INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

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Research Article

UV Protective Wound Healing Ointment Enriched with Dragon Fruit Extract

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ARTICLE INFO

Published: 02 Oct 2025
Keywords:
Wound Healing, Dragon Fruit, Ointment, Tissue Repair.
DOI:
10.5281/zenodo.17250919

ABSTRACT

Dragon fruit (Hylocereus spp.), also known as Pitaya, is a tropical cactus plant native to Central America, now widely cultivated in southeast Asia, including countries like Vietnam, Thailand, Malaysia, and part of India. It thrives in warm, dry climates with well-drained soil and requires minimal water, making it suitable for semi-arid regions. Dragon fruit is renowned for its vibrant appearance and rich nutritional profile, containing vitamins, minerals, antioxidants, and bioactive compounds such as polyphenols, flavonoids, and betalains. These constituents exhibit potent antioxidant, anti- inflammatory and antimicrobial properties, making dragon fruit a promising natural source for medicinal applications. This study aims to formulate and evaluate a wound healing ointment incorporation dragon fruit extract. The ointment was prepared using an ethanolic extract of dragon fruit pulp, integrated into a suitable base, and assessed for its wound healing potential. Result revealed that the dragon fruit-based ointment significantly accelerated wound contraction, enhanced tissue regeneration, and reduced inflammation compared to the control group. The combination of Dragon fruit extract and controlled UV exposure accelerates. Thus, dragon fruit extract holds considerable promise as a natural, cost- effective ingredient in topical wound healing products, encouraging further research and clinical evaluations.

INTRODUCTION

DRAGON FRUIT

Family name: Cactaceae (Cactus family)

Botanical source:-

Scientific names:

- Hylocereus undatus (white fleshed dragon fruit)

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

- Hylocereus polyrhizus (Red fleshed dragon fruit)
- Selenicereus megalanthus (Yellow-skinned dragon fruit with white flesh)

Chemical constituents:

- Pigments- Responsible for color and antioxidant property
- Betalains-
  betacyanins (e.g. betanin, hylocerenin)
  Betaxanthins (e.g. indicaxanthin)
- Phenolics- gallic acid, caffeic acid, ferulic acid
- Flavonoids- kaempferol, quercetin, isorhamnetin
- Polysaccharides- pectin and other dietary fibers
- Vitamins and minerals- vitamin C, VitaminB (B1,B2,B3), Magnesium, potassium, iron
- Fatty acids- Linoleic acid, oleic acid
- Carotenoids- Beta-carotene, lycopene
- Proteins and Amino acids- leucine, lysine and isoleucine.

Pitaya (Hylocereus undatus, sometimes known as dragon fruit) is a captivating tropical fruit praised for its eye - catching appearance and unusually sweet flavor .

Dragon fruit has grown in popularity because of its eye catching red or pink skin, white or red flesh, and tiny black seeds, as well as for its possible nutritional and health benefits. This fruit, part of the cactus family (cactaceae), it grows best in warm, humid climates, and cultivation of it has spread to many areas of the world, making it a widely available fruit.

Aim:

To formulate and evaluate a Wound-healing Ointment incorporating dragon fruit extract (Hylocereus spp.) for its potential antimicrobial, antioxidant, and skin regenerating properties along with UV protection potential.

INSTRUMENTS:

- Magnetic stirrer - Kshitij innovations
- Weighing balance - Kshitij innovations
- Desiccator - Kshitij innovations

CHEMICALS:

Chemical Name - Compound Name

- Paraffin wax - Rankem (avantor)
- Vitamin E oil - Evion
- Lavender oil - Phillauri
- Ethanol - Avra
- Petroleum jelly - Molychem
- Bees wax - Rankem (avantor)

METHODOLOGY

Step1: Sample preparation

- Selection & cleaning:
  - Wash 2 fresh dragon fruits thoroughly to remove impurities.
- Peeling & cutting:
  - After cutting weight of the 2 dragon fruits are 240gms.
- Homogenization:
  - Blend the pulp into a uniform paste using blender.
  - One dragon fruit contains 85% of moisture and only 15% of solid content
  - So, 10g/15% = 10/0.15 = 66.67g (Approximately 65-70g)

Step 2: Solvent extraction

- Weigh the sample: Take 300 g of the pulp for extraction.

- Choose the solvent: Use ethanol as a solvent in a 1:2 or 1:3 ratio (w/v)
- Mix the sample with solvent:
- Stir using a magnetic stirrer for 45 minutes at room temperature (25-30^{o}c)
- Alternatively, perform ultrasound- assisted extraction (UAE) For 15-30 minutes at 40KHZ

Filtration: Filter the mixture using watts man filter paper and vacuum filtration to separate the extract

Step 3: Concentration of extraction

- Evaporation: Evaporate the extract by using desiccator.
- After evaporating the weight of pulp extract is 13gms.

Storage: Store the concentrated extract at 4^{o}c in an amber glass bottle

FORMULATION OF 100gms 0F WOUND - HEALING OINTMENT

OINTMENT BASED INGREDIENTS

1. Bees wax (10%)- Thickening agent for ointment consistency.
2. Petroleum jelly or paraffin wax (30%)- Ointment base.
3. Essential oil (lavender oil 2-5%) – Antimicrobial.
4. Vitamin E (1%)- Skin healing and antioxidant protection.

INGREDIENTS AND QUANTITIES FOR 100mg

1. Dragon fruit extract – 5g
2. Solvent (ethanol 70%) – 50ml
3. Bees wax – 10g
4. Petroleum jelly – 50g
5. Liquid paraffin – 2g
6. Vitamin E oil – 2g
7. Essential oil – 3 drops

- Melt the bees wax, petroleum jelly, and liquid paraffin together by using methanol as solvent and put it in a water bath at 60- 70^{O}C.
- Once fully melted, add the dragon fruit extract and stir thoroughly.
- Remove from heat and let it cool slightly.
- Add vitamin E oil & essential oil while stirring continuously. Pour the mixture into sterilized ointment jars.
- Let it set at room temperature until it solidifies.

FINAL PRODUCT AND STORAGE

- 40grams of final product was obtained.
- Stored in an air tight container at cool dry conditions.
- Shelf life- 3-6 months (if stored properly)

RESULTS & DISCUSSIONS

We have conducted lab tests on our wound healing ointment with dragon fruit extract and UV exposure; here are the expected results and interpretations.

- **pH Test result:**

pH between 6.0 – 6.5 → suitable for skin application

- **UV stability Test:**

Stable color and texture, No degradation under moderate UV exposure.

- **Spreadability test result:**

Good spreadability ensures easy application and absorption.

- **Skin irritation test:**

No irritation when applied on skin.

- **Antioxidant effect:**

Reduction in redness, swelling and oxidative stress.

CONCLUSION

The formulated wound healing ointment containing dragon fruit (Hylocereus spp.) extract exhibited promising results in enhancing the wound healing process. The ointment demonstrated accelerated wound contraction, reduced inflammation, and improved tissue regeneration, likely due to the antioxidant, anti-inflammatory, and antimicrobial properties of the bioactive compounds present in dragon fruit. The wound healing ointment with dragon fruit extract and UV protection is an effective, stable, and safe formulation that promotes faster wound healing, protects against UV damage and prevents infections.

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HOW TO CITE: G. Vijaya Lakshmi, Gubbala Omkara Satya Sai, Indukuri Pavitra, Golthi Bhanu Srilekha, Jaddu Mounika, Gorrela Dakshayani, UV Protective Wound Healing Ointment Enriched with Dragon Fruit Extract, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 10, 241-245. https://doi.org/10.5281/zenodo.17250919