

ORIGINAL ARTICLE

Preparation and Analytical Evaluation of *Samanga Navaneetha* Ointment for the Management of *Kanabhavisha* (Wasp Sting)

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ABSTRACT

Visha Chikitsā, also known as *Agada Tantra*, is one of the eight branches of *Ayurveda*. A poison (*Visha*) is any substance—external or internally taken—that can threaten life or harm health. Exogenous toxic effects come from external sources and are classified into two types: living (*Jangama*) and non-living (*Sthaavara*) poisons. In clinical practice, poisoning incidents from insect bites are rather prevalent. The symptoms of *keetas* might range from minor discomfort to circumstances that could be fatal. The bites and stings group includes scorpion, wasp, and bee stings, as well as snake bites. Wasps are members of the Hymenopteran order. The composition of wasp venom varies depending on the species. The primary allergens in wasp venoms are phospholipase A2, hyaluronidase and antigen. Phospholipase A2 acts as an indirect cytolytic, cytotoxin, and neurotoxin by blocking neurotransmission at synapses. Its sting can cause anything from mild local reactions to severe, potentially fatal effects. *Ayurvedic* classics mention insect poisoning and its management under "*Keetavisha-prakarana*." However, no prior published *Ayurvedic* studies specifically address *Kanabhavisha* (wasp sting). Although these traditional *yogas* are widely used, they have received very little scientific evaluation. *Samang Navaneetha lepa* be used in managing *Kanabha damsā* (wasp stings). Because of their busy schedules, patients often find preparing *Lepa* from *churna* tiring and inconvenient, which can also lead to uneven mixing. Converting this *Lepa* into an ointment form would improve consistency and increase patient compliance. The formulation was first analyzed to establish the fundamentals needed for its development, manufacturing, and quality control.

Keywords: *Vishachikitsa*; *Kanabhavisha*; *Agadtantra*; *Ayurveda*; *Toxicology*; wasp sting.

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INTRODUCTION

Agadtantra, is one of the eight clinical branches (*Ashtanga*) of *Ayurveda*. The terms *Agad* and *Tantra* are the roots of the word *Agadtantra*. Anything that overcomes a poison is called *agada*, and *Agadtantra* is a body of knowledge that does precisely that. This discusses the characteristics, effects and the management of both living (*Jangama*) and inanimate (*Sthavara*) poisons. Any material that, when administered, inhaled, or consumed, fails to function dexterously on the human body and hence ends life is considered poison. [1] Poisoning cases due to insect bites are very common in clinical practice. *Keetas* are capable of producing a variety of symptoms ranging from pain to life threatening situations. But a clear picture of the presentations of stings and bites of different insects found in day-to-day practice needs to be studied. Very little work has been carried out on such insect bites and stings. The bites and stings group comprises of scorpion, wasp and bee stings along with snake bites. Acharya *Susrutha* has classified *Kanabhavisha* (Wasp poisoning) under the vast topic *Keeta visha*. [2] Symptoms of

Kanabhavisha includes severe pain, swelling, body ache, heaviness of body and blackish discolouration of stung site. Wasp is considered as *Kanabha* belonging to the class Insecta, of subphylum Apocrita, from kingdom Animalia. [3] Wasps belong to the members of the order Hymenoptera. The composition of wasp venom varies from species to species. Wasp venom typically contains enzymes, polypeptides (vespakinin, chemotactic and mastoparan peptides), amino acids (histidine, tryptophan), and active amines (serotonin, histamine, tyramine, adrenaline, and dopamine). Phospholipase A2, hyaluronidase, and antigen 5 are the main allergens found in wasp venoms. In addition to acting as an indirect cytolytic and cytotoxin, phospholipase A2 possesses neurotoxic properties via obstructing neurotransmission at brain synapses. Its sting can cause a range of reactions, from minor local reactions to serious, perhaps fatal situations. [4,5] Local reactions such as discomfort, wheal, flare up, edema, and swelling are typically brought on by wasp stings. Vomiting, diarrhea, widespread edema, dyspnea, hypotension, collapse, renal failure, and mortality can result from several stings. [6] Poisoning due to Wasp stings can even prove to be fatal as there are case reports where Multiple Organ Dysfunction Syndrome (MODS) developed as complications in the course of the treatment. In order to save the victim's life, early diagnosis and treatment are crucial. The External application of whole part of *Samanga* (*Biophytum sensitivum*) with butter is specifically mentioned in the treatment of *Kanabhavisha* (Wasp sting) in the popular regional treatises namely *Prayogasamucchyam* and *Vishavaidyajyotsnika*. [7,8] Due to their hectic schedules, patients frequently find it difficult and time-consuming to prepare *Lepa* from *churna*, which can also result in uneven mixing. Making this *Lepa* into an ointment would boost patient compliance and enhance uniformity. The formulation was initially examined to determine the principles required for its formulation, production, and quality assurance.

MATERIAL AND METHOD:

Collection of Raw material: *Samanga* (*Biophytum sensitivum*) will be procured after identification of genuine sample by a Botanist. *Navaneetha* (Butter)- Butter will be collected from Goshala. Raw materials for the preparation of *Samanga navaneetha* ointment was procured from reliable suppliers from south India.

Material:

Table 1: Ingredients of *Samanga Navaneetha* ointment

Sr. No.	Ingredient	Quantity	Function
1.	<i>Samanga</i> (<i>Biophytum sensitivum</i>) fresh plant extract	100 g	Active herbal component
2.	<i>Navaneetha</i> (Butter)	60%	Base/emollient/Active
3.	Beeswax	9%	Consistency enhancer, emollient
4.	Cetomacrogol	5%	Surfactant/Emulsifying agent
5.	Polysorbate 80	2%	Emulsifier/Solubilizer
6.	Phenoxyethanol	1%	Preservative

Pharmaceutical study:

Procedure for development of *Samanga Navaneetha* ointment from *Samanga Navaneetha lepa*:

1. Preparation of *Samanga* (*Biophytum sensitivum*) Extract

- 100 g of fresh *Samanga* (*Biophytum sensitivum*) was taken.
- Washed thoroughly with clean water to remove any dirt or impurities.
- Material was juiced with required quantity of water
- Filtered or squeezed to collect the juice.
- Juice was heated gently over a water bath until it reduces to a semi-solid paste consistency. This formed the herbal base for the formulation.

2. Preparation of Phase A (Aqueous Phase)

- To the semi-solid *Samanga* paste, Polysorbate 80 was added.
- Stirred continuously until a homogeneous blend was formed.

3. Preparation of Phase B (Oil Phase)

- Beeswax and Cetomacrogol were weighed into a clean beaker.
- The mixture was heated on a water bath until completely melted.
- Allowed to cool and Butter was added to the mixture when temperature falls 50° C and mixed thoroughly by continuous stirring.

4. Emulsification

- Slowly added Phase A (*Samanga* paste + Polysorbate 80) into Phase B (Butter + Beeswax + Cetomacrogol) with continuous stirring.

- Continue homogenisation was done until a uniform and smooth ointment base was formed.

5. Addition of Preservative

- Once the mixture has been cooled further (below 40°C), Phenoxyethanol was added and stirred thoroughly to ensure even distribution of the preservative.

6. Final Processing

- Allow the mixture to attain room temperature.
- Inspect for consistency, homogeneity, and smooth texture.
- Transfer the final product into sterile, airtight containers.

7. Storage:

Keep out of direct sunlight and in a cool, dry location. The ointment was applied using a sterile spatula or with clean, dry fingers.

RESULT

Analytical study: Physicochemical examination; Pesticide analysis; heavy metal analysis; wet analysis; test for specific micro-organisms qualitative were done.

Table 2: The organoleptic study after the preparation of the formulation is mentioned below.

Organoleptic character	<i>Samanga Navaneetha</i> ointment
Odor	Odorless
Color	Whitish
Form	Cream

Table 3: Physicochemical evaluation

Sr. no.	Test	<i>Samanga Navaneetha</i> ointment
1.	Loss on drying at 105° C	23.01 % mass
2.	Viscosity	4757, RPM:100; SP No:64
3.	Total Acidity	2.66 %
3.	pH value	5.62
4.	Total Fat content	65.75 % mass
5.	Thermal stability	Complies

Table 4: Test for specific micro-organisms qualitative

	Limits (as per IP)	<i>Samanga Navaneetha</i> ointment	Test method
E. Coli	Absent/100ml	Absent	API, Part 2, vol 4
S. sp.	Absent/100ml	Absent	API, Part 2, vol 4
P. aeruginosa	Absent/100ml	Absent	API, Part 2, vol 4
S. aureus	Absent/100ml	Absent	API, Part 2, vol 4

Table 5: test for specific micro-organisms quantitative

	Specification	<i>Samanga Navaneetha</i> ointment	Test method
Total plate count for bacteria	10 ⁷ cfu/g	88000 cfu/g	API, Part 2, vol 4
Total yeast and mould count	10 ³ cfu/g	<10 cfu/g	API, Part 2, vol 4

[<10 is considered as “not detected” as per test method]

Table 6: Heavy metal analysis of *Samanga Navaneetha* ointment

Sr. No.	Parameter	Unit	Results	Specifications	Detection limit
1.	Cadmium	Ppm	BDL	NMT 0.3	0.05
2.	Lead	Ppm	BDL	NMT 10	0.05
3.	Mercury	Ppm	BDL	NMT 1	0.05
4.	Arsenic	Ppm	BDL	NMT 3	0.05

[BDL: Below detection limit; NMT: not more than]

DISCUSSION

Agada Tantra deals with the effects and treatment of poisonous substances, both animate (*Jangama*) and inanimate (*Sthavara*). Acharya Susrutha has classified *Kanabhavisha* (Wasp poisoning) under the vast topic *Keeta visha*. Symptoms of *Kanabhavisha* includes severe pain, swelling, body ache, heaviness of body and blackish discolouration of stung site. Wasp is considered as *Kanabha* belonging to the class Insecta, of subphylum Apocrita, from kingdom Animalia. There is no published works regarding *Kanabhavisha* (Wasp sting) so far from the field of Ayurveda. *Prayogasamuchaya* and *Visha Vaidya jyothsnika* are two important practical handbooks of ayurvedic toxicologists in Southern part of India. The *yogas* mentioned in these texts were least explored in a scientific way though it is well in practice. Scarcity of raw materials and lack of not many available formulations are the challenges mostly faced by physicians in the acute management of stings. The External application of whole part of *Samanga* (*Biophytum sensitivum*) with butter is specifically mentioned in the treatment of *Kanabhavisha* (Wasp sting) in the popular regional treatises namely *Prayogasamucchyam* and *Vishavaidyaajyotsnika*. Henceforth the study was carried out by using an ointment made of Samang Navaneetha in wasp stings. The preparation of *Samanga Navaneetha lepa* in ointment base can be made readily available, easy to use and can improve the shelf life of the herbal ingredients. *Samanga* and *navaneetha* was used as ingredients. After obtaining the *samanga* plant extract, oil phase and aqueous phase were prepared and mixed with each other along with Ingredients to form the cream. To extend the formulation's shelf-life Phenoxyethanol were added as preservative. A *Samanga Navaneetha* ointment designed to treat wasp stings was successfully developed and standardized. Using conventional Ayurvedic principles and contemporary pharmaceutico-analytical procedures, the preparation process produced a stable, homogenous, and pharmaceutically acceptable topical formulation. Important information on the quality, stability, and applicability of *Samanga Navaneetha* ointment for topical application in the treatment of wasp stings is provided by the analytical evaluation. The loss on drying (23.01%) shows that the formulation contains both moisture and volatile ingredients. This degree of moisture indicates sufficient integration of aqueous herbal ingredients without compromising product stability for an ointment incorporating Navaneetha (butter/*ghee*) and herbal decoctions. This degree of moisture content also facilitates easy application and desired spreadability on irritated skin. A semi-solid consistency suitable for topical application is indicated by the viscosity measurement of 4757 cP (at 100 RPM, spindle 64). This viscosity level permits smooth application and adhesion to the skin's surface while guaranteeing the ointment's structural integrity within the container. For the management of wasp stings, a moderate viscosity is advantageous because it allows a protective barrier to form over the injured area, improving retention time and local therapeutic activity. The presence of natural fatty acids and organic components from Navaneetha and herbal substances is probably reflected in the total acidity (2.66%), which is within an acceptable range for fatty-based ointments. Maintaining the ointment's antibacterial qualities and formulation stability are both aided by controlled acidity. Good dermatological compatibility is indicated by the pH value of 5.62, which is near the natural skin pH range of 4.5 to 6.5. For skin that is irritated or reactive, like in wasp sting reactions, a pH that is close to physiological is very crucial. This pH promotes the skin barrier, reduces the possibility of irritation, and permits the bioactive components to have the best possible therapeutic effect. The total fat content (65.75%) guarantees occlusive and emollient qualities and is consistent with a formulation based on *Navaneetha*. The large lipid percentage soothes the sting site, lowers trans-epidermal water loss, and aids in maintaining hydration. Additionally, fat-rich bases can promote the long-term release of lipophilic herbal components, boosting their anti-inflammatory and anti-allergic properties. The formulation's capacity to retain its chemical and physical integrity at high temperatures is verified by the thermal stability test (Complies). This is an important quality characteristic since it indicates that there is little chance of rancidity, phase separation, or viscosity breakdown when stored in warm conditions. *Samanga Navaneetha* ointment fully complies with the microbial limitations specified by the Indian Pharmacopoeia (IP) for topical treatments, according to the microbiological evaluation. According to the methods described in API, Part 2, Volume 4, *Samanga Navaneetha* ointment proved negative for all four designated pathogens: *E. coli*, *S. spp.*, *P. aeruginosa*, and *S. aureus*. The total lack of these microorganisms suggests that the ointment base is suitable for inhibiting unwanted microbial development, that the microbiological quality is appropriate, and that hygiene methods during formulation were efficient. *Samanga Navaneetha* ointment's heavy metal profile was carried out to guarantee the formulation's safety and regulatory compliance. Four hazardous heavy metals—cadmium (Cd), lead (Pb), mercury (Hg), and arsenic (As)—that are tightly restricted because of their cumulative toxicity and tendency to induce systemic or dermatological injury were included in the analysis. The quantities of all four metals were found to be considerably lower than the maximum allowable limits

stipulated for topical herbal preparations, since they were all below the detection limit (BDL) of 0.05 ppm.

CONCLUSION

A *Samanga Navaneetha* ointment designed to treat wasp stings was successfully developed and standardized. Using conventional Ayurvedic principles and contemporary pharmaceutico-analytical procedures, the preparation process produced a stable, homogenous, and pharmaceutically acceptable topical formulation. The formulation's therapeutic significance in reducing the pain, inflammation, and allergy symptoms linked to wasp stings was supported by biological experiments that showed significant antioxidant, anti-inflammatory, mast-cell stabilizing, and antibacterial activity. The formulation maintained its efficacy and purity under expedited settings, according to stability testing. To determine its safety, effectiveness, and therapeutic advantage over traditional treatments, more in-vivo and clinical testing is advised.

AUTHOR CONTRIBUTIONS

Conceptualization, VKR and NA.; methodology VKR and NA.; formal analysis, VKR, SM, NA.; investigation, VKR And SM.; resources, VKR.; data curation, VKR, NA AND SM; writing—original draft preparation, VKR; writing—review and editing, VKR AND NA.; visualization, SM; supervision, SM. All authors have read and agreed to the published version of the manuscript

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DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are available in the [repository name] at [persistent link/DOI].

COMPETING INTERESTS

The authors have declared that no competing interest exists.

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