ISSN: 0976-7126
Prajapati *et al.*, 15(7):16-27, 2024

International Journal of Pharmacy & Life Sciences
Open Access to Researcher

Preparation and Evaluation the Herbal spray for the management of Pain and Inflammation

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Article info

Received: 10/05/2024

Revised: 01/06/2024

Accepted: 01/07/2024

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Abstract

Pain is an uncomfortable sensation triggered by the nervous system in response to tissue damage or other body damage. It can be dull, achy, shooting, burning, orpins-and-needles. Pain is tied to emotional, psychological, and cognitive factors and can be categorized into acute, chronic, referred, cancer, neuropathic, and visceral pain. Acute pain is experienced rapidly in response to disease or injury, while chronic pain lasts more than three months. Referred pain originates in one part of the body but is felt in another. Cancer pain is caused by nerve irritation caused by malignancy, neuropathic pain is caused by damage to the nervous system, and visceral pain is caused by problems with internal organs. Symptoms may include depression, flu-like symptoms, in ability to concentrate, muscle spasms, sleep disturbances, and un expected weight loss.

Serious symptoms may indicate a life-threatening condition, such as a heart attack. Pain can be caused by a variety of diseases, disorders, and conditions, including inflammatory syndromes, malignancy, trauma, and infection.

Keyword: Analgesic, Chronic pain, Inflammation, Analgesiometer, Plethysmometer.

Introduction

Pain is an uncomfortable sensation triggered by the nervous system in response to tissue damage or other damage to the body. Pain can be a dull, achy,
shooting, burning, or a pins-and-needles sensation. You may feel pain symptoms in a specific area of the body, such as your back, or you may feel aches and pains all over, such as when you have the flu (Influenza). The experience of pain is invariably tied to emotional, psychological, and cognitive factors. In the studies have found that some people with chronic pain may have low levels of endorphins in their spinal fluid. Endorphins are neurochemicals, similar to opiate drugs (like morphine), that are produced in the brain and released into the body in response to pain. Endorphins act as natural pain killers.

Chronic pain most often affects older adults, but it can occur at any age. Chronic pain can persist for several months toyears.[1]

Pain can be due to a wide variety of diseases, disorders and conditions that range from a mild injury to a debilitating disease. The types of pain can be categorized as acute, chronic, referred, Cancer, neuropathic, and visceral.[1]

Acute pain is experienced rapidly in response to disease or injury. Acute pain serves to alert the body that something is wrong and that action should be taken, such as pulling your arm away from a flame. Acute pain often resolves within a short time once the underlying condition is treated.

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Chronic pain is defined as lasting more than three months. Chronic pain often begins as acute pain that lingers beyond the have natural course of healing or after steps been taken to address the cause of pain.

Pain may occur with other symptoms depending on the underlying disease, disorder or condition. For instance, if your pain is due to arthirites, you may experience pain in more than one joint. Pain due to a compressed nerve in the lower back can even lead to loss of bladder control. Pain is often a major symptom of fibromyalgia, which is also characterizedby fatigue and sleep problems. [1]

Herbs used for Pain and inflammation

Ginger (Zingiber officinale Rosc.) belongs to the family Zingiberaceae. It originated in South-East Asia and then used in many countries as a spice and condiment to add flavor to food [3]. Herbal medicines are usually not the most potentanalgesic treatments available. However, they can be highly beneficial for mild to moderate pain . To translate complementary and integrative medicine using herbs into clinical practice and to enable acceptance into treatment guidelines, further rigorous studies are required to confirm the effectiveness and safety of these medicines. Jolad *et al*. grouped fresh ginger into two wide range categories, i.e. volatiles and non-volatiles. Volatiles include sesquiterpene and monoterpenoid hydrocarbons providing the distinct aroma and taste of ginger. On the contrary, non-volatile pungent compounds include gingerols, shogaols, paradols, and zingeron.[4]

The following review aims to consolidate efficacy and safety data for some of the most commonly used herbal medicine for pain relief. That is achieved by identifying the analgesic active components, integrating clinical trial data on their effectiveness, and relating known herb–drug interactions. The original discovery of ginger's inhibitory effects on prostaglandin biosynthesis in the early 1970s has been repeatedly confirmed.This discovery identified ginger as an herbal medicinal product that shares pharmacological properties with non steroidal anti- inflammatory drugs. Ginger suppresses prostaglandin synthesis through inhibition of cyclooxygenase-1 and cyclooxygenase-2. An important extension of this early work was the observation that ginger also suppresses leukotriene biosynthesis by inhibiting 5- lipoxygenase

This pharmacological property distinguishes ginger from nonsteroidal anti inflammatory drugs. This discovery preceded the observation that dual inhibitors of cyclooxygenase and 5- lipoxygenase may have a better therapeutic profile and have fewer side effects than non steroidal antiinflammatory drugs. The characterization of the pharmacological properties of ginger entered a new phase with the discovery that a ginger extract (EV.EXT.77) derived from Zingiber officinale (family Zingiberaceae) and Alpina galanga (family Zingiberaceae) inhibits the induction of several genes involved in the inflammatory response. These include genes encoding cytokines, chemokines, and the inducible enzyme cyclooxygenase-2. This discovery provided the first evidence that ginger modulates biochemical pathways activated in chronic inflammation. Identification of the molecular targets of individual gingerconstituents provides an opportunity to optimize and standardize ginger products with respect to their effects on specific biomarkers of inflammation. Such preparations will be useful for studies in experimental animals and humans. [2]

Herbs for inflammation :- Various herbal supplements, such as the following, are shown Trusted Source to have anti-inflammatory properties: Ginger, Turmeric and Cannabis .

Material and Methods

Collection of ginger:- The Rhizome of Zingiber officinale were collected from the localmarket of Indore (Madhya Pradesh), cleaned and used for further evaluation. [7]

Collection of piperment:- The leaf of the piperment was collected from the college Chameli devi institute of pharmacy indore [Madhya Pradesh] cleaned and used for the futher evaluation and process . [6]

Collection of Aleo vera:- The whole fresh plant of Aloe vera (Aloe barbadensis Miller) was collected from the biological garden of Chameli devi institute of pharmacy indore [Madhya Pradesh] cleaned up and gel was extracted and used for the further evaluation andprocess .[8]

Authentication of plant:- The plant Ginger (Zingiberaceae officinale), Mentha (Mentha piperita), Aleovera (Aleo) was authenticated by **DR. K K Sadhav (Ph.D)** Botany, HOD (Head of the department) S.T.P Govt. Science College Mendaki DhakadDewas (Madhya Pradesh)

Preparation of Herbal Extracts

Extraction of Ginger oil :- Raw material selection and analysis Selection of ginger of Essential Oil Extraction: The technological feasibility of both fresh and dry ginger was assessed to obtain ginger oil. Fresh ginger and dried is used for the experimental purpose. The ginger used in this research was purchased from the local market. The fresh ginger chopped into 1-2 mm size pieces was used. Ginger oil extraction & its physicochemical properties: Ginger oil was extracted by soxhlet extraction, Ultrasound assisted extraction and autoclave agitator etc. with optimized operational condition. The operational conditions include optimized sample, temperature, extraction time, and ratio of ginger to solvent. Temperature: The operating temperature for experiments carried out was varied from 70°C to 80°C. Extraction time: The termextraction time is used for the duration of time it took for experiment to run. In this research, the experiments were carried out from 1 to 2 hrs. of extraction time. Ratio of ginger to solvent: The experiments being carried out using the equipment set up. The ratio of ginger to solvent was 50 gm. ginger sample to 200ml of solvent was used . [7]

Extraction of piperment oil :- Steam distillation: Steam distillation is one of the mostpopular ways

will be used to extract essential oils from plants, leaves and flowers. During steam distillation process, 100g of the plant raw material was being placed in
the chamber of the essential oil distillation still, and steam passed through the plant matter. When the steam passed through the plant matter it picked up the oils and movedinto another chamber where it is cooled and condensed. Then, essential oil was separated from the water and bottled for used.[6]

Extraction of aleovera :- Slit the leaf of an aloe plant lengthwise and remove the gelfrom inside and use as a commercial or the medicinal prepration . [8]

Pharmacognistic Study (Ginger , Piperment , Aleo vera)

Moisture content :- Moisture content (MC) is a reference to the amount of moisture present in a material. This value is often represented as a percentage of the material's mass (such as X% MC). The amount of moisture in an object can be measured in several different ways, such as with oven-dry tests or moisture meters . [14]

Ash value :- The ash value is a measure of the total amount of minerals present in a plant sample. The ash value can be used to determine the extractive values of the plant, as well as the nutrient content of the plant. The ash value is also a good indicator of the purity of the plant sample.[14]

Alcohole soluble extract value :- alcohol-soluble extractive values of the different marketed formulations and their similar in-house prepared formulations were in the range of 9.08−11.12% . [14]

Water soluble extractive value :- Water-soluble extractive value plays an important role in

evaluation of crude drugs. Less extractive value indicates addition of exhausted material, adulteration or incorrect processing during drying or storage or formulating. [14]

Crude fat :- Crude fat is often synonymous with ether extract and generally refers to freelipids that can be extracted into less polar solvents such as petroleum ether or diethyl ether. Bound lipids require more polar solvents for extraction. Choice of solvents is based on solvent.characteristics. [14]

Phytochemical screening

Ginger :

Alkaloids :- In 2 ml of 1% aqueous extract of ginger in acetone and methanol, add 2 ml of Hager's reagent. Yellow precipitates indicate the presence of alkaloids.

Glycosides :- 2ml of sample in a test tube then add Molisch reagent and add concentration H2SO4 . violet ring present and it indicates the presence of glycosides .

Tannins :- 1ml of sample in a test tube and add acetone and menthol with 2ml of 5%fecl3. Dark brown colour indicates the presence of Tannins .

Voletile oil :- A thin section of drug is treated with alcoholic solution of sudan-3 .Appearance of red colour indicates the presence of voletile oil

Flavonoids :- 1ml of sample in test tube with a few drops of 10% lead acetate solution .yellow precipitates shows the indicates of flavonoids.[10]

Piperment oil

Alkaloids :- Sample in a test tube then add few drops of dragendoff reagent . white precipitate shows the indicates of alkaloids .

Glycosides :- 2ml sample in a test tube add 2ml glacial acetic acid and few drops of FeCl3 and add 1ml of H2SO4 . Appearance if brown ringat junction indicates the presence of glycosides .

Tannins :- 2ml of sample in a test tube add 2ml of 2% FeCl3 . A black colour formed and indicates the presence of tannin.

Voletile oil :- Thin section of drug then add sudan solution . Red colour appear and indicates the presence of voletile oil .

Flavoniods :- sample in a test tube then 2-3 magnessium ribbon fragments and add 4 drops of concentrated HCL was added . Red colour appear and it indicates the presenceof flavonoids . [10]

Aloe vera

Alkaloids :- 3ml ethanolic extract in a test tube then add 3ml of 1% Hcl and wagnersreagent . turbidity show with precipitates and it indicates the presence of alkaloids .

Glycosides :- 2ml extract in a test tube and add 2ml chloroform and 2ml of H2SO4 .it appear in reddish brown colour and indicates the presence of glycoside .

Tannins :- Sample in a test tube the add FEO3 solution . green precipitate occour andit shows the presence of tannin .

Voletile oil:- A thin section of drug is treated with tincture of alkane . appearance ofred colour and it indicates the presence of voletile oil .

Flavonoids :- 1ml of ethanolic extract then add 1ml of 10% lead acetate solution .yellow precipitate indicates the presence of flavonoids . [10]

Evaluation of Physico-Chemical Characterization of spray

pH: The pH of optimized solution of the spray was determined using digital pH meter. Before measuring the pH of optimized formulation, the pH meter was calibrated with the help of phosphate buffer pH 4.0, 7.0 and 9.0. Then about 30 ml of spray solution was taken in a smallglass beaker and the electrode of pH meter was dipped into it for a minute and the pH was noted. The measurement of pH of each formulation was done in triplicate and mean values were calculated. [15]

Viscosity: Viscosity of solution for topical spray was determined by Oswald viscometer. 30 ml spray solution was filled in Oswald viscometer. Flow of solution was measured in time from A to B point in viscometer. Reading was taken at least three times. Viscosity of spray 1solution was measured against the viscosity of water . [15]

Density: Dried and emptied Pycnometer was weighed. The sample were filled in it and air bubble were allowed to rise to top before inserting the stopper. Pycnometer was handled by theneck with one or two layers of paper between the fingers and the bottle to avoid expansion due to the heat of the hand. The proper value of the density was known by dividing the resultant weight of liquid by its volume in Pycnometer. [15]

Pressure test: As per method described in USA at the temperature of 250C, Not fewer than four

aerosol were selected each container is placed in an upright position. The actuator is pressed to remove liquid from the dip tube and valve. The actuator is removed and replaced with the pressure gauge. The gauge is pressed to actuate the valve and the pressure exerted by the propellant is being noted for each aerosol container . [15]

Flame Projection: This test indicates the effect of an aerosol formulation on the extension of an open flame. Product is sprayed for 4 sec. into flame. Depending on the nature of formulation, the fame is extended, and exact length will be measured with ruler. The sample is classified as flammable if ignition occurs at a distance equal or greater than 15 cm but less than75 cm. [15]

Leak test: Two types of leak test are being performed as described below. 1. Immediate leak test: Filled aerosol containers are allowed to sink in warm water (around 50 0 C) for About 10 seconds, immediately after the filling. The bubbling in water is being identified as a leakage in the container. 2. Delayed leak test: Accurately weighed aerosol containers are keeping at room temperature for 2 months. After this time period the containers are weighed again. The difference in the weight of a container is being identified as leakage in the container. [15]

Pharmacological Activity

Analgesiometer :- Analgesiometer is the instrument ant for studying the analgesic effect of Morphine by observing the Paw licking or jump response due to heat as heat is used as source of pain. Analgesics increase the reaction time of animals to heat. The instrument is self contained in all respect It is fitted with heat element maintained at constant temperature (adjustable) with the help of front panel controls marked current it is provided with an acrylic box fitted for placing the mice gunmetal stand over the heat element for holding the tail of the mice two nozzles are provided on the stand for cooling by water on Hot.

Procedure:- 1. Weigh and number the mice.

2 Take the basal reaction-time by observing hind paw licking or jump response (whichever appears first) in animals when placed on the hot plate maintained at constant temperature (55° C). normally animals show such response in 6-8 sec. A cut off period of 15 sec is observed to avoid damage to the paws.

Inject morphine to animals and note the reaction time of animals on the hot plate at 15, 30, 60 and 120 min after the drug administration. As the reaction time increases with morphine, 15 sec is taken as maximum analgesia and the animals are removed from the hot plate to avoid injury to the paws.

4 Calculate percent increase in reaction time (as index of analgesia) at each time interval.

Plethysmometer:- Aplethysmometer is a valuable piece of equipment used to measure the effectiveness of anti-inflammatory agents that are experimentally induced in rodents. It can also be used to test agents designed to reduce endemic conditions. Throughout this blog post, we will look at how a plethysmometer is used and the benefits it provides in researchlaboratories.

Procedure:

Weigh the animals and number them.

Mark a mark on both the hind paws (right and left) just beyond tibio-tarsal junction, so thatevery time the paw is dipped in the mercury column upto the fixed mark to ensure constant paw volume.

Note the initial paw volume (both right and left) of each rat by mercury displacement method.

Divide the animals into two groups each comprising of at least four rats. To one group inject saline and to the second group inject indomethacin subcutaneously.

After 30 min inject 0.1 ml of 1% (w/v) carrageenan in the plantar region of the left paw of control as well as indomethacin-treated group. The right paw will serve as reference non-inflamed paw for comparison.

Note the paw volume of both legs of control and indomethacin-treated rats at 15,30,60, and120 min after carrageenan challenge.

Calculate the percent difference in the right and left paw volumes of each animal of control and indomethacin-treated group. Compare the mean percent change in paw volume incontrol and drug-treated animals and express as per cent oedema inhibition by the drug.

Results and Discussion

Pharmacognostic Study

As per this table all the pharmacognostic study of the drug Ginger , Piperment And Aleovera are

shown :

S.no	Chemical test	Ginger	Piperment	Aleovera
1	Moisture Content	12.12%	84.14(+-0.48)	Negative
2	Ash Value	8.83%	Negative	13.3%
3	FOM Value	1.3%	Negative	Negative
4	Crude Fat	Negative	2.72(+-0.7)	Negative
5	Alcohole Soluble Extactive Value	2.4%	Negative	11.07%
6	Water Soluble Extractive Value	8.3%	Negative	20.98%

Phytochemical Screening :- As per this table all the chemical test and screening ofthe phytochemicals result are shown :-

S.no	Chemicals	Alkaloid	Glycoside	Flavanoids	Tannins	Volitileoil	Resins
1	Ginger	Present	Present	Present	Present	Present	Present
2	Pipermentoil	Present	Present	Present	Present	Present	Absent
3	Aleovera	Present	Present	Present	Present	Absent	Absent

GINGER

Test for Alkaloids

S.no	Chemical Test	Observation	Inference
1	**Wagner test** :- 2ml sample in test tube + 2-3 drops of wagner reagent	Reddish brown colour	Present
2	**Hager test** :- 2ml sample + acetone ormethanol add 2 ml of hager reagent	Yellow ppt arepresent	Present

Test for Glycoside

S.no	Chemical test	Observation	Inference
1	**Molisch test** ;- 2ml sample + molisch reagent +conc. H2So4	Voilet Ring found	Present
2	**Fehling test** :- 2ml sample +dil.H2So4+ heat + fehling A+B reagent	Brick redppt are present	Present

Test for Tannin

S.no	Chemical test	Observation	Inference
1	**Ferric chloride test** :- 1ml sample +acetone and methanolwith 2ml of 5% fecl3	Dark bluecolour	Present
2	**Gelatin formation**	White ppt	Present

Test for voletile oil

S.no	Chemical test	Observation	Inference
1	**Sudan-3 test** :- A thin section ofdrug is treated with alcoholic solution of sudan-3	Appearanceof red colour	Present
2	**Tinture test** :- A thin section of drug treated with tincture ofalkane	Appearance of redcolour	Present

Test for resins

S.no	Chemical test	Observation	Inference
1	**Acetic anhydrite test** :- 1mlsample +few drops of aceticanhydrile + 1 ml of conc. H2SO4	Yellow toorange colour	Present
2	**Acetone test** :- Acetone + Sample	Appearance of turbidity	Present

Test for Flavanoids

S.no	Chemical test	Observation	Inference
1	1ml of sample with a few drops of 10% lead acetate solution	Yellow ppt	Present

Piperment oil

Test for alkaloids

S.no	Chemical test	Observation	Inference
1	**Mayer test** :- 2ml sample +mayer reagent	Yellow pptor Presence of turbidity	Present
2	**Dragendroff test**:- Sample + 3 drops of dragendoff reagent	Presence of white ppt	Present

Test for Glycosides

S.no	Chemical test	Observation on	Inference
1	**Killer kilianin test** :- 2ml sample +2ml glacial acetic acid +fewdrops of Fecl3 +1ml of conc. H2SO4	Brown ringat junction	Present
2	**3,5 Dinitro benzoic acid test** :- Alcoholic solution + drops of 2%NaoH solution + 2% dinitro benzoic acid	Pink colour formed	Present

Test for Tannin

S.no	Chemical test	Observation	Inference
1	**Ferric chloride test** :- 2mlsample + 2ml 2% Fecl3	A blackcolour formed	Present
2	**Ammonia test** :- 2 ml sample + heat + conc.Hno3 + excess ammonia	White pptfromed	Present

Test for volatile oil

S.no	Chemical test	Observation	Inference
1	Few drops of piperment oil +5ml of nitric acid preparedby 1ml nitric acid to 300 mlglacial acetic acid after 5 minutes liquid develop blue colour than copper colour then golden yellow		Present
2	**Sudan-3 red test** :- Thin section of drug + Sudansolution	Red colourAppear	Present

Test for Resins

S.no	Chemical test	Observation	Inference
1	**Acetic anhydride test** :- 1 ml of sample + few drops of acetic anhydride + 1 ml of concentrated H2SO4	Yellow toOrange	Absent
2	Acetone water test :- Acetone + water + sample	Appearance of turbidity	Absent

Test for flavonoids

S.no	Chemical test	Observation	Inference
1	**Shinoda test** :- Sample + 2-3 magnesium ribbon fragment + 4drops of concentrated HCL was added	RED colouroccur	Present

ALEOVERA

Test for Alkaloids :-

S.no	Chemical test	Observation	Inference
1	**Mayer test** :- 3ml ethanolic extract +3ml 1% HCL + mayer reagent	Turbidity with ppt	Present
2	**Wagner test** :- 3 ml ethanolic extract + 3ml 1% HCL + Wagnerreagent	Turbiditywith ppt	Present

Test for Glycoside

S.no	Chemical test	Observation	Inference
1	**Liberman test** :- 2ml extract + dissolve in 2 ml chloroform + 2 ml acetic acid	Voilet to blue colour	Present

2	**Salkoneskis test** :- 2 ml extract + 2ml chloroform + 2 ml H2SO4	Reddishbrown colour	Present

Test for Tannins

S.no	Chemical test	Observation	Inference
1	**Ferric chloride test** :- Extraction + feo3 solution	Green ppt	Present
2	**Vanilin HCL test** :- 1g vaniline +10 ml alcohol +10ml concentratedHCL + Extract	Pink or red colour occur	Present

Test for volatile oil

S.no	Chemical test	Observation	Inference
1	Sudan-3 test :- A thin section of drug is treated with alcoholic solution of sudan-3	Appearance of red colour	Absent
2	Tinture test :- A thin section of drug treated with tincture of alkane	Appearance of red colour	Absent

Test for Resin

S.no	Chemical test	Obervation	Inference
1	**Acetic anhydrite test** :- 1mlsample +few drops of acetic anhydrile + 1 ml of conc. H2SO4	Yellow toorange colour	Present
2	**Acetone test** :- Acetone + Sample	Appearance of turbidity	Present

Test for Flavonoids

S.no	Chemical test	Observation	Inference
1	1 ml ethanolic extract + 1ml of 10 % lead acetate solution	Yellow precipitate	Present

Pharmacological Evaluation :- The pharmacological evaluation result are show inthis below table :-
Analgesiometer

S.No	**Animal Weight**	**Basal Reaction time (Sec)**		**Reaction Time After Treatment**	
		Paw Licking	**Jump Response**	**Paw Licking**	**Jump Response**
1	150 g	03	05	01	03
2	150 g	04	10	02	06

Plethysmometer

S.No	Treatment	Drug/Solution And Dose	Paw Volume (ml) As Measured By Mercury Displacement									
			0min		15min		30min		60min		120min	
			R	L	R	L	R	L	R	L	R	L
1	Control Group	Normal	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.7	0.4	0.9
2	Control Group	Normal	0.5	0.5	0.5	0.5	0.4	0.8	0.4	0.9	0.4	0.9
3	Treated group	Ginger , Piperment , Aleovera	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.6	0.2	0.7
4	Treated Group	Ginger , Piperment , Aleovera	0.3	0.3	0.2	0.3	0.2	0.6	0.2	0.7	0.20	0.7

Conclusion

In conclusion, pain is a complex sensation that can be acute or chronic in nature, often accompanied by various symptoms depending on the underlying cause. The types of pain, such as referred, cancer-related, neuropathic, and visceral, highlight the diverse ways pain can manifest. It's crucial to recognize potential serious symptoms that might indicate a life- threatening condition, emphasizing the importance of seeking medical attention when needed. Understanding the causes of pain, including traumatic and inflammatory factors, provides a comprehensive view of the mechanisms behind this experience.

Chronic inflammation is particularly relevant, as it has been associated with various long-term diseases. The discussion on herbal medicine for pain and inflammation, particularly the benefits of ginger, serves as a significant insight into alternative treatment options. The pharmacognostic and pharmacological studies of ginger, piperment, and aloe vera shed light on the potential application of these herbs in managing pain and inflammation. The evaluationusing tools like the Analgesiometer and Plethysmometer provides a scientific basis for the efficacy of these herbal extracts.

Overall, this comprehensive exploration into the types, causes, symptoms, and herbal remedies for pain and inflammation contributes to our understanding of this complex phenomenon and offers potential alternative solutions for managing it. This holistic approach underscores the importance of further research and consideration of diverse treatment modalities for alleviating pain and inflammation. In conclusion, pain is a complex and multifaceted experience that can be caused by a wide range of diseases and conditions.

Understanding the different types of pain, such as acute, chronic, referred, cancer, neuropathic, and visceral, is crucial for accurate diagnosis and effective treatment. Pain may occur with a variety of symptoms, indicating the underlying cause, and in some cases, it may be linked to life-threatening conditions. The pharmacological activity of herbal medicines, such as ginger, piperment, and aloe vera, can provide effective relief from pain and inflammation. These natural remedies offer promising potential for the management of various health issues and can be included as part of integrative treatment plans. Furthermore, the detailed methods and material for the extraction and preparation of herbal extracts provide valuable insights into their application and potential benefits.

The comprehensive pharmacognostic studies and phytochemical screening of these herbal extracts offer a deeper understanding of their chemical composition and potential therapeutic properties. Additionally, the pharmacological activities assessed through pain measurement devices, such as the analgesiometer and plethysmometer, provide valuable data on the effectiveness of these herbal extracts in managing pain and inflammation. Over all, this in-depthexploration of pain, herbal medicine, and their pharmacological

activities provides a valuable foundation for further research and clinical application.

By understanding the complexities of pain and exploring the potential of natural remedies, wecan pave the way for more integrated and holistic approaches to healthcare and pain management.

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Cite this article as:
Prajapati V., Tomar P.S. and Gupta A.K. (2024). Preparation and Evaluation the Herbal spray for the management of Pain and Inflammation**.** *Int. J. of Pharm. & Life Sci.*, 15(7): 16-27.

Source of Support: Nil
Conflict of Interest: Not declared
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