



Formulation and Evaluation of Topical Gel Containing *Curcuma amada* Roxb. Family- Zingiberaceae

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INTRODUCTION



NSAIDs have been widely used in the treatment of rheumatoid arthritis and other related conditions. However, they carry the risk of undesirable systemic side effects gastrointestinal irritation at the usual dose of oral administration.^[1] Topical and transdermal products are important classes of drug delivery systems, and their use in therapy is becoming more widespread. The purpose of topical dosage forms is to conveniently deliver drugs to a localized area of the skin.^[2] Curcumin, a constituent of *Curcuma longa* (Family- Zingiberaceae), chemically known as diferuloylmethane has been reported to possess anti-oxidative,^[3] anti-inflammatory,^[4] anticarcinogenic,^[5] hypocholesterolemic properties.^[6] Some of the novel formulations developed using curcumin include liposomes,^[7] solid lipid nanoparticles,^[8] transdermal film,^[9] microspheres,^[10] nanoemulsion,^[11] etc. Following oral administration (up to 8 g per day),^[12] it is poorly absorbed,^[13] and only the traces of compound appear in blood. It undergoes extensive first-pass metabolism,^[14] and hence is a suitable candidate for topical. Considering the fact that most inflammatory diseases occur locally and near the surface of the body, topical application of CUR on the inflamed site can offer the advantage of delivering a drug directly to the disease site and producing its local effect.^[15,16] However, the barrier properties of intact skin limit the permeability of wide variety of substances, including pharmaceutical active agents.^[17] The most promising technique to reduce barrier properties of stratum corneum is the use of chemical enhancers that allow drug permeation through the skin at an appropriate rate for a suitable time. The chemical enhancers that have been studied are azone and its analogs, pyrrolidones, polyunsaturated fatty acids, alkanols, polymeric enhancers, non-ionic surfactants, and terpenes.^[18-22] ideal penetration enhancer should be pharmacologically inactive, non-irritant, no damaging for the skin, potent, and cosmetically acceptable.^[23] Terpenes, the naturally occurring volatile oils, possess most acceptable criteria as penetration enhancers like high percutaneous enhancement ability, reversible effect on the lipids of stratum corneum, minimal percutaneous irritancy at low concentrations (1-5%) and good evidence of freedom from toxicity.^[24-27]

Menthol, a monocyclic monoterpene free from toxic effects, has been approved as a penetration enhancer in the transdermal delivery of several drugs.^[28] It enhanced the transdermal transport of several hydrophilic and lipophilic drugs.^[29,30] Menthol, used in the present study, is l-menthol that occurs most widely in nature.

carbopol (CRB) and Hydroxypropylcellulose (HPC) are widely used in the pharmaceutical and cosmetic industries to give viscous or gel formulations. Carbomers are made of polymers of acrylic acid cross-linked with

allyl sucrose or with allyl pentaerythritol, and the degree of cross-linking determines their viscosity.^[31] Both these polymers possess several desirable attributes as gelling agent like high viscosity at low concentrations, quite stable to heat with negligible batch-to-batch variability, increase the stability of the formulations and also give them a pleasant texture, unaffected by aging, do not support bacterial or fungal growth, and are non-irritating.^[32-34] The aim of the present study was to evaluate the suitability of the transdermal route of drug delivery for CUR. The specific goals of the research were to: (I) develop topical gel preparations using polymer like CRB 934 and HPC with and without permeation enhancer (menthol); (ii) perform physicochemical characterization and in vitro permeation studies through rat skin; (iii) to investigate the usefulness of menthol as a penetration enhancer on the transdermal permeability of CUR such that the required flux of the drug could be provided from the CRB and HPC gel reservoirs; and (iv) compare the anti-inflammatory activity of prepared CUR topical gels with standard gel formulation of diclofenac sodium.^[35]

- **Uses of topical gel formulation**

1. It shows anti-inflammatory activity
2. Used as anti-bacterial activity
3. Antifungal activity
4. Anti-viral activity
5. Anti-oxidant
6. Anti-allergic
7. Wound healing activity open & closed wound

- **Advantages of gel formulation**

1. Easy to application
2. Topical application better effect than oral formulation
3. It shows different more activity
4. Better absorption

- **Disadvantages.**

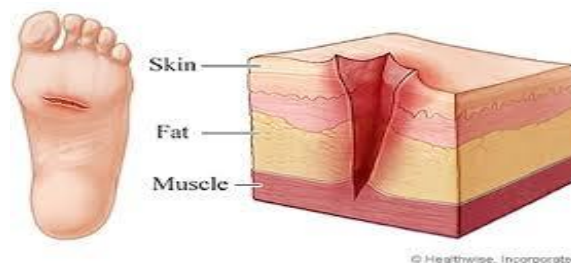
1. Normally irritation
2. Oral route increases chances of nausea, diarrhoea headache,

3. Skin rash yellow stool

- **Purpose of gel formulation.**

The need of work oral cur cumin is poor bioavailability because the unconjugated cur cumin molecules, which is hydrophobic, poorly absorbed in gastrointestinal tract. Very low level detected in blood and tissues topical cur cumin can be formulated to be better absorbed through the skin. Gel is easily apply to the skin and also show the more activity like anti-inflammatory, anti-bacterial, anti-fungal, anti-oxidant, wound healing activity open wound and closed wound healing activity. Normal crush [36]

- **open wound**



- **In this type of wound** , blood come outside the body and bleeding s clearly observable . it is further categorized in to different types on the basis of object that created the wound
- **Incisions or incised wound** : It is caused due to intentional or non- intentional cut by clean, sharp-edged object such as a knife, razor or glass splinter.
- **Irregular tear- like wound:** It is created due to some blunt trauma. It may be appear as regular (linear) or irregular incision (stellate).
- **Abrasions or superficial wound:** in this type of wound, epidermis the uppermost layer of the skin is scraped off. Abrasion may be caused by a sliding or fall in to rough by accident.
- **Avulsion:** In this type of injuries any body structure or part forcefully detached from its normal point of insertion may be due to serious accident.
- **Puncture wound:** this type of wound caused due to the puncturing of skin by a pointed object such as a splinter, nail or needle.
- **Penetration wound:** this type of wound caused by entering and coming of object from the skin such as knife
- **Gunshot wound:** wound caused by a bullet or similar projectile driving device in to or through the body. there may be two wound , one at the entry site and another at the exit site.¹
- **Closed wound**



In this type of wound blood partially or completely escapes the circulatory system but remains in the body. It is as dangerous as an open wound and has following some categories.. Hematomas: It is also called as a blood tumor which may be caused by damage to a blood vessel which results into collection of blood under the skin. On the skin. On the basis of origin they are further categorized as hematomas that originate from internal blood vessel pathological change and hematomas that originate from an external source as a trauma

- **Material**

Curcumin drug, carbopol 934, hpc, glycerine, trimethylamine, distilled water, Butter paper, spachula, wide mouth container, FTIR machine, Soxhlet etc

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