

Run-Through of Diclofenac Diethylamine

K.Monish¹, Dr.M.Chellappa²

^{1,2}Dept of Pharmaceutics

^{1,2}Pallavan Pharmacy Collegeiyangarkulam, Kanchipuram-631502.

Abstract- *The Diclofenac gel was prepared for pain relief for especially, arthritic pain, tooth aches, and other musculoskeletal disorders. Here we are discuss about the diclofenac diethylamine overview in this study we determine that the topical administration of diclofenac is better than other administration it was majorly used to pain relief it have analgesic, antipyretic, anti-inflammatory activity it was penetrate in to synovial fluid.*

Keywords- diclofenac diethylamine, Topical gel, Analgesic, Anti-inflammatory

I. INTRODUCTION

- Gels are uniform, semi-solid mixtures created by dispersing or solving one or more medications in appropriate hydrophilic or hydrophobic bases^[1].
- They are typically made with the use of appropriate gelling agent^[1-2].
- They are meant to be administered to the skin or specific mucous membranes for therapeutic, preventive, or protective reasons^[2].
- Gels are transparent to opaque semisolids that combine or entangle to create a three-dimensional colloidal network structure. They have a high solvent to gelling agent ratio. This network traps and immobilizes the solvent molecules, limiting the flow of fluid. Additionally, the network structure is in charge of the gel's viscoelastic qualities and resistance to deformation^[4].
- Compared to other semi-solid formulations, gels are typically utilize better drug release and smoother, more elegant, non-greasy, and have a cooling effect.
- Compared to ointments, gels have greater potential as a vehicle for topically administered drugs because they are stable, non-stick, and visually appealing they also require less energy during formulation^[3].
- Gels may include appropriate extra ingredients such as stabilizers, antioxidants, and antibacterial preservative^[4]. Appropriate measures must be implemented to ensure the microbiological quality of gels during their production, packaging, storage, and distribution.
- Diclofenac diethylamine has been utilized in the production of diclofenac gel it was an ideal base.
- Diclofenac gel contains a minimum of 90.0% and a maximum of 110.0% of the specified equivalent amount of diclofenac diethylamine^[5].
- Diclofenac diethylamine along with the equivalent quantity of diclofenac sodium.
- The non-steroidal anti-inflammatory medicine (NSAID) diclofenac is commonly prescribed to symptomatically reduce pain and swelling brought on by illness including dysmenorrhea, arthritic pain, tooth aches, and other musculoskeletal disorders.
- Extended first pass metabolism and possible gastrointestinal irritations, bleeding, ulceration and perforation of the stomach have been associated to the consumption of oral diclofenac.
- While administrated through intramuscular injection of a diclofenac it cause skin lesion.
- Compared with oral and intramuscular administration the transdermal (topical) administration it can improve the bioavailability with reduction of side effects and it enhance the therapeutic efficacy.
- The tropically applying diclofenac is more protective than other route of administration.
- An NSAID that has been clinically shown to be both efficacious and well-tolerated in both acute and chronic diseases is topical diclofenac diethylamine 1.16% gel.
- Synovial fluid, muscles, and joints are all accessible to diclofenac when it is given topically since it crosses the skin barrier^[6].
- Regarding drug distribution through the skin and vehicle release, there have been issues with conventional topical dose forms such lotions, creams, ointments, and powders Because creams and lotions are quickly removed from the skin and release the medication from their base poorly, they frequently have poor bioavailability.
- The mechanism of action involves the inhibition of cyclooxygenase (COX) and lipoxigenase enzymes, which leads to a strong suppression of prostaglandin and thromboxane formation.
- When diclofenac was applied topically as opposed to orally, the synovial fluid's C-max AUC values were noticeably higher.
- When transdermal diclofenac diethylamine is used instead of diclofenac sodium, the percentage of adverse gastrointestinal events is significantly lower.

- Each gram of 11.6mg of diclofenac diethylamine is equivalent to 10mg of diclofenac sodium.

ROUTE OF DRUG ADMINISTRATION:-

- Topical diclofenac is absorbed through the skin and penetrates into sub dermal tissues, including synovial tissue, to act directly at the site of pain and inflammation
- Synovial fluid, muscles, and joints are all accessible to diclofenac when it is given topically since it crosses the skin barrier
- When diclofenac was applied topically as opposed to orally, the synovial fluid's c-max AUC values were noticeably higher.

IDEAL PROPERTIES:-

Physical properties:-

- Odourless
- White to off-white crystalline
- Slightly hygroscopic powder

Biological properties:-

- Anti-inflammatory
- Analgesic
- Antipyretic

Chemical properties:-

- Log p – 4.26
- Pka (strongest acid) – 4
- Pka (strongest base) – 2.1
- Hydrogen acceptor count – 3
- Hydrogen donor count – 2
- Rotatable bond count – 6
- Number of rings – 2

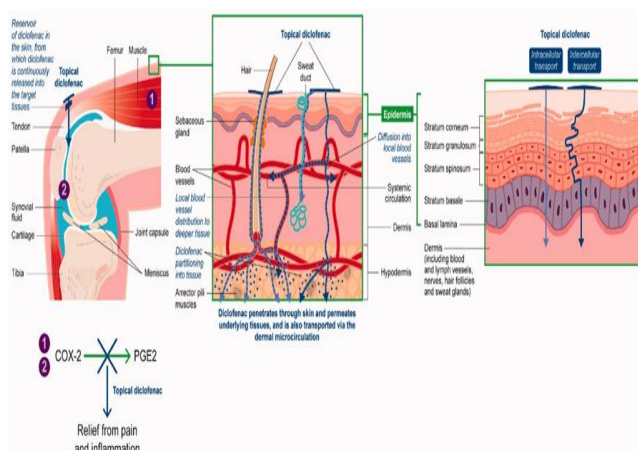
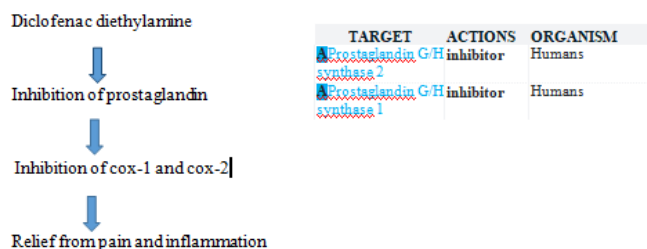
USES:-

- Dysmenorrhea
- Arthritic pain
- Inflammatory disorders
- Rheumatoid arthritis
- Osteoarthritis
- Tooth aches
- Musculoskeletal disorders etc..

SIDE EFFECTS:-

- Dryness
- Redness
- Itching
- Hardness
- Irritation
- Acne

MECHANISM OF ACTION:-



PHARMACODYNAMICS:-

Diclofenac reduces inflammation and by extension reduces nociceptive pain and combats fever. It also increases the risk of developing a gastrointestinal ulcer by inhibiting the production of protective mucus in the stomach.

ADVANTAGES:-

- Administration directly at the site of pain
- Avoidance of first-pass metabolism
- Reduced systemic exposure, with a resultant lower risk of systemic adverse events (e.g. gastrointestinal, cardiovascular or renal complications)
- Ability to use in patients unable to tolerate oral NSAIDs
- Avoidance of drug–drug interactions
- Potential dose-sparing effect when used with oral NSAIDs

- Patient preference, with the potential for increased compliance

WARNINGS:-

Diclofenac is one of the nonsteroidal anti-inflammatory medications that very infrequently may raise your risk of having a heart attack or stroke. While this effect can occur at any point while taking the medication, prolonged use increases the likelihood of it.

If you have heart disease or are at higher risk of developing heart disease (for instance, because of smoking, a family history of the disease, or conditions like diabetes or high blood pressure), your risk may be higher if you are an older adult. Take this medication neither before nor after coronary artery bypass grafting (CABG).

Additionally, this medication may sporadically result in severe (rarely fatal) bleeding from the intestines or stomach. When taking diclofenac, this side effect can happen at any time and without any prior warning signs. This effect may be more likely to affect older adults. (Also refer to the sections on drug interactions and precautions.)

If you experience any of the following uncommon but extremely dangerous side effects, stop taking diclofenac and get medical attention right away: persistent stomach or abdominal pain; black or bloody stools; vomit that looks like coffee grounds; pain in the chest, jaw, or left arm; shortness of breath; unusual sweating; confusion; weakness on one side of the body; sudden changes in vision; difficulty speaking.

INTERACTIONS:-

Drug interaction:-

Aliskiren, ACE inhibitors (captopril, lisinopril), angiotensin II receptor blockers (losartan, valsartan), cidofovir, corticosteroids (prednisone, dexamethasone), lithium, methotrexate, other products applied topically, and "water pills" (diuretics like furosemide) are a few products that may interact with this medication.

When combined with other medications that can also cause bleeding, this medication may make bleeding more likely. Examples include "blood thinners" like dabigatran/enoxaparin/warfarin, erlotinib, and antiplatelet medications like clopidogrel.

STORAGE:-

Keep the container at room temperature. Avoid freezing. Keep all medications out of the reach of kids and animals.

SAFETY:

Only one AE was recorded (moderate headache in the placebo group), which was not considered by the investigator to be drug related. No serious AEs were reported and no clinically relevant abnormal vital signs were observed during the study, according to the clinical judgment of the investigators.

HOW DICLOFENAC GEL CAN RELIEVE YOUR PAIN:-

Back Pain:-

Studies demonstrate that diclofenac gel is an effective treatment for low back pain, particularly when used in conjunction with other treatments like muscle relaxants and ultrasound therapy. Even when comparing oral diclofenac to oral forms of other NSAIDs (which accounts for the inherent advantages of topicals over orals), diclofenac produces fewer side effects when used to treat low back pain than other NSAID options.

Diclofenac is especially helpful in treating acute musculoskeletal pain. More recent research suggests that diclofenac may also be helpful in treating more chronic nerve-related pain and muscle strain.

Arthritis:-

Over 50 million Americans suffer from arthritis, a condition that diclofenac gel can help with.

Osteoarthritis, which gradually erodes joint cartilage, is the most common type of arthritis. In cases of osteoarthritis, topical diclofenac significantly improves physical function while reducing pain and stiffness, according to research. No matter how severe osteoarthritis is, diclofenac treatment also has few side effects, even when elderly patients use it for an extended period of time.

Knee Pain:-

The application of topical diclofenac to knee pain is supported by research.

Osteoarthritis knee pain can be effectively treated at the site with topical diclofenac solutions. Patients who

received treatment showed decreased stiffness and increased physical functioning; the only adverse effect was mild skin irritation at the application site. Similar results from other clinical trials have been observed.

A randomized study showed that applying 2% diclofenac gel significantly reduced osteoarthritis pain. Additionally, patients in Germany saw good outcomes after using topical diclofenac diethylamine gel on a regular basis for three weeks.

The strength of diclofenac hydroxyethylpyrrolidone (DHEP) plasters was examined in a different study. Osteoarthritic knee pain was significantly reduced in patients by the DHEP patches.

II. CONCLUSION

According to study's findings, topical DDEA 1.16% gel relieves acute neck pain quickly, effectively, and with good tolerance while also promoting improved neck function. This study established the therapeutic relevance and significant superiority of DDEA 1.16% gel may be used to treat acute pain. It may also be studied for usage in other indication with related pathomachanism, like non-specific lower back pain.

REFERENCES

- [1] Efficacy and safety of diclofenac diethylamine 1.16% gel in acute neck pain: a randomized, double-blind, placebo-controlled study
- [2] Hans-Georg Predel^{1*}, Bruno Giannetti^{2†}, Helmut Pabst³, Axel Schaefer⁴, Agnes M Hug⁵ and Ian Burnett⁶ Predel et al. BMC Musculoskeletal Disorders 2013, 14:250 <http://www.biomedcentral.com/1471-2474/14/250>
- [3] Formulation and Evaluation of Pharmaceutical Gel Mr. Umakant Sharma^{*1}, saurabh Arjariya², Dr. Rajendra Chouksey³, Dr. Neeraj Sharma⁴ 1. Research scholar^{*1}, College of pharmacy, Madhyanchal professional University, Bhopal (462044), Madhya Pradesh, India. 2. Associate Professor^{*2}, Shri RLT Institute of Pharmaceutical Science and Technology, Ekdil, Etawah, Uttar Pradesh, DOI: 10.47750/pnr.2022.13.S01.160
- [4] Diclofenac 1 % Topical Gel - Uses, Side Effects, and More Wikipedia.
- [5] INDIAN PHARMACOPIEA – VOLUME I
- [6] INDIAN PHARMACOPIEA – VOLUME II
- [7] Developing an efficacious diclofenac diethylamine transdermal formulation Syed Nisar Hussain Shan, Mehboob-E-Rabbani, Yasser

- shhzad, Amirbadshah, victor M. Meidan and Ghulam Murtaza January – 31 201 <https://doi.org/10.6227/jfda.2012200205>.
- [8] Efficacy and safety of diclofenac diethylamine 1.16% gel in acute neck pain: a randomized, double – blind placebo – controlled study 2013 –Aug– 21 . doi:10.1186/1471 - 2474-14-250 PMID:PMC3847223/PMID:23964752 pubmed central
 - [9] Formulation & evaluation of diclofenac gel Priya P. Munshi, D.S. Mohale, R. Akkalwar and A.V. Chandewar research J. Pharm and tech (a): sept-2011; page 1394-1399
 - [10] Design & characterization of diclofenac diethylamine transdermal patch using silicon and acrylic adhesives combination January-7 2013 dandigi M. Panchaxari, sowjanya pampana, anilkumar aravapali
 - [11] Bioavailability and tolerability of topical and oral diclofenac sodium administration in healthy ponies January 2013 <https://doi.org/10.1016/j.jevs.2012.04.013>
 - [12] Efficacy & safety of oral diclofenac sustained release transdermal diclofenac patch in chronic musculoskeletal pain a randomized open label trial 2017-oct-dec8 (k):166-171. doi 10.4103/jpp.jpp-35-17 PMID : PMC5820746 PMID :29472748 pubmed central
 - [13] Wikipedia- diclofenac 1% gel