

ANTI-INFLAMMATORY ACTIVITY OF POLY-HERBAL AEROSOL SPRAY AS A SUPPORTIVE THERAPY FOR INFLAMMATION

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ABSTRACT

The present study was intended to assess the poly-herbal topical aerosol spray as a sympathetic therapy for clinical inflammatory disorders. A total of 18 mice were suffering from induced inflammatory disorders were selected and were sprayed on inflamed affected area. Topical application of spray have shown a significant improvement ($P < 0.001$) in alleviation of paw inflammation. The results demonstrate that these types of advanced spray could be considered as an alternative to non-steroidal anti-inflammatory drugs (NSAIDs) as a supportive therapy for clinical inflammatory disorders.

Keywords: Anti-Inflammatory Activity, Nsaids, Poly-Herbal Aerosol Spray

Introduction

Inflammation is biological response of vascular tissue which is also characterized by redness, warmth, swelling and pain. Generally it is considered to be harmful stimuli against pathogens, irritants and injury associated with local vascular reaction and cellular response, of the living tissue, to an injury insufficient to kill the tissue, Agrawal et.al.(2010). Mostly inflammation is bodies first line defense contrivance but unrelenting effects can leads to serious conditions like Inflammatory bowel disease (IBD), degenerative diseases such as rheumatoid arthritis, atherosclerosis, congestive heart failure, Alzheimer, cancer, multiple sclerosis, diabetes, gout disease, aging and other neurodegenerative CNS depression, Mikami et. al.(1883). Two types of inflammatory disorders are well known viz 'acute and chronic'. Acute inflammation lasts for minutes to several hours only which can be characterized by redness, heat and oedema. On contrary chronic inflammation is more prolonged resulting in fibrosis and tissue necrosis, Pahwa and Jilal (2018).

Treatment and management of inflammatory disease relies on tempering pain and since majority of the biological changes and pathological lesions are allied with clinical disease conditions as a result of the inflammatory reaction to infection, Xu et.al. (2019). Hence administration of anti-inflammatory agents to ease the inflammation

and pain along with other supplements, checks further tissue damage and spread of infection or allergic response facilitates inflammation management Carclo and Bruce, (2008). Glucocorticoids and Non-steroidal Anti-inflammatory Drugs (NSAIDs) are the classical and well-studied examples of anti-inflammatory agents frequently used in treatment and management of inflammatory related disorders. Glucocorticoids and NSAIDs inhibit the release and metabolism of arachidonic acid thus hampering the release of prostaglandins, leuko-trienes and thromboxanes thereby wielding their anti-inflammatory, analgesic and antipyretic effects, Esmail (2016). However, uncritical, overuse and long term use of these drugs are associated with a broad spectrum of adverse effects such as gastrointestinal and cardiovascular events, renal toxicity, hypertension. Moreover these types of synthetic anti-inflammatory preparations are quite lavish and repetition of the doses makes the treatment probably cost-prohibitive, Gangwaret. al. (2015).

In recent years, widespread research and pharmacological assessments of active ingredients from distinct herbal species reveal the significant strength and efficacy of herbal medications in the management of pain and inflammatory conditions with less or no adverse effects, tolerance.

Analgesic and anti-inflammatory effects of various extracts and essential oils from herbal plants species have exhibited the significant effects in animal models. These activities are

may be predictable due to the presence of secondary metabolites (phytochemicals) like mono- terpenoids, tri-terpenoids, alkaloids, glycosides, flavonoids, sterols, tannins, saponins and glucosinolates and many more, Ilavarasan et. al. (2005). With this perspective and growing acceptance of substitute herbal therapy, the present study was carried out to evaluate the topical poly-herbal aerosol formulation spray as a supportive therapy for inflammatory disorders.

Materials and methods

Collection and identification of plant

Fresh herbal plants were collected directly from the field and were authenticated by the Botany group at D.B.F Dayanand college of Arts and science Solapur (M.S).

Extraction and partial purification of plant material

Extraction of herbal dried herbal material was done using method described by Damaet. al. (1999). Ethanolic extracts were harnessed after 72 hours. Collected extracts were subjected to column chromatography with Hexane: Acetone fractions and preparative TLC.

Ethical approval

The study conducted fulfills the guidelines laid down by the Institutional Ethics Committee. All applicable institutional guidelines regarding care and use of animals were followed. All procedures used during studies were in accordance with the ethical standards of the institution

Animal collection and maintenance of albino mice

For the present research work 18 albino mice of either sex were obtained from Aarya Biotech Dhule (M.S), India (CPCSEA registration No. 1822/PO/RcBiBt/S/15 /CPCSEA). All animals were housed as per CPCSEA guidelines (CPCSEA, 2003).

Study design

All mice were injected with 0.1 ml of 1 % carrageenan solution in sub-plantar region prior to study. Animal group IV received poly herbal spray in a combination of essential oils of

Tridaxprocumbens (L.), *Ocimum sanctum* (L.) *Cymbopogon citratus* (L.) and crude menthol extract from *Mentha spicata* (L.) as excipients (Table 1), whereas group III were sprayed with standard Diclofenac in seed oil methyl salicylate & Menthol applied topically on inflamed paw. Group I and II were kept as negative and carrier control Damaet. al. (1999).

Table 1. Each 10 ml Poly herbal spray Composition

<i>Tridaxprocumbens</i> (L.) crude oil extract	1gm
<i>Ocimum sanctum</i> leaf crude oil extract	1gm
<i>Cymbopogon citratus</i> (L.) leaf crude oil extract	1gm
Menthol as excipients*	q.s.

q.s. quantum sufficit*

Results and Discussion

Collection and identification of medicinal plants

All collected plant materials were identified by botanist from the Department of Botany, and the Herbarium sheaths, were deposited in the Department of Zoology, D.B.F Dayanand College of Arts and Science Solapur.

Extraction of medicinal plant parts

Extraction 1kg of dried herbal material yielded 10 gm of crude extract in 72 hour. Column chromatography with Hexane: Acetone fractions and preparative TLC yield was 4 gm (Dama and Jadhav, 1999).

Carrageenan inflammatory activity

Carrageenan in sub- planter region of mice paw induced localized inflammation in 3 hours. However there was no natural inflammation reduction seen even after 4 hours (Group I).

Anti-inflammatory activity on albinomice

The topical anti-inflammatory activity of poly-herbal spray was evaluated with modified mercury displacement method technique described by Bhalsing et. al.(2018) in 0-4 hour time intervals. All results were expressed as average mean \pm S.E.M mercury displacement (ml)/ Hour upon comparing with standard 10 % diclofenac spray (**Table 2.**)

Table 2. Anti-inflammatory activity of poly herbal spray on albino mice left paw after 0.1 ml (1 %) carrageenan administration (Mean \pm S.E.M)

Animal Group	Mercury displacement (ml)/Hour (Average volume Mean \pm S.E.M)									Percent inhibition
	Initial hour	½ Hour	1 hour	1 ½ hour	2 hour	2 ½ hour	3 hour	3 ½ hour	4 hour	
Group I	0.130 \pm 0.0036	0.303 \pm 0.0021	0.301 \pm 0.0016	0.298 \pm 0.0016	0.293 \pm 0.0021	0.291 \pm 0.0022	0.291 \pm 0.0021	0.288 \pm 0.0022	0.288 \pm 0.0030	0
Group II	0.130 \pm 0.0036	0.303 \pm 0.0021	0.303 \pm 0.0021	0.298 \pm 0.0016	0.288 \pm 0.0016	0.289 \pm 0.0025	0.286 \pm 0.0033	0.281 \pm 0.0047	0.286 \pm 0.0021	0
Group III	0.125 \pm 0.0034	0.298 \pm 0.0016	0.275 \pm 0.0034	0.275 \pm 0.0034	0.256 \pm 0.0047	0.241 \pm 0.0047	0.208 \pm 0.0047	0.193 \pm 0.0047	0.175 \pm 0.0034	69.04
Group IV	0.126 \pm 0.0042	0.296 \pm 0.0021	0.296 \pm 0.0021	0.286 \pm 0.0042	0.265 \pm 0.0072	0.248 \pm 0.0060	0.228 \pm 0.0075	0.206 \pm 0.0055	0.19 \pm 0.0044	59.99

Discussion

There is urge to find alternative medicines to steroidal anti-inflammatory drugs as they are well to known to provoke serious and adverse health effects, discussed by Carclo and Bruce (2008). Finding alternatives to NSAID's has remained a major plunge area in mounting novel, effective and safe anti-inflammatory agents, Jagtap et.al. (2010). Natural product especially from medicinal plants on the other hand has remained a very successful combination for the contraption of new therapeutic agents. The main intention of the present study was to perform topical anti-inflammatory activity of poly herbal spray guided standardization for selected medicinal plants. Variety of phytochemicals like flavonoids, terpenoids, alkaloids and saponins has been described to possess significant topical anti-inflammatory activity. Several studies proved that naturally occurring coumarins and flavonoids acting as dual inhibitors of inflammatory mechanisms, Negi (2012). Lieschke and Currie, (2007), Negi (2012), Agrawal et.al.(2010), with medicinal plants a number study so far has reported for the anti-inflammatory activity in gel formulation. This research investigation underwrites information in the database of Indian and world ethanopharmacy. Anti-inflammatory activity on albino mice Present research investigation represents topical anti-inflammatory activity of selected medicinal plants extracts on mice paw, Brash (2001).

Hypothetically screened plants included for animal experimentation exhibited substantial anti-inflammatory activity at 3 mg/kg per body weight of albino mice inn partially purified form. Similar kind of works with topical gel have been discussed by Rathod et. al. (2008); Brash(2001); Mikami and Miyasaka (1883); Damaet. al.(1999). In present research work 1 %, 0.1ml carrageenan shows effective for inflammation (100 %) induction in 0-4 hours in mice paw, as also formerly described by Akinyemiet. al. (2005). During present investigation a great variation in pharmacokinetic anti-inflammatory activity was observed in selected plants extracts. Herbal spray formulation *Tridexprocumbens*(L.) crude oil extract 1gm, *Ocimum sanctum* leaf crude oil extract 1gm, *Cymbopogon citrates* (L.) leaf crude oil extract 1gm showed 59.99 % activity in 4 hours.

Conclusion

Poly herbal spray in aerosol formulation could be best alternative to treat localized inflammation and related disorders. Further purification and standardization in evaluation may enhance result output; Very less work has been done with same approach. Further standardization in spray formulation and assessment method may improve quality in results. The same procedure may be applied with different crude plant extracts.

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