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Formulation and evaluation of ointment using cold compressed moringa oleifera oil for arthritis: A research

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Abstract
Moringa oleifera is most widely cultivated vegetable tree in India and other countries. Moringa oleifera is often called the drumstick tree, the ben oil tree or the miracle tree, It is used for medicinal purpose.
Moringa leaves contain minerals like calcium, potassium, zinc, magnesium, iron and copper. It is rich source of vitamins like beta-carotene of vitamin A, vitamin B such as folic acid, pyridoxine and nicotinic acid, thiamine, riboflavin, B-6, ascorbic acid (vitamin C), calcium, potassium, iron. It also contains antioxidants such as flavonoids, polyphenols and ascorbic acid.
Moringa has antifungal, antiviral, antidepressant, anti-diabetics, anti-asthmatic and anti-inflammatory properties. Almost all parts of the plant is used to treat various diseases, such as skin infections, anemia, asthma, bronchitis, diarrhea, joint pain, rheumatism, gout, diarrhea, heart problems, arthritis, digestive disorders, wounds etc. It helps in reduction of cholesterol and blood sugar.
Along with other dosage forms, moringa is also formulated in the ointment form. Ointment is viscose semisolid preparation intended to applied externally to the skin. It is used to heal wounds, burns, rashes, or other skin problems. Ointment is topical formulation hence show better patient compliance.
Use of Moringa oleifera oil topically as anti-arthritis has some disadvantage like skin irritation, patient compliance, flow of oil after application on skin etc. Moringa ointment is best choice to avoid such disadvantage and increase effect of Moringa oil by retaining it on skin for long period of time by using ointment base.

Keywords: ointment, anti-inflammatory, occlusivity, fashion method, spread ability, washability

Introduction

Moringa Oleifera is most widely cultivated medicinal tree in India of family Moringaceae. It has therapeutic and medicinal characteristics due to present of antioxidant, minerals, antibiotics, nutrients and vitamins like vitamin A, thiamine, riboflavin, niacin, folate and ascorbic acid etc. Every part this plant such as leaves, stem bark, seeds, flawers, gum has been used to treat various types of disease Moringa extracts from its various part show helpful antimicrobial activity against gram positive and gram negative bacteria. Many herbal cosmetics are prepared by using Moringa seeds and leaves extract. Ointment, lotion, cream, sunscreen and oil of Moringa Oleifera extract is used to treat various types of skin diseases.
Moringa is also known as 'the miracle tree' and used to treat anemia, skin infection, asthma, diarrhea, epilepsy, ulcer, cancer, fever, joint pain, pimples and eye disease etc. Moringa oil is also used as hair oil and moisturizer. In ancient times Moringa oleifera leaves was used to treat patients suffering from various kind of pain. Ointment made up of moringa and ginger in appropriate proportion is the best for anti-inflammatory properties.

Image 1: Moringa Oleifera

Synonym
Synonym: Sahajana leaf, Moringa Oleifera, drumstick tree,ben oil tree,
the miracle tree
Kingdom: Plantae
Order: Brassicales
Family: Moringaceae
Genus: Moringa
Species: Moringa Oleifera
Binomial name: Moringa oleifera
Category: Antidiarrhoeal, antibacterial, anti- inflammatory, antimicrobial and

Anticancer
Description
Fruit is long green stick shaped with diameter of 1.0 to 1.5 cm. They are hanging, three sided brown capsules of 20-25 cm size. These fruits holds dark brown and globular 26 seeds. Leaves are small, alternate, dark green in color and 25-50 cm long. 2 to 9 leaflets are present on the ultimate pinnules. These leaflets are thin and 1 to 2 cm long. Leaflets shows epidermis and unicellular hair which are present on both the surface. Calcium oxalate crystals are present in mesophyll and collenchyma Tous cells.

Material and methods
Moringa Oleifera seed oil (cold compressed) is obtained by online order on flipkart. Cold compress moringa oil is free from any impurity. As it is cold compressed it does not contain ethanol or other solvent which may affect the benefits of moringa oil.

Ointment formulation from Moringa oleifera oil
Ointments is semisolid preparation intended to applied externally to the skin or mucous membrane.
Formula of Moringa oleifera ointment.

Table 1: Moringa Ointment Formulation table

Sr. No.	Ingredients	Quantity	Uses
1.	Moringa oleifera oil	5 ml	antibacterial, anti-inflammatory, antimicrobial
2.	Triethanolamine	1.5 ml	Surfacting agent, penetration enhancer.
3.	Cetosteryl alcohol	3 gm	Stabilizer
4.	Anhydrous Lanolin	4 gm	Ointment base
5.	Methyl salicylate	0.25 ml	Flavoring agent
6.	Methyl Paraben	0.1 gm	Preservative
7.	Propyl Paraben	0.1 gm	Preservative

Procedure
Ointments are the semisolid preparation meant for application to the skin or mucous membrane.
1. All constituents required for preparation of base weighted properly.
2. Ointment base was prepared by melting all constituent in descending order of there melting point i.e by fusion method
3. After melting, stir the ingredients gently by maintaining temperature of 70°C for about 5 minutes. Then cool it with continuous stirring.
4. Formulation of ointment is done by incorporating the oil of Moringa oleifera into the bases to obtain herbal ointments containing Moringa oleifera as active constituent.
5. The prepared herbal ointment is put in ointment jars.
6. labelled and stored the moringa ointment jar at room temperature.

Evaluation of formulation
1. Organoleptic parameters
Organoleptic parameters of ointment includes colour, odour, texture and consistency. Moringa oleifera ointment formulation were examined for colour, odour, texture and consistency by visual examination.

2. pH
Appropriate pH is very important factor of ointment to reduce skin irritation. pH of moringa oleifera ointment was measured by using digital pH meter.
2.5 gm of moringa ointment was taken in 100 ml of beaker and 50 ml of distilled water was added to it. Beaker was heated on water bath for almost 10 minutes then cooled at room temperature and centrifuged it for 10 minutes. Measurement of pH of moringa ointment was done by using digital pH meter by dipping glass electrod into the ointment formulation.

3. Spread ability
Moringa ointment was determined for spread ability by placing it between two slides which was then compressed to uniform thickness by certain load for definite time.
Less time for separation of two slides - Better spread ability of ointment
Spread ability of ointment was calculated by using the formula -

$$S = MxL / T$$

Where
S = Spreadability
M = Weight tied to upper slide
L = Length of glass slides
T = Time taken to separate the slides
Ointments containing oleagenous ointment base show difficult spread ability while water in oil emulsion ointment base shows easy spread ability.

4. Loss on drying
The loss in weight, in the formulation is due to loss in water and other volatile content from it. Loss on drying was determined by placing 1 gm of Moringa Oleifera ointment formulation in petri dish on water bath and then dried for 105 C temperature. It is calculated by formula -

$$LOD = W1 - W2$$

Where
LOD = Loss on drying
W1 = weight of ointment and petri dish before drying
W2 = weight of ointment and petri dish after drying

5. wash ability
Moringa oleifera ointment was applied on the skin and then ease washability by water was checked by keeping applied ointment skin area under tap water for 10 minutes.
Ointments containing oleagenous or absorption ointment base are non - washable while ointments containing oil in water or water in oil emulsion ointment base are easily washable.

6. Solubility
Solubility of moringa oleifera ointment formulation was checked by dissolving ointment in boiling water, alcohol, ether and chloroform.

7. Non - irritancy test
Moringa oleifera ointment was prepared and applied on the human skin and observed for non irritancy effect.

8. *In vitro* occlusivity test
Four 100 ml beakers were used to perform this test by placing 10 ml of distilled water in each beaker. Open end of beakers were closed by using Whatman filter paper. Filter paper of first beaker was kept uncovered. On the upper surface of Whatman filter paper of Second beaker cold compressed Moringa oil was evenly distributed. Filter paper of third beaker was evenly covered by simple ointment base and filter paper of fourth beaker was covered by Moringa ointments. Then these beakers were placed at 37±2 °C for 48 hours. Beakers are studied for the *in vitro* occlusivity to determine the loss of water (water flux).
The occlusion factor F was calculated by using following formula -

$$F = (A - B)/ A X 100$$

Where
A= Loss of water (water flux) through uncovered filter
B= Loss of water (water flux) through filter when covered by test preparation

9. Stability study
Moringa oleifera ointment formulation was evaluated for their stability at an ambient condition of pressure and temperature for two weeks. Formulation was observed for phase separation and particle agglomeration.

Results and discussion
Moringa oleifera ointment were found to be homogeneous, without phase separation with medium yellow colour with a smooth homogeneous texture. The pH of the ointment was in the range of 5 to 6.5, which is almost same as normal pH range of the skin and hence would not produce any skin irritation after application on skin. Loss on drying was found to be in the range of 2-3 %.Ointment formulation were found to be stable at different temperature.

Image 2: Moringa oleifera ointment formulation

The weight loss of water (water flux) depends on the occlusivity of membrane. The results of occlusivity was found to be 0%,23%, 30 % and 59 % for uncovered filter paper, filter paper covered with oil, simple ointment base and moringa ointment respectively. When value were compared to each other it is observed that moringa ointment has high occlusivity than moringa oil and simple ointment base. Higher the occlusivity more it prevents loss of water from the system.

Table 2: Observation and Result

Sr. No	Test	Results
1.	Colour	Medium yellow
2.	Odour	like wintergreen oil
3.	Texture	Smooth and Semi solid
4.	pH	6.5
5.	Spread ability	Good
6.	Loss on drying	2-3 %
7.	Wash ability	Non washable easily
8.	Solubility	Soluble in chloroform, hot water, acetone and ether.
9.	Non irritancy test	Non irritant
10.	*In vitro* occlusivity test	59%
11.	Stability test	Stable at room temperature

Conclusion
Natural remedies are more safer with fewer side effects than synthetic ones. The Moringa oleifera oil was used to formulate ointment formulations with different bases like cetostearyl alcohol, anhydrous lanolin. The results of the physical evaluation of ointment preparations with Morenga oleifera oil indicated the suitability of method for the production of ointments formulation.

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