sciences, 15(2), 334–343.
This work is licensed under Creative Commons Attribution 4.0 International license.

## ABSTRACT

Maypop or purple passion flower is another name is Passiflora incarnate, Which has medicinal properties, The current research focused on develop the Passiflora incarnata trans dermal patch for controlled and slow delivery of active ingredients. The major advantage in trans dermal patch is improved bioavailability and reduce the GIT rises and to avoid the first pass metabolism, the variety of chemical constituents found in Passiflora incarnata such as Flavonoids, Alkaloids, Glycosides, Beta Carboline alkaloids and amino acids, triterpins, micro-elements. The formulation involved in the design of efficient trans-dermal patches for the incorporation of Passiflora incarnata extract and focus on polymer to provide acceptable adhesion, flexibility and controlled release properties and permeation enhancers incorporated in to the system which allows for enhance penetration through the skin barrier by the active ingredients.

## INTRODUCTION

Passiflora comes from the Latin word “Passio” that was first time discovered by Spanish discoverers in 1529 and was described as a symbol for “Passion of Christ” This plant was used widely in traditional medicine in West India, Mexico, the Netherland, South America, Italia and Argentina. Passiflora contains several compounds including alkaloids, phenols, glycosyl flavonoids and cyanogenic compounds. It has Pharmacological effects for treatment of some diseases like anxiety, opiates withdrawal, insomnia, attention deficit hyperactivity

disorder and cancer.[1] Several pharmacological studies indicate that various bioactive components, such as polyphenols, triterpenes, carotenoids, polysaccharides, amino acids, essential oils, and flavonoids, contribute to the antioxidant, antimicrobial, anti diabetic, hepatoprotective, and anti-inflammatory effects of Passiflora species. Besides their medicinal applications, the fruits of certain species are utilized in the food industry due to their richness in dietary fibers, vitamins, minerals, and other beneficial compounds. The purpose of this review is to systematize the knowledge about the chemical com- position and biological activity of the different plant parts of Passiflora species and relate it to their applications in medicine and cosmetics.[2] The Contemporaneous tense life style is responsible for the wide use anxiolytic substance mainly those of the benzodiazepine groups. These class of synthetic drugs is one of the most prescribed and anxiety drugs in the world to treat stress and anxiety. How ever many risks are associated to their uses such as dependence abstinence syndrome and the reduction of motor reflexes. Their fore the uses and acceptance and herbal medicine and nutraceutical for this purposes including Passiflora species have been growing among doctors and patients.[3] Trans dermal delivery leads to over inject able and oral route by increasing patient complacency and avoiding the first pass metabolism respectably. They can even prevent drug related gastro intestinal problems and low absorption. The goal of the trans dermal drug delivery system is to maximize the skin flux into systemic circulation while reducing the re tension and metabolism of the drug in the skin at the same same time[4] FDA approved the first trans dermal patch in the year 1981 which was developed by alza corp California for the treatment of motion sickness with the drug scopolamine(Transderm scop) and followed by trans derm nitro for the treatment of angina pectoris.[5] The insoluble dietary fiber in P.edulies seeds is over 64.1%In addition the fruits are rich in some flavonoids, such as apigenin-3-rhamnoside (4.01mg per 100grams) Luteolin -3-Glucoside (3.63 mg per 100grams) quercetin (2.21mg per 100grams) and Kaempferol (1.78mg per100grams) The flavonoids might contribute to the anti allergic and anti tumor and anti viral and neuroprotective agents.[6] Passiflora fruits also rich in nitrogen, potassium, Calcium and phosphors for example yellow passion fruit contain 2400mg of nitrogen per 100grams of pulp, Potassium is essential for cell function and nerve impulse transmission and muscle contraction.[7]

## MATERIALS REQUIRED FOR TRANSDERMAL PATCHES

### Polymer Matrix

The Polymer controls the release of the drug from the device.

a) Natural Polymers: Cellulose derivatives, Zine, Gelatin, Shellac, Waxes, Proteins, Gums and their derivatives, Natural rubber, Starch etc.
b) Synthetic Elastomers: Polybutadieine, Hydrin rubber, Polysiloxane, Silicone rubber, Nitrile, Acrylonitrile, Butyl rubber, Styrenebutadieine
c) rubber, Neoprene etc.
d) Synthetic Polymers: Polyvinyl alcohol, Polyvinyl chloride, Polyethylene, Polypropylene, Polyacrylate, Polyamide, Polyurea, Polyvinylpyrrolidone, Polymethylmethacrylate, Epoxy etc.[8][9]

**2. Drug**

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

**Physicochemical properties**

1. The drug should have a molecular weight less than approximately 1000 daltons.
2. The drug should have affinity for both-lipophilic and hydrophilic phases. Extreme partitioning characteristics are not conducive to successful drug delivery via the skin.
3. The drug should have a low melting point. Along with these properties the drug should be potent, having short half life and be non irritating.[10]
4. Permeation Enhancers (Cal K et al., 2000) These are compounds which promote skin permeability by altering the skin as a barrier to the flux of a desired penetrans.

**DETAILED DESCRIPTION ABOUT PASSIFLORA INCARNATA**

**TOXONOMY**

| | | |
|---|---|---|
| Kingdom | : | Plantae. |
| Phylum | : | Tracheophyta. |
| Subphylum | : | Spermatophytina. |
| Class | : | Magnoliopsida. |
| Superorder | : | Rosanae. |
| Order | : | Malpighiales. |
| Family | : | Passifloraeae. |



## MATERIAL AND METHOD

Preparation of trans-dermal patch containing drug and polymer matrix. Matrix type trans dermal patches compose of different ratio of metoprolol, Polyvinylpyrrolidone (PVP), Ethyl cellulose, Glycerin and PEG400 were prepared by solvent evaporation techniques using bangles. The bottom of the bangle was wrapped with aluminum foil on which backing membrane was cast by pouring 5%w/v aqueous PVA solution followed by drying at 50°C for 8hrs. The drug matrix was prepared by dissolving therequisite amount of drug(Propranolol) and EC in methanol. To this solution PEG400 (40%w/w of polymer composition) was added and stirred.[12] The uniform dispersion obtained was casted on PVA backing membrane and dried at room temperature for 24hrs. The dry films were removed and wrapped in aluminum foil and kept in a desiccator until used. The so prepared films were stick to an adhesive layer of bandage which was purchased from local market.

### Preparation of Passiflora incarnata Transdermal Patch

The preparation of Passiflora incarnata transdermal patches involves the following steps to ensure uniform dispersion of bioactive compound, suitable adhesion, and good drug release. Here is a general method.

### Extraction of bioactive compounds

aerial parts of Passiflora incarnata are typically dried, powdered, and solvents like ethanol or hydro ethanol are used in the methods of maceration, Soxhlet extraction, and ultrasonication for extractions. The extract is then concentrated by rotary evaporation. It is screened for bioactive constituents, including flavonoids and alkaloids.

**Preparation of Passiflora incarnata Transdermal Patch**

The preparation of Passiflora incarnata transdermal patches involves the following steps to ensure uniform dispersion of bioactive compound, suitable adhesion, and good drug release. Here is a general method.

**Extraction of bioactive compounds**

Aerial parts of Passiflora incarnata are typically dried, powdered, and solvents like ethanol or hydro ethanol are used in the methods of maceration, Soxhlet extraction, and ultrasonication for extractions. The extract is then concentrated by rotary evaporation. It is screened for bioactive constituents, including flavonoids and alkaloids.

**Patch Formulation**

Polymers selection may vary that could be used for forming a patch matrix. This is PVA, ethyl cellulose, and even HPMC.

Plasticizer s: These include agents such as glycerin or polyethylene glycol (PEG), added to provide flexibility and avoid brittleness.

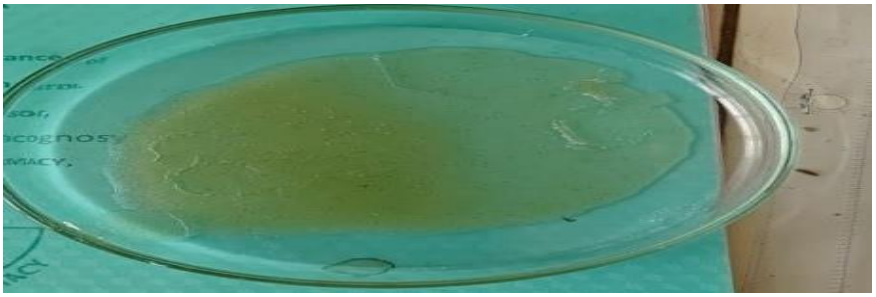
This allows for penetration enhancement using materials such as dimethyl sulfoxide (DMSO) or oleic acid.

Solvent Casting: The active extract and other additives are dissolved or dispersed in a suitable solvent, such as ethanol, water, or a water-alcohol mixture.



**Patch Preparation**

The solution is then poured into a flat, clean glass or silicone mold. This is dried at controlled temperature and humidity, and produces a thin, uniform film. The film is then cut in desired shapes and sizes according to the therapeutic action.



## EVALUATION OF TRANSDERMAL PATCH

### Folding endurances

A Particular area of the strip (2x2 cm) was cut uniformly and folded over and over until it broke. The value of the folding endurance was determined by the number of times the film was folded at the same location either to break the film or to develop visible cracks.

### Tensile strength

The tensile strength of patches was determined using a tensiometer. It has two for load cells. The lower one was fixed, and the upper one could be moved. Film strips measuring 2x2 cm were placed between the cell gripes and force was applied progressively until the film broke. The tensile strength was calculated using the dial reading in kilograms.

### Percentage Elongation break test

The percentage elongation break was determined by taking the length just before the breaking point and used to calculate the percentage elongation.

### Thickness

The thickness of the transdermal patches was measured using a digital micrometer screw gauge at three different places, and the mean value along with SD was calculated.

### Drug content

A 2x2cm size transdermal patch was dissolved in 100ml of ethanol and shakes continuously for 24 hrs. The whole solution was then ultra sonicated for 15 Min. After filtration the drugs content was measured using spectrophotometry at a wave length of 292nm.

### Percentage Moisture content

The prepared transdermal films were individually weighed and staved in a desiccator containing hosed calcium chloride at room temperature for 20h. After 24k, the feet were reweighed and the percentage moisture content was determined from these formula.

Percentage moisture uptake = Final weight-Initial weight÷ initial weight x 100

**Percentage Moisture Content**

Prepared transdermal lime were weighed separately placed in desiccator in which contained fused saturated solution of potassium chloride as maintain to get to 84% and left room temperatures. After 24 hours films were weighed and amount of moisture gained calculated with this formula

Percentage Moisture uptake Final weight-Initial weight Initial weight100; Swelling index. The formulated transdermal patches were weighed (W1) Individually and incubated at 3710.5°C separately in agar gel (2%) plate. Patches were taken out of the petridish at frequent time intervals of every 15 min op to 1 h and excess water from the surface was carefully wiped out with filter paper. The swollen patches reweighed (W2) and the swelling index calculated by using the formula

**Swelling index = $\frac{W2-W1}{}$ ×100**

**W2**

**In vitro drug release studies**

A Franz diffusion cell with receptor compartment capacity of 60 ml was used for the in vitro drug release tests. The drug was determined using a cellulose acetate membrane from the prepared transdermal matrix type patches.

The diffusion cell's donor and receptor compartments were separated by a 0.45µ pore size cellulose acetate membrane. The prepared transdermal patch was and mounted on the cellulose acetate membrane, which was then sealed with aluminium foil. The diffusion cell's receptor compartment was filled with phosphate buffer. The entire assembly was mounted placed magnetic stirrer, and the solution was constantly and continuously stirred at 50rpm in the experiments using magnetic beads as described by Simon in the receptor compartment, while the temperature was maintained at 37±0.5®C that corresponds to normal human body temperature. Samples were drawn at various intervals and were spectrophotometrically analyzed for drug content. In the experiment, manual sampling requires constant careful attention since air bubbles are easily entered in the receiver compartment when the samples are taken. At every removal of the sample, the receptor step was replenished with an equal volume of phosphate buffer.



**Solvent-casting matrix patch the simplest, most common lab method**

Dissolve a film-forming polymer (HPMC, PVA, or Eudragit; optionally ethyl cellulose) + plasticizer (PEG 400, glycerol) in a suitable solvent (water, ethanol or their mix), disperse the standardized Passiflora extract (crude extract, dried extract or poly phenolic seed extract), cast on a release liner, evaporate solvent, laminate with backing and cut. Use a pressure-sensitive adhesive (PSA) if required. Easy, scalable, good for sustained release. Works for herbal extracts if extract is stable in solvent and not too volatile. Characterization: uniformity, drug content, adhesion, in vitro skin permeation (Franz cell), stability. Reviews of herbal trans dermal patches describe solvent casting as a standard route.

**Reservoir patch (membrane-controlled)**

Active (Passiflora extract solution or gel) is held in a small reservoir under a rate-controlling membrane; patch constructed so release is controlled by that membrane. Tighter control of flux; useful if you can solubilize the extract actives consistently. More complex to produce; better when you want near-zero order release. See general transdermal patch patents/reviews.

**Matrix with permeation enhancers / chemical enhancers**

Incorporate permeation enhancers (propylene glycol, ethanol, oleic acid, DMSO in research settings) into either matrix or adhesive. For plant actives (polyphenols, flavonoids in Passiflora) such enhancers can improve skin flux. Many herbal actives are polar or large; enhancers are often required for therapeutically useful trans dermal flux. Characterize enhancer safety for skin irritation. See herbal patch reviews for common enhancers and their roles.

**Nanocarrier-enabled patches**

Load Passiflora extract into liposomes, niosomes or polymeric nanoparticles, then incorporate those into a patch matrix or gel that is cast into a patch.

Improves stability, enhances permeation, can give controlled release and protect sensitive phytochemical (polyphenols/flavonoids). Recent nano formulation work on Passiflora extracts (nano formulations for anticancer and reduced toxicity) shows feasibility of nano encapsulation for the plant's extracts — you can adapt methods for trans dermal delivery.

**Adhesive skin patch cosmetic/cosmeceutical approaches**

Simple adhesive patches releasing aroma or small amounts of actives (often used in sleep patches). Many commercial "sleep patches" include passionflower as part of multi-herbal blends; patents describe manufacturing and patch compositions. These are a practical route for OTC products.

**REFERENCE**

1. Gupta JRD, Ichhiaya R, Garud N, Tripathi P, Formulation and evaluation of matrix type transdermal patches of glibenclamide. Int. J. Pharm. Sci. and Drug Res., 2009; 1(1): 46-50.
2. Vijayan V, Sumanth MH, Suman L, Kumar KJ, Development and Physio chemical, In-Vitro Evaluation of Anti hypertensive Transdermal Patches J. Pharm. Sci. & Res., 2010; 2(3): 171-177.
3. Bhowmik D, Chandira M, Jayakar B, Sampath KP, Recent Advances In Transdermal Drug Delivery System Int. J. PharmTech Res., 2010; 2(1): 68-77.
4. Subramanian K, Sathyapriya LS, An Approach to the formulation and evaluation of transdermal DDS of isoxsuprine HCl. Int J Pharm Sci Tech., 2008; 1(1): 22-28.5
5. Sankar V, Johnson DB, Sivanand V., Design and evaluation of nifedipine transdermal patches. Indian J Pharm Sci., 2003; 65(5): 510-515.
6. Shinde AJ, Garala KC, Development and characterization of transdermal therapeutics system of tramadol hydrochloride. Asian J Pharm., 2008; 2: 265-269.
7. JayaprakashS, HalithSM, Preparation and evaluation of celecoxib transdermal patches, Pak. J. Pharm. Sci., 2010; 23(3): 279-283.
8. BarhateSD, Bavaskar KR, Development of transdermal drug delivery system of ketoprofen. Int. J. Pharm. Res. and Dev., 2009; 1(10).
9. Fang JY, Wang RJ, Passive and iontophoretic delivery of three Diclofenac salts across various skin types. Biol Pharm Bull., 2000; 23: 1357–1362.
10. Arora P, Mukherjee B, Design, Development, Physicochemical and In Vitro and In Vivo Evaluation of Transdermal Patches Containing Diclofenac Diethylammonium Salt, J.

Pharm Sci., 2002; 91(9): 2076–2089.

11. Anitha P, Chetty M, Preparation, in-vitro and in-vivo characterization of Transdermal patch containing glibenclamide and atenolol: a combinational approach, Pak. J. Pharm. Sci., 2011; 24(2): 155-163.
12. Ahad HA, Kumar CS, Characterization and permeation studies of diltiazem hydrochloride-ficus reticuleta fruit mucilage transdermal patches, Int. J Pharm Sci Rev and Res., 2011; 1(2): 007.
13. Ahad HA, Sreeramulu J, Kumar CS, Fabrication and in- vitro permeation studies of indomethacinficus carica fruit mucilage patches. Int. J. Applied Bio and Pharm Tech., 2010; 1(3): 786- 792.
14. Saroha K, Yadav B, Sharma B, Transdermal Patch: A Discrete Dosage Form, Int J Curr Pharm Res., 2011; 3(3): 98-108.
15. Prof. Gajanan. D. Mogal, Formulation and evaluation of transdermal patches, International Journal of Multidisciplinary Research, 2025; 11(6): 163-172.