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Formulation of Herbal Pain Relief Balm Using Extracts of Different Medicinal Plants

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Abstract: *Herbal balms have grabbed significant attention due to their therapeutic potential and minimal side effects compared to synthetic and chemical containing balms. This study focuses on formulating and evaluating a herbal balm using selected plant extracts with analgesic, anti- inflammatory, and antimicrobial properties. The formulation includes olive oil and waxes as a base, combined with plant extracts such as Moringa, Ashwagandha, Neem and Aloe Vera. Preliminary results indicate that the formulated balm has promising potential as a safe and effective alternative for managing minor pain, skin irritations, and inflammation.*

Keywords: *Ashwagandha, Moringa, Neem, Aloe Vera, Essential oils, Herbal Balm, Pain relief, Natural pain relief ointment.*

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Introduction:

Herbal bam is an ayurvedic preparation of potent essential oils for reducing pain and providing fast relief from headache, backache, cold and other symptoms. This herbal balm composition offers relieve in pain and stiffness when applied on skin. It consists of organic essential oils, organic bases, wax, and other desired components (Jagruti S.B. et.al., 2023). The increasing consumer preference for natural and plant-based health products has spurred a renewed interest in the therapeutic applications of medicinal plants. Among these, Ashwagandha (*Withania somnifera*), Moringa (*Moringa oleifera*), Neem (*Azadirachta indica*), and Aloe Vera (*Aloe barbadensis miller*) stand out for their diverse pharmacological properties and extensive use in traditional medicine. This report focuses on the formulation of a balm utilizing these four botanicals, aiming to create a multipurpose topical remedy that leverages their synergistic benefits for skin health and overall wellness.

Herbal balm formulation, consisting of extracts from medicinal plant leaves, natural essential oils, beeswax, and natural preservatives, functions as a therapeutic topical remedy applied to the skin to ease discomfort and inflammation.

Pain is a distressing sensation often triggered by severe or harmful stimuli. Pain balm is something that is comforting & soothing. Pain balms generally contain menthol which is easily absorbed through the skin. Role of this herbal balm includes anti-inflammatory and relaxing effect which finally provides comfort. These products do not have any side effect or allergic reactions such as skin irritation or rashes because it does not contain any chemical (Chaudhari V.S. et.al., 2023). *Moringa oleifera* is universally referred to as the miracle plant or the tree of life. The *Moringa* plant derives this name based on its uses, particularly with regard to medicine and nutrition (Sharma B. et.al., 2020).

Moringa oleifera has been utilized for its different restorative properties, for example, as wound healing, anti-diabetic, pain relief, anti-inflammatory, cancer prevention. All aspects of this plant contain a significant therapeutic component (Srivastava M. et.al., 2020).

Withania somnifera commonly known as "Ashwagandha" or "Indian ginseng" is an essential therapeutic plant of Indian subcontinent regions. *Withania somnifera* has demonstrated various biological actions such as anticancer, anti-inflammatory, antidiabetic, anti-microbial, antiarthritic, anti-stress/adaptogenic, neuro-protective, cardioprotective, hepatoprotective, immunomodulatory properties (Ingawale D.S.M. and A.G. Namdeo. et.al., 2021).

Neem tree in Sanskrit is called as "Arishtha", which means "reliever of sickness". In 1942, the United States National Academy of Sciences published a report entitled "Neem- a tree for solving global problems", several biological and pharmacological activities of neem compounds have been reported such as antioxidant, anti-inflammatory, antiarthritic, antipyretic, antiviral, spermicidal, hypoglycaemic, anthelminthic, antigastric ulcer, and antitumor activities (Sarkar S. et.al., 2021).

Aloe vera, a succulent perennial and drought resisting plant, is well known for its therapeutic potential. A number of beneficial effects of Aloe vera have been reported, including immunomodulatory, wound and burn healing, hypoglycemic, anticancer, gastroprotective, antifungal, and anti-inflammatory properties. These beneficial therapeutic properties of Aloe vera have been employed for a number of commercial applications (Aslam Maan A. et.al., 2018).

Materials and Methods:

The samples of plant extracts were collected and then they were used in the formulation of balm.

First, the leaves of plants which were Ashwagandha, moringa, neem and aloe vera were collected and their active compounds were extracted. The steps involved in extraction process is discussed below:

1. **Extraction of plant extracts**: The extracts of plants (Ashwagandha, moringa, neem and aloe vera) were extracted using solvent extraction method. The leaves of the plants were washed, dried, and crushed to make a powder which was soaked in ethanol for 24-72 hours then filtered and concentrated using rotary evaporator (Fig. 1).

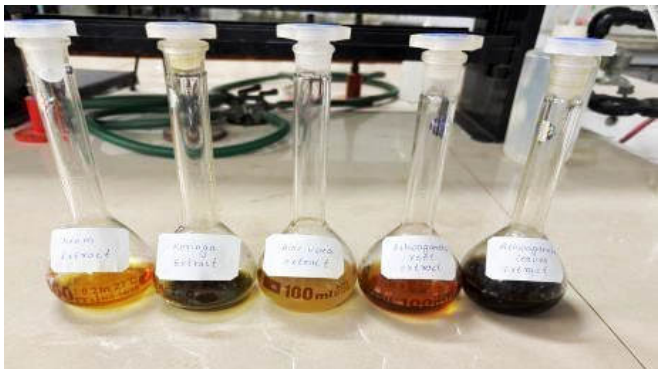


Fig. 1. Extracts of plants

The extracts of plants i.e. Ashwagandha, Moringa, Neem and Aloe Vera were used in formulation of balm. The steps involved are discussed below:

2. **Formulation of balm**: The extracts of plants which were Ashwagandha, Moringa, Neem and Aloe Vera were used in formulation of balm.

   The base of balm was beeswax and olive oil which was melted using double boiler method and mixed in a ratio of three parts of oil and one part of beeswax.

Incorporating other ingredients: some essential oils like peppermint oil, eucalyptus oil and lavender oil was added along with neem oil and vitamin E oil.

Storage: The balm was poured into petri dish when it was liquid and stored in cool dark place away from sunlight.

Fig. 2. Balm formulated using different herbal plants

Color and odour were examined by visual inspection.

Patch test: Prepared balm formulation was applied on human skin to observe its effects.

Stability: Physical stability of the prepared balm formulation was carried out for 2 months at different temperatures.

Washability: The prepared balm was applied on the skin and then washed with water.

Consistency: The consistency of balm was observed by visual inspection.

pH Test: The pH of prepared balm formulation was determined using a digital pH meter. The electrode of pH meter was dipped in the balm to cover it and average of three readings was recorded.

Results and Discussion:

The physical and chemical parameters of balm were determined and the formulation showed good characteristics in texture as well as pH which was found to be 6.5 which is around 7 which is desired pH of our skin.

The balm was formulated using plant extracts, essential oils and menthol which was evaluated for physical parameters and was found satisfactory in terms of texture and appearance.

The color was light yellow and it's appearance was smooth.

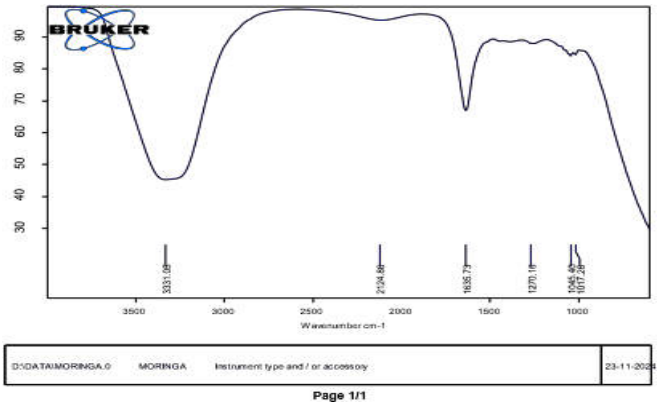
The balm was evaluated for various physical and chemical parameters and results were satisfactory as shown in the given Table 1.

Table 1. Physical and chemical parameters of balm

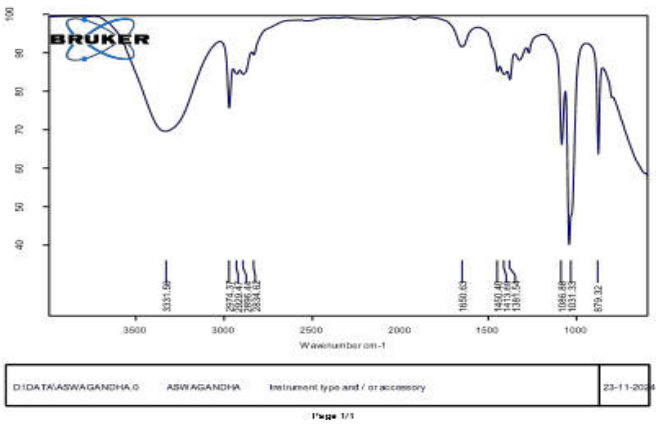
S. No.	Parameters	Results
1	color	Light yellow
2	Odour	Fragrant
3	Appearance	Smooth
4	Consistency	Semi-solid
5	Stability	Stable at different temperatures
6	Patch test	Non- allergenic
7	pH	6.5

FT- IR (Fourier Transform Infrared) spectroscopy is often used to analyse plant extracts. It helps in identification of functional groups, chemical bonds and also the molecular structures when exposed to infrared radiations. The graphs of the FT-IR test of different herbal plants showed the functional groups present in them.

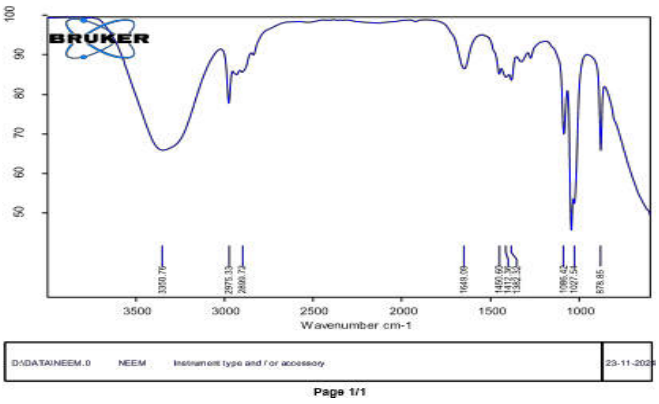
The FT-IR of the extracts was also done which is shown in following graph:



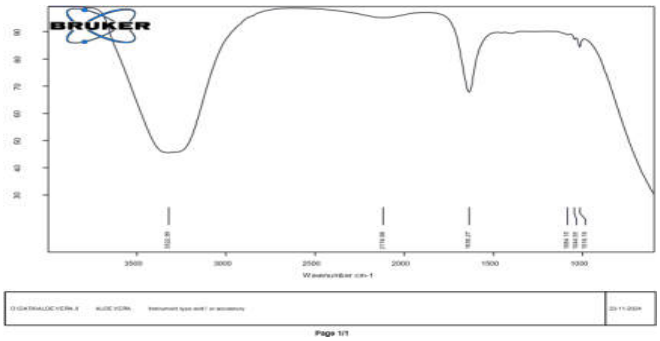
Graph 1. FT-IR of Moringa Extract



Graph 2. FT-IR of Ashwagandha Extract



Graph 3. FT-IR of Neem Extract



Graph 4. FT-IR of Aloe Vera Extract

As shown in the graphs of different herbal plants the functional groups present in their extracts are: Ashwagandha: The FTIR spectra of *Withania somnifera* samples are recorded in between 4000 to 800 cm^{-1}. In FTIR spectrum, broad peaks at 3331 cm^{-1} represent phenolic and -OH group which is due to phenolic compounds or free hydroxyl groups present in it. The peaks at 2834.62 cm^{-1} to 2074.37cm^{-1} are associated with saturated -CH stretching which indicates the presence of lipids or fatty acid content and alkaloids which contributes to stress-relieving property of Ashwagandha. The peak at 1650.63 cm^{-1} represents aromatic C=C group system which is due to withanolides and this peak contributes to anti-inflammatory and antioxidant property of Ashwagandha. The peak at 1381.54 cm^{-1},1413.69cm^{-1} signify C-H bending and it also contributes in anti-inflammatory and antioxidant property of Ashwagandha. The peak at 879.32 cm^{-1} shows aromatic benzene ring and if polysaccharides are present then it relates to the immune modulating effects of Ashwagandha (**Graph-1**). Moringa: The FTIR spectra of Moringa showed peak at 3331.05 cm^{-1} which represents hydroxyl groups and corresponds to hydrogen bonded OH stretching. It highlights the antioxidant properties of Moringa. The peak at 1635.75 cm^{-1} corresponds to c=o and c=c stretching. This peak may signify the presence of proteins in moringa leaves. The phenolic compounds are responsible for the antioxidant, anti-inflammatory and other medicinal properties (**Graph-2**).

Neem: The FTIR of neem gives evidence of presence of variety of bioactive compounds in it. The peak at 3350.76 cm-1 shows the O-H stretching which indicates the presence of phenolic compounds, flavonoids and water. They are responsible for it's medicinal properties such as antioxidant and anti-inflammatory effects. The peaks between 2899.72 and 2975.33 cm-1 corresponds to C-H stretching which is a characteristic of fatty acids, lipids and terpenoids. They are responsible for moisturizing and skin healing properties of neem (**Graph-3**).

Aloe vera: The FTIR spectra of aloe vera are recorded between 1000 to 3500 cm^{-1}. The peak at 3322.99 cm-1 is O-H stretching vibration for compounds like phenol, water and alcohol. It indicates the water content of Aloe Vera, phenolic and flavonoids present in Aloe Vera and also the polysaccharides which are beneficial for skin hydration and wound healing. The 1636 cm^{-1} peak of aloe vera gives evidence of carbonyl containing compounds and possibly proteins. It is responsible for hydrating, healing and anti-inflammatory properties of Aloe Vera (**Graph-4**).

The physical and chemical parameters of balm were determined and the formulation exhibited good characteristics in appearance as well as pH which was 6.5 i.e. around 7 which is desired pH of the skin.

- The Balm was formulated using plant extracts, essential oils and menthol which was evaluated for physical parameters and was found satisfactory in terms of texture and appearance.
- The Balm was easily spreadable using fingers.
- The color of the Balm was light yellow but it varied a little bit.
- The odour of the Balm was fragrant.

Conclusion:

Samples of different herbal plants were collected for extraction of their extracts and the extraction process

done using solvent extraction method where ethanol was used as solvent. Extracts were concentrated using rotary evaporator. Herbal balm was formulated using the plant extracts and various essential oils having pain relief, anti-inflammatory, soothing, antiseptic, antifungal and relaxing properties.

Evaluation was done for various parameters such as pH, patch test, stability and it gave good results. FT-IR of plant extracts was also done which showed peaks of compounds present in the extracts.

The balm does not contain any chemicals

References:

Aslam Maan A., Nazir A., Iqbal Khan M. K., Ahmad T., Zia R., Murid M., Abrar M. (2018). The therapeutic properties and applications of Aloe vera: A review. *J Herb Med;* Volume 12, pp. 1- 10.

Chaudhari V. S., Dhokale P. D., Chaudhari P. S., Bhalekar S. M. (2023). Formulation & Evaluation of Pain Relief Natural Miracle Balm by Using Plant *Vitex Negundo*. *TIJER* Volume 10, Issue 5, pp. 3052-3059.

Ingawale D. S M., Namdeo A. G. (2021). Pharmacological evaluation of Ashwagandha highlighting its healthcare claims, safety, and toxicity aspects. *J. Diet supplement*; 18(2):183- 226.

Jagruti S.B, Shivam S.B, Kajal K.K and Samadhan K.K (2023). Formulation and Evaluation of Herbal Pain Relief Balm. *IJARD*; volume 8, Issue 3, pp. 26-30

Sharma B, Tripathy S, Kantwa C.R, Ghaswa R, Bhadauria R.S and Pachauri D. R. (2020). Moringa Oleifera: The Miracle Tree on the Eath. *Int.J.Curr.Microbiol.App.Sci*; 9 (8), pp. 2623-2632.

Sarkar S., Singh R. P., and Bhattacharya G. (2021). Exploring the role of *Azadirachta indica* (neem) and its active compounds in the regulation of biological pathways: an update on molecular approach. *3Biotec*; 11(4):178, pp. 6-12.

Srivastava M., Dhakad P., Srivastava B. (2020). A Review on Medicinal Constituents and Therapeutic Potential of *Moringa oleifera*. *Univers. J. Plant Sci*; 8(2), pp. 22-33.