

# “FORMULATION AND EVALUATION OF HERBAL WOUND HEALING CREAM”

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**ABSTRACT:** Now, a day's herbal cosmetics are products which are widely used in every generation. The goal of the research was to develop an herbal cream healing the wound and treating various skin disease and moisturizing, nourishing the skin. The basic drugs used to make the cream. Extract of turmeric rhizomes (*curcuma longa*), aloe-vera (*Aloe-barbadensis miller*), neem leaves (*Azadirachta Indica*), Tulsi (*Ocimum sanctum*), they have anti-inflammatory and antiseptic property helpful against disease, wound healing, enzymes parameters are used to the cream.

**Keyword:** Wound healing, Anti-bacterial, Neem, Turmeric, Aloe Vera, Tulsi.

## INTRODUCTION

The Indian traditional Ayurvedic system of medicine has advocated the use of natural products to promote healthy living by preventing unnecessary ailments. This traditional medical system is well-known using a variety of herbal medications to treat various causes of imbalance in human health. The fundamental principle behind the use of herbal formulation in Ayurvedic is not only the restoration of a disease-free body, but also the prevention of its recurrence <sup>[1]</sup>. The Indian traditional Ayurvedic system of medicine has advocated the use of natural products to promote healthy living by preventing unnecessary ailments. This traditional medicine to treat various causes of imbalance in human health. The fundamental principle behind the use of herbal formulation in Ayurvedic is not only the restoration of a disease-free body, but also the prevention of its recurrence <sup>[2]</sup>.

Polyherbal utilizes the concept of synergies which indicates a positive herb-herb interaction. This principle suggests that the phytochemical constituent from one plant get activated in the presence of constituents from another plant. Such interaction has been demonstrated using two mechanisms namely pharmacodynamic. The former mechanism, absorption, and elimination of one herbal constituent by another. However, the latter mechanism focuses on the synergistic effect of one herbal with other, when the phytochemical constituent has similar therapeutic activity and thus when targeted to a similar receptor enhance the overall pharmacological effect. It also advocates the fact that the use of multiple herbs in a single formulation may help in targeting many potential targets in the physiological system at the same time imparting faster relief. Therefore, both these mechanisms support the use of multiple herbs rather than single herbal formulation. Medical partitioner also believes that polyherbal formulation help in lowering the dose size for each herbal constituent, reducing the risk of any side effects due to high dose of herbs <sup>[3]</sup>.

Thus, the term “refers to that pharmaceutical preparation that uses more than one herbal as a component for increased therapeutic effectiveness and decrease toxicity of individual herbs. The ancient herbal medicine system from many parts of the world from many parts of the world have made use of polyherbal formulations due to their multifaceted pharmacological action <sup>[4]</sup>. Herbal formulation is also common in other ancient medicine system, such as those of China, Egypt and Greece according to World Health Organizations (WHO), across the world still resort to these natural herbal products for the maintenance of a good lifestyle <sup>[5]</sup>.

## Wound:



**Fig. no.1 Wound healing**

Anatomical, cellular, and functional integrity of living tissue can be lost or broken as a result of wounds, which are inevitable events <sup>[6]</sup>. A loss or interruption of the cellular, anatomical, or functional continuity of the deep skin tissue or the tissue may be referred to as a wound <sup>[7]</sup>. Wound healing is defined as a complex process occurring by regeneration or reconstruction of damaged tissue<sup>[8]</sup>.

## Type of Wound:

Wound can be classified in number of ways, depending on Healing time they can be acute or chronic.

1. **Acute Wound** : Acute wound is defined as the traumatic loss of normal structure and function to recently uninjured tissue <sup>[9]</sup>. Those wound that get healed in short period of time <sup>[10]</sup>.
2. **Chronic Wound** : Chronic wounds are defined as wounds that have not healed through the regular phases and have instead entered a state of pathologic inflammation. These wound either take a long time to heal or keep coming.

## Wound Healing :

Wound healing is an integrated cellular and biochemical process of restoring normal structure functions of damaged tissue <sup>[11]</sup>. Wound healing or wound repair is an intricate process in which skin or organ or tissue repairs itself after injury <sup>[12]</sup>. Wound healing consists of complex, well- organized cascade of biochemical and cellular events that involves tissue repairs and regeneration

<sup>[13]</sup>.

## Wound healing process

This process can be categorized into four stages [figure 1]: Hemostasis phase, inflammatory phase, proliferative phase and finally the remodeling phase, it strengthens the appearance of the healed tissue in a timely manner <sup>[14]</sup>.

### 1. Hemostasis phase

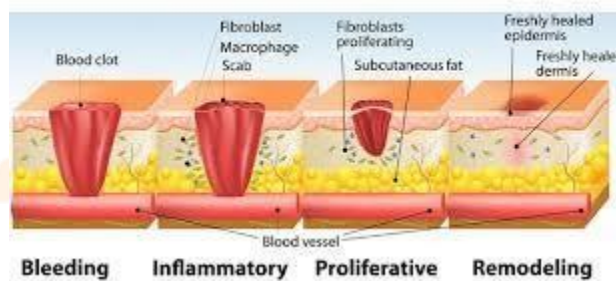
The hemostasis phase [coagulating] occurs in first few seconds after injury and last approximately 1 hour. The fast recruitment of neutrophils to the injured tissue followed through the first 24 hours. Microvascular damage and extravasation of blood into the wounds are the major class of tissue injuries. Loss of structure integrity initiates the coagulation cascade and constriction of vessel walls; the resulting clot formation and platelet aggregation limits further blood loss <sup>[15]</sup>.

### 2. Inflammatory phase

The inflammatory phase [removal of bacteria] starts between 24 to 48 hour and may persist for up to 2 weeks in some cases <sup>[16]</sup>. In this stage it causes the blood vessels to become leaky, releasing the surrounding tissue with plasma and neutrophils <sup>[17]</sup>.

### 3. Proliferation phase

The third phase [formation of granulation tissue and collagen synthesis] of wound healing is the proliferative phase that last up to 2 days to 3 weeks after the inflammatory phase, depending on the extent of the wound and the patient's health <sup>[16]</sup>.



**Fig. no. 2 Wound healing process**

## Wound healing in the fetus and adult

It is evident that the ability to repair wounds without excessive wound healing is age-dependent <sup>[17]</sup>. The more advanced age is and higher possibility of excessive wound healing occurs. Fetal wound healing is characterized by regeneration of normal dermal architecture, which includes

restoration of neuro vascular and dermal appendages <sup>[17]</sup>. Wound healing in the fetal skin involves distinct GF profile, a lower inflammatory response with an anti-inflammatory cytokine profile, lower biomechanical stress, an EMC rich in hyaluronic acid and type II collagen, and a potential role for stem cell <sup>[17,20,21,22,23]</sup> Compared with fetal skin, adult has a higher risk of scar formation.

There are at least four mechanisms to show the difference of wound healing between fetal skin and adult's skin <sup>[22]</sup>. The early stage of adult healing is characterized by an inflammatory reaction with migration of neutrophils and macrophages but inflammation is not apparent in fetus. Studies show that fewer of the

inflammatory cell are found in the fetal wound that those is the adult wound <sup>[22]</sup>.

### **Factor Affecting Wound Healing :**

- Improper diet.
- Infection at the wound site.
- Insufficient oxygen supply and tissue.
- Perfusion to the wound area.
- Drugs
- Elderly age
- Diabetes and their diseases condition.

### **Benefits of herbal wound healing cream:**

- Promote healing
- Reduce inflammation
- Antimicrobial action
- Reduced Risk of Side Effects
- Herbal wound healing creams are generally safe for use on all skin types.
- Herbal cream often contains ingredients that help keep the wound area created an optimal environment for healing.
- Herbal wound healing creams offer a natural and potentially affective alternative for promoting wound healing while minimizing the risk of side effect. <sup>[13]</sup>

### **Traditional Medical Practices:**

Traditional medicine is often described by practitioners of “modern” (western) medicine using septical terms such as “alternative,” and “complementary,” when in fact may of the techniques and practice of “modern” medicine are little different from traditional practices when it comes to wound. Traditional approaches depend almost entirely upon natural resources, such as water, plants, animals, and minerals, and continue to be values and widely practiced by a majority of the world’s population <sup>[23]</sup>. The practice of traditional Chinese theory and Yin-Yang theory, recorded in the ancient Chinese medical documents such as “Shen Nong Ben Cao Jing” “Ben Cao Gang Mu.” Many, but not all, TCM makes extensive use of plants, ensuring it is effective, affordable, and accessible <sup>[24]</sup>. Interestingly, of the new anticancer drugs developed between 1940 and 2002, approximately 54% were derived from natural products <sup>[25]</sup>. Another study has determined that of all current pharmaceutical products, about 73% include ingredients derived from natural products <sup>[26]</sup>. The therapeutic activity of many traditional medicines is conferred by natural ingredients produced within the plant; consequently, the efficiency of TCM preparations can vary widely and are determined by the genotype, environmental, and growing conditions encountered by each source plant <sup>[24,27]</sup>.

## ❖ HERBAL INGREDIENT USED IN FORMULATION:

### 1. Aloe Vera



**Fig.no. 3 Aloe Vera**

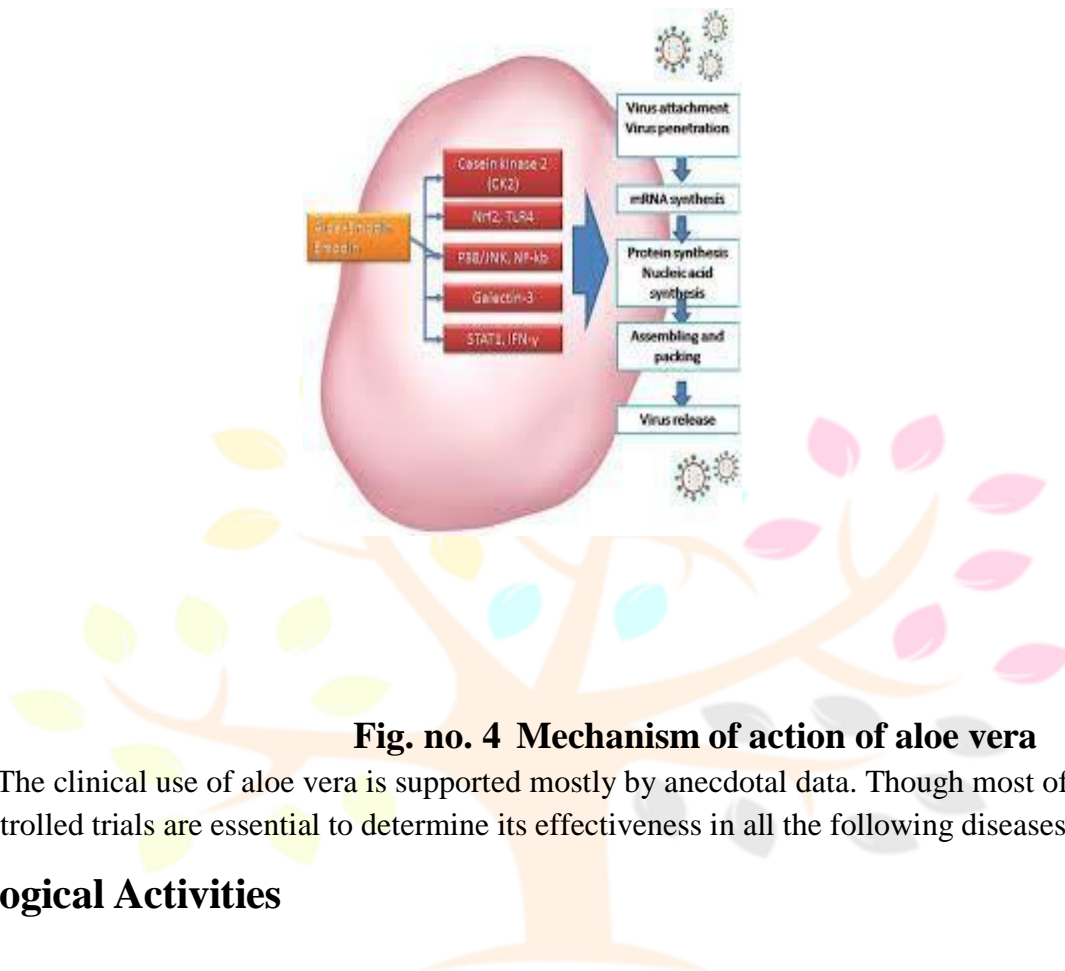
Applied to wound for over 5000 years by Egyptians, Romans, indigenous peoples of Africa Asia, and the Americas, Aloe vera continues to be a first-line treatment for burns, ulcers, and surgical wounds <sup>[28]</sup>. Aloe vera contains many natural bioactive compounds, including pyrocatechol, saponins, acemannan, anthraquinones, glycosides, oleic acid, phytol, as well as simple and complex water-soluble polysaccharides <sup>[29]</sup>. Acetone extracts from the leaves of Aloe vera exhibit stronger antimicrobial activity than alcohol and aqueous extracts. Gram-positive bacterial species appear to be more sensitive than Gram-negative species to Aloe vera <sup>[30]</sup>. Compounds with known antimicrobial activity are saponins, acemannan, and anthraquinone derivatives <sup>[31]</sup>.

**History of Aloe Vera:** Aloe vera has been used for medicinal purpose in several cultures for millennia: Greece, Egypt, India, Mexico, Japan and China <sup>[32]</sup>. Egyptian queens Nefertiti and Cleopatra used it as part of their regular beauty regimes. Alexander the Great, and Christopher Columbus used it to treat soldier's wounds. The first reference to Aloe vera in English was a translation by John Gooyew in A.D. 1655 of Dioscorides Medical treatise De Material Medica <sup>[33]</sup>. By the early 1800s, Aloe vera was in used as a laxative in the United point occurred when it was successfully used to treat chronic and severe radiation dermatitis <sup>[34]</sup>.

- **Synonyms:** Aloe barbadensis mill, Aloe indica Royal, Barbados aloe, Curacao aloe.
- **Biological source:** Aloe barbadensis Miller
- **Family:** Asphodelaceae
- **Chemical constituents:** Vitamins (A, C, E, and B12), Minerals (calcium, magnesium, zinc, copper), and other fatty acids.

**Active components:** Aloe vera contains 75 potentially active constituents: Vitamins, Enzymes, Minerals, Sugars, Lignin, Saponins, Salicylic acids and amino acids<sup>[35, 36]</sup>.

## Mechanism of action:



**Fig. no. 4 Mechanism of action of aloe vera**

**Clinical uses:** The clinical use of aloe vera is supported mostly by anecdotal data. Though most of these uses are interesting, controlled trials are essential to determine its effectiveness in all the following diseases [37].

## Pharmacological Activities

The implications of aloe vera, as the whole leaf extract, the gel, and the latex, or health maintenance through the modulation of various biological activities have been widely described worldwide [38,39].

1. **Anti-inflammatory action:** Aloe vera inhibit the cyclooxygenase pathway and reduces prostaglandin E2 Production from arachidonic acid Recently, the novel anti-inflammatory compound called C-glucosyl chromone was isolate from gel extracts [40].
2. **Burn wound healing effect:** Aloe is known as the healing plant. Aloe vera has been used for traditional purposes in several cultures [41]. In vitro extracts of Aloe vera stimulate the proliferation of several cell type. Many studies have shown that treatment with whole Aloe vera gel extracts resulted in faster healing of wound [42,43]. Aloe vera may have a direct effect on the wound healing process as a whole, which is manifested by increase in rete of contraction of wound area [44].
3. **Anti-Bacterial effects:** Aloe vera is known for its antibacterial, antiviral, and antiseptic properties. This is part of way it may help heal wounds are treat skin problems. Aloe vera Staphylococcus aureus and Pseudomonas aeruginosa.
4. **Anti-septic affect:** Aloe vera contains 6 antiseptic agents: Lupeol, salicylic acid, urea nitrogen, cinnamomic acid, phenols and sulfur. They all have inhibitory action on fungi, bacteria and various.
5. **Laxative effects:** Anthraquinones present in latex are a potent laxative. It increases intestinal water content, stimulates mucus secretion and increases intestinal peristalsis [45].

## 2. *Curcuma longa*:



**Fig. no. 5 *Curcuma longa***

Globally, medicinal plants and their bioactive constituents have found practical application in treating, managing, and preventing various human and animal diseases in complementary and orthodox medicines. Recently, it has been reported that about 80% of the world's population depends on medicinal plants and their phytoconstituents (bioactive compounds for their primary health care [46,47,48]). Interestingly, the preference for the use of medicinal plants over orthodox medicines may be due to the efficacies of their bioactive agents as well as other of factors such as accessibility, affordability, availability and their acclaimed less toxic effects [49,50,51].

**History of *curcuma longa*:** Turmeric has been utilized by humans for nearly, 6,000 years [52]. Historically, turmeric was widely used in Ayurveda medicine and traditional Asian medicine such as traditional Chinese medicine. The exact origin of turmeric is unknown. According to records, the use of turmeric in Indian dated back roughly 6,000 years. It probably spread to both Morocco and China by around 700 AD, reached East Africa by 800 AD and West Africa by 1200 AD. Then in the thirteenth century, Arab merchants brought turmeric to Europe [53]. Alternative in sixteenth century, turmeric entered Turkish cuisine, where it served as a natural coloring agent to give yellow color to the saffron-infused rice dessert [53].

- **Synonyms:** Turmeric, Haldi,
- **Biological source:** *Curcuma longa*.
- **Family:** Zingiberaceae
- **Chemical constituent:** Curcuminoids, Curcumin, Dimethoxy curcumin, and Bisdemethoxycurcumin curcumin.

**Active constituent:** The main active constituents of *Curcuma longa* are curcuminoids, a group of compounds that includes curcumin, dimethoxy curcumin, and trimethoxy curcumin.

## Mechanism Of Action of Curcuma Longa:



Fig. no. 6

### Mechanism of action of Curcuma longa

**Clinical uses:** It's is used for digestive disorders, certain types of arthritis, and as an adjunctive treatment for inflammatory bowel disease and some cancers.

### Pharmacological activity:

1. **Anti-microbial activity:** Curcuma longa, known for its anti-microbial activity, showed anti- bacterial activity against Bacillus subtilis, Escherichia coli, Pseudomonas aureus, and Vibrio cholerae, exhibiting MIC values within the range of 125-100 ug/ml <sup>[54]</sup>. Lobo de Sa et al. suggested the inhibitory growth activity of curcumin on Campylobacter jejune <sup>[54]</sup>.
2. **Hepatoprotective activity:** Additionally, turmeric is well-recognized for its hepatoprotective activity. It was demonstrated that the protective effect of curcumin against liver oxidative injury involves restoring gut microbiota balance and lipid metabolism dysregulation caused by Ochratoxin a <sup>[55]</sup>.
3. **Anti-inflammatory:** Curcumin is a bioactive substance that can help fight inflammation though very high does are required to produce medicinal results, Still, it means it has the potential to fight the inflammation in serval conditions and diseases, such as rheumatoid arthritis.
4. **Anti-diabetic activity:** Three curcuminoids, including curcumin, dimethoxy curcumin, significantly reduced blood glucose, alanine aminotransferase, and aspartate aminotransferase levels, and improved liver histopathology score, indicating that these three curcuminoids have potent anti-diabetic efficacy <sup>[56]</sup>.
5. **Improve Brain Functions:** Curcumin can improve and boost levels of the brain hormone brain-derived neurotrophic the growth of new neurons in the brain. Hence, turmeric has been used to attempt to prevent diseases such as Alzheimer's diseases.

### 3. Tulsi



**Fig. no. 7 Tulsi**

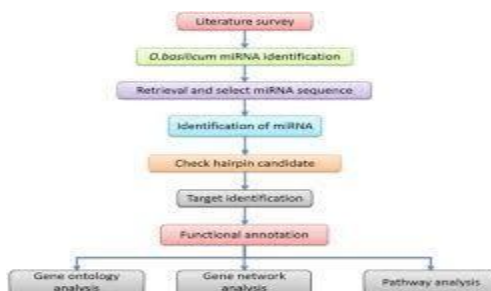
Tulis (Holy Basil) is an important symbol of the tradition considering the hind religion. Tulsi has another name called Vishnupriya, which means a person who pleases Lord Vishnu. In Indians <sup>[57]</sup>. Plant is known for various medicinal properties from ancient times. The essential oils extracted from therapeutic plants are safe, economical, effective and easily available <sup>[58,59,60,61]</sup>.

India is the home for more than 8000 species of vascular plant out of which 1748 are considered for their therapeutical uses <sup>[62]</sup>.

**History of Tulsi:** According to some ancient Indian legend, the plant (Tulsi) came into being as an avatar (incarnation) of the Hindu goddess Tulsi. In the botanic form Tulsi is the favored herb of the lords, Vishnu, Krishna, and being greatly revered by lord Shiv and lord Brashma. Tulsi opens the heart and mind, confers love, compassion, trust, and devotion. Today, it is widely used and incorporated in religious rituals and auspicious ceremonies throughout the subcontinent and is worshipped and carefully grown by the traditional Hindu families <sup>[63]</sup>. From literature, it is said that Tulsi has been therapeutically since 400-500 BC. Earliest references of this were found in Rigveda (3500-1600BC) <sup>[64]</sup>.

- **Synonyms:** Surasa, Vaishnavi, Vrinda, and Haripriya.
- **Biological source:** Ocimum sanctum-holy basil  
Ocimum basilicum-sweet basil
- **Family:** Lamiaceae
- **Chemical constituents:** Eugenol, Carvacrol, Methyl chavicol, Bornyl acetate, Camphor, Limonene, Camphene.

## Mechanism of Action:



## Fog. No. 8 Mechanism of Tulsi

### Pharmacological activity:

1. **Anti-viral activity:** The chemical constituents of Tulsi show antiviral activity. Majorly ursolic acid and eugenol demonstrated antiviral activity including influenza.
2. **Anti-tussive:** It was reported that the aqueous and methanolic extracts of the OS plant showed antitussive activity when studied in guinea pigs <sup>[65]</sup>.
3. **Anti-stress:** It was reported that the leaves of *O. sanctum* possess antistress activity when studied in rabbits <sup>[66]</sup>.
4. **Immunomodulatory:** It was studied that leaves of *O. sanctum* increase the RBC's WBC's hemoglobin and antibodies production without affecting other biochemical activities when tested in mice <sup>[67]</sup>.
5. **Anti-fungal:** It was studied that the linalool and methyl chavicol content extracted from the essential oil of Tulsi leaves showed antifungal dermatophytes <sup>[68]</sup>.

### 4. Neem



**Fig. no. 9 Neem**

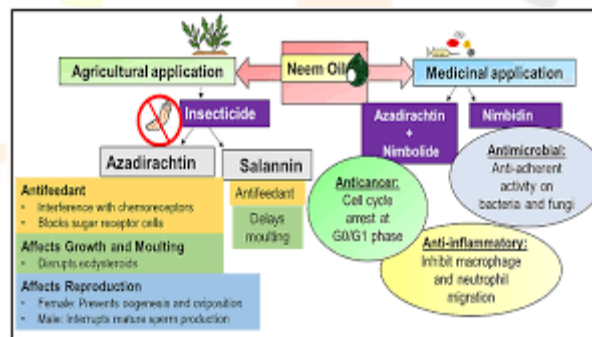
The plant product or natural products show an important role in diseases prevention and treatment through the enhancement of antioxidant activity, inhibition of bacteria growth, and modulation of genetic pathways. The therapeutics role of number of plants in diseases management is still being enthusiastically researched due to their less side effect and affordable properties. It has been accepted that drugs based on allopathy are expensive and also exhibit toxic effect on normal tissues

and on various biological activities. It is a largely accepted fact that numerous pharmacologically active drugs are derived from natural resources including medicinal plants [69,70]. Neem ingredients are applied in Ayurveda, Unani, Homeopathy, and modern medicine for the treatment of many infectious, metabolic, or cancer disease [71,72].

**History of Neem:** The history of the neem tree spans ancient religious texts and traditional medicine, with its origins believed to be in the Indian subcontinent. In ancient Indian mythology, the tree is of divine origin, said to have been created when drops of “Amrita” (the elixir of immortality) fell from the heavens. Its medicinal and pesticidal properties were documented in texts like the Atharvaveda and Kautilya’s Arthashastra, and it was considered a cure for numerous ailments.

- **Synonyms:** Neem tree, Indian Lilac, Margosa Tree, and Nimba tree.
- **Biological source:** Azadirachta indica
- **Family:** Meliaceae
- **Chemical constituents:** Triterpenoids, Isoprenoids, non-isoprenoids, Proteins and amino acids, Carbohydrates, Fatty acids, Polyphenols, Ascorbic acid

**Mechanism of action:**



**Fig. no. 10 Mechanism of Neem**

**Pharmacological activity:**

1. **Anti-inflammatory:** It has been shown to have anti-inflammatory and analgesic (pain-relieving) effects, which many help reduce inflammation and fever.
2. **Anti-microbial:** Neem has antibacterial and antifungal properties that can help combat infections and fight against microbes like Streptococcus mutans and Vibrio cholerae. It is also being studied for its potential in managing resistant bacterial infections.
3. **Wound healing effect:** As a folk medicine, wound-healing properties of the neem leaves are known since ancient times. In one study, the effects of neem oil in the treatment of chronic, nonhealing wounds were performed, and the results showed that after 8 weeks of treatment, 50% wound healing was observed in

almost 44% patients<sup>[73]</sup>.

4. **Blood sugar activity:** May lower blood glucose useful for mild diabetes management (always check with doc).
5. **Boost immunity:** Rich in antioxidants (nimbin, quercetin).

## 5. Ashwagandha



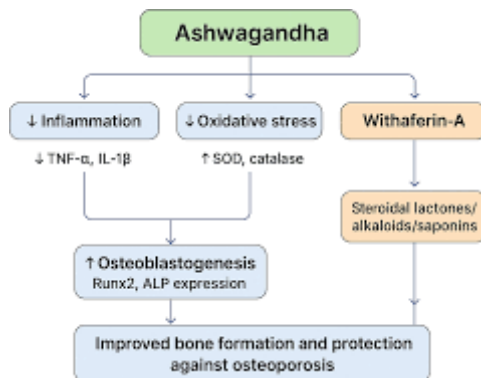
**Fig. no. 11 Ashwagandha**

Ashwagandha is also sometimes known as winter cherry or Indian ginseng, although it does not belong to the ginseng family. Ashwagandha root has been used in the traditional Ayurvedic and Unani medicine system of Indian as an adaptogen, which is loosely defines as a compound or product that increase the ability of a person to resist to resist, adapt, or become resilient in nonspecific ways to biological physical, or chemical stressors<sup>[74,75]</sup>. The chemical composition of ashwagandha root and differ<sup>[76]</sup>. Most commercial ashwagandha supplement contain extracts from the plant's root, although some contain extracts from both the root and leaf. The species name somnifera comes from the Latin word for sleep-inducing, signifying another purported property of this botanical<sup>[77]</sup>. In addition to sleep, ashwagandha is commonly promoted for stress and anxiety reduction.

**History of Ashwagandha:** Ashwagandha has a history spanning over 3,000 years, originating in Indian and documented in ancient Ayurvedic texts like the Rigveda, which describes its use as a rejuvenating tonic. The name "Ashwagandha" is Sanskrit for "horse smell." Referring to its odor and its ability to impart strength and stamina like a horse. In recent years, characterized by a fast pace of life, intensive mental work and prevailing stressors, the decrease in sleep duration, and increase in stress levels.

- **Synonyms:** Indian ginseng
- **Biological source:** *Withania somnifera* (L).
- **Family:** Solanaceae.
- **Chemical constituent:** Withanolides, Alkaloid, Flavonoids, Phenols, Tannins, and other compounds.

## Mechanism of Action:



**Fig. no. 12 Mechanism of Ashwagandha**

## Pharmacological activity:

1. **Blood Sugar Management:** Ashwagandha has been shown to help manage blood sugar levels and many improve insulin sensitivity, making it beneficial for individuals with diabetes or at risk of developing it. Maintaining healthy blood sugar levels is critical for overall health. Some research indicates Ashwagandha improve blood sugar control by reducing inflammation and oxidative stress, both of which can contribute to blood sugar imbalance.
2. **Improving Sleep Quality:** Sleep is essential for both physical and mental health. Ashwagandha has been used for centuries to promote restful sleep by reducing stress and anxiety, it can indirectly enhance sleep quality. Additionally, some studies suggest that Ashwagandha may directly influence sleep patterns, aping individuals fall asleep sicklier and experience more restorative sleep.
3. **Immunity Boost:** A robust immune system is crucial for defending the body against infections and diseases. Ashwagandha has traditionally been used to strengthen immunity, a claim supported by modern research. It is believed to enhance immune function by increasing the activity of natural killer's cells, which play a vital role in embaying infections.
4. **Cardiovascular Health support:** Its anti-oxidant and anti-inflammatory properties can support hearth by helping to lower cholesterol levels and improve circulation.
5. **Anti-inflammatory and Antioxidant Effect:** The active compounds in ashwagandha, particularly withanolides, possess significant anti-inflammatory and antioxidant properties. This helps protect cells from damage caused by aging and environment factors and can help alleviates symptoms of inflammatory condition like arthritis.

## Result:

Creation and Assessment of Herbal Cream for wound healing is prepared and evaluated. According to the evaluation parameter, the formulation is stable at room temperature and its sage applied to the skin. It is utilized for skin softening, anti-Moringa and its anti-inflammatory and antiseptic properties Olifferra and Ocimum sanctum have wound healing properties.

## Conclusion:

A formulation of Herbal Skin Cream for wound healing was successfully developed, meeting the relevant pharmaceutical characteristics. The cream demonstrated wound healing effects through the use of turmeric. All of the herbal components, including Tulsi, Neem, Aloe vera, Curcuma longa, and Ashwagandha demonstrated a variety of significant effects. The ready formulation demonstrated good spread ability, no evidence of phase separation, and good consistency through the study time. According to recent studies, it is possible to make creams with herbal extracts. Act as a barrier to shield the body from harm. Because they stimulate, plants are more potent healers. The natural healing process of the body. The herbal skin cream's ability to heal wounds has not yet to tried.

## Reference:

1. National Institute of Health. U.S. Department of Health and Human Services; 2005. Ayurvedic medicine- An introduction. [Google Scholar]
2. National Institute of Health. Ayurvedic medicine-An introduction. U.S Department of Health and Human Service:2005.
3. Chorgade M.S. Drug discovery and department. Drug Dec. 2007;2 [Google Scholar]
4. Spinella M. The important of pharmacological synergy in psychoactive Med Rev 2002;7:130-7.
5. Chorgade M.S Drug discovery and development. Drug Dev 2007;2.
6. Vamsi S, Satish C, Nagaveni K, Jyothi M joy, Latha P. Formulation and Evaluation of Polyherbal Wound Healing Ointment International Journal of Pharma Research & Review, April 2014; 3(4):66-73.
7. Manoj D. Jadhav, Mangesh P. Ubale, Shubham V. Kadam, and Ansar M. Ehtesham. Formulation and Evaluation of Herbal Skin Crem for Wound Healing Activity. International Research Journal of Pharmacy and Medical Sciences (IRJPMS), Volume 6, Issue 4, pp. 8-12, 2023.
8. Akshay Sharma, Suryamani Khanna, Gaganjot Kaur and Inderbir Singh Medicinal plant and their components for wound healing applications Future Journal of Pharmaceutical Sciences (2031)7:53.
9. S. P. Ekhande, K. S. Rathi, M. P. Patil, S. J. Kshirsagar. Review Article Wound Healing with Medicinal Plants International Journal of Pharmaceutical and Medicinal Research, 2020; 8(3):18-22.
10. Rani Shalu, Amanjot, Gautam Surya Prakash, Kanwar Kapil and Kaur Sukhbir WOUND HEALING POTENTIAL OF MEDICINAL PLANTS WITH THEIR SCREENING MODELS: A COMPREHENSIVE REVIEW. Journal of Drug Delivery & Therapeutic 2016; 6(1):56-66.
11. Prafulla Sabala, Bhargav Bhimani, Chirag Prajapati and Vidya Sabala an Overview of medicinal plant as wound healers. Journal of Applied Pharmaceutical Science Vol. 2(1), pp. 143-150, November, 2012.
12. Nilani p.\*, Pranav A., Duraisamy B., Damodaran P., Subhashini V. and Elango K. Formulation and evaluation of wound healing dermal patch. African Journal of Pharmacy and Pharmacology Vol. 5(9), pp. 1252-1257, 8 September, 2013.
13. P. F. BUILDERS\* , B. KABELE-TOGE, M. BHUILSERS2, B. A. CHINDO3. Wound Healing Potential of Formulation Extract from Hibiscus Sabdariffa Caylx, Indian Journal of Pharmaceutical Sciences January – February 2013.
14. Sable, P., Bhimani, B., Prajapati, C., & Sabala, V. (2012). An overview of medicinal plants as wound healers. Journal of Applied Pharmaceutical Science, 2(11), 143-150.
15. Enoch, S., & Leaper, D. J. (2008). Basic science of wound gealing Surgery (Oxford), 26(2), 31-37.

16. Alam, G., Singh, M. P., & Singh, A. (2011). Wound healing potential of some medicinal plants. *International journal of pharmaceutical science Review and Research*, 9(1), 136- 145.
17. Agyare, C., Boakye, Y. D. Bekoe, E. O., Hensel, A., Dapaah, S. O., & Appiah, T. (2016). African medicinal plants with wound healing properties, *Journal of ethnopharmacology*, 177, 85-100.
18. A. Leung, T. M. Crumble Holme, S. G. Keswani Fatal wound healing: implication for minimal scar formation *Curr opine pediatric*, 24 (2012), pp. 371-378.
19. H. W. Tsai, P.H. Wang, K.H. Tsui Mesenchymal stem cell in wound healing and regeneration *J Chin Med Assoc* (2017 Jul 14) pii: S1726-4901 (17) 30168-5.
20. I.V. Yannas, D.S. Tzeranis, P.T.C. So, Regeneration of injured skin and peripheral nerves requires control of wound contraction, not scar formation *Wound Repair Regen*, 25 (2017), pp. 177-191.
21. B.J. Larson, M.T. Longaker, H.P. Lorenz Scarless fetal wound healing: a basic science review *Plast Reconstructive Surg*, 126 (2010), pp. 1172-1180.
22. A.L. Carre, B.J. Larson, J.A. Knowles, K. Kawai, M.T. Longaker, H.P. Lorenz Fetal mouse skin heals scarlessly in a chick chorioallantois membrane model system *Ann Plas Surg*, 69 (2012), pp. 85-90.
23. WHO Traditional Medicine Strategy: 2014-2023, ISBN: 9789241506090, <http://www.who.int/traditional-complementary-integrative-medicine/en/>.
24. Han F., Li Y., Zhang X., Song A., Zhu H., Yin R. A pilot study of direct infusion analysis by FT-ICR MS for rapid differentiation and authentication of traditional Chinese herbal medicines. *International Journal of Mass Spectrometry*. 2016;403:62-67. Doi.10.1016/j.ijms.2016.010.012. [DOI] [Google Scholar]
25. Yuan H., Ma Q., Ye L., Piao G. The traditional medicine and modern medicine from natura products. *Molecules*. 2016;21(5) Doi: 10.3390/molecules21050559. [DOI] [PMC free article] [PubMed] [Google Scholar].
26. Wangchuk P. Therapeutic application of natural products in herbal, medicines, biodiscovery programs, and biomedicine. *Journal of Biologically Active Products from Nature*. 2018;8(1)-20. Doi: 1080/22311866.2018.1426495. [DOI] [Google Scholar].
27. Qi Y., Li S., pi Z., et al. Chemical profiling of Wu-to decoction by UPL C-Q-TOF-MS. *Talanta*. 2014;118:21-21-29. Doi: 10.1016/j.talants.2013.09.054. [DOI] [PubMed] [Google Scholar].
28. Garcia-Orue, I., Gainza G., Gutierrez F. B., et al. Novel nanofibrous dressings containing EGF and Aloe vera for wound healing applications. *International Journal of Pharmaceutics*. 2017;523(2):556-566. Doi: 10.1016/j.ijpharm.2016.11.006. [DOI] [PubMed] [Google Scholar]
29. Salehi B., Albayrak S., Antolak H., et al. Aloe genus plants: from farm to food applications and Phyto pharmacotherapy. *International Journal of Pharmaceutics*. 2018;19(9):p. 2843. Doi: 10.3390/ijms19092843. [DOI] [PMC free article] [PubMed] [Google Scholar]
30. Lawrence R., Tripathi P., Jeyakumar E. Isolation, purification and evaluation of antibacterial agents from Aloe vera. *Brazilin Journal of Microbiology*. 2009;40(4):906-915. Doi: 10. 1590/s1517-83822009000400023. [Doi] [PMC free article] [PubMed] [Google Scholar]
31. Martine-Romero D., Alburquerque N., Valverde J. M., et al. Postharvest sweet cherry quality and safety maintenance by Aloe vera treatment: a new edible coating. *Postharvest Biology and Technology*. 2006;39(1):93-100. Doi: 10.1016/j.postharvbio.2005.09.006. [DOI] [Google Scholar]
32. Marshall JM. Aloe vera gel: What is the evidence? *Pharma Jr*. 1990;24:360-2. [Google Scholar]
33. Davis RH. Aloe vera: A scientific approach. New York: Vantage Press; [Google Scholar]
34. Tyler V. The honest herbal: A sensible guide to the use of herbs and related remedies. 3<sup>rd</sup>. Binghamton. New York: Pharmaceutical Products Press; 1993. [Google Scholar]

35. Atherton P. Aloe vera revisited. *Br J Phytother.* 1998;4:76-83. [Google Scholar]
36. Atherton P. The essential Aloe vera: The actions and the evidence. 2<sup>nd</sup> ed 1997. [Google Scholar]
37. S. C. Joshi, C.S. Mathela Antioxidant and antibacterial activities of the leaf essential oil and its constituents furanodienone and curzerenone from *Lindera pulcherrima* (Nees.) Benth. Ex hook. *F Pharmacognosy. Res.*, 4(20120), p. 80.
38. Zawahri ME, Hegazy MR, Helal M. Use of aloe in treating leg ulcers and dermatoses *Int J Dermatol.* 1973;12:68-73. Doi: 10.1111/j.1362.1973.tb00215.x. [DOI] [PubMed] [Google Scholar]
39. Ernst E, Fugh-Berman A. Methodological considerations in testing the efficacy of complementary/alternative treatments (CATs) *Int J Alt Comp Med.* 1998;16:8-10. [Google Scholar].
40. Hutter JA, Salmon M, Stavinoha EW, Satsangi N, Williams RF, Streeper RT, et al Anti-inflammatory C-glucosyl chromone from *Aloe barbadensis*. *J Nat Prod.* 1996;59:541-3. Doi: 10.1021/np9601519. [DOI] [PubMed] [Google Scholar].
41. O.M. Grace, M.S. Simmonds, G.F. Smith, A.F. Smith A.E. Wyk Therapeutic uses of Aloe L. (*Asphodelaceae*) in southern Africa *J Ethnopharmacology*, 119 (2008), pp. 604-614.
42. M. Tarameshloo, M. Norouzian, S. Zarein-Dolab, M. Dadpay, J. Moshenifar, R. Gazor Aloe vera gel and thyroid hormone cream may improve wound healing in Wistar rats *Anat Cell Biol*, 45 (2012), pp. 170-177
43. C. Liu, M.Y.K. Leung, J.C.M. Koon, et al. Macrophage activation by polysaccharide biological response modifier isolated from *Aloe vera* L. var. *chinensis* (Haw.) Berg *Int Immunopharmacology*, 18 (2006), pp. 1634-1641.
44. S. Subramanian, D.S. Kumar, P. Arulselvan Wound healing potential of Aloe vera leaf gel studied in experimental rats *Asian J Biochemistry*, 1 (2006), pp. 178-185.
45. Ishii Y, Tanizawa H, Takino Y. Studies of aloe. V: Mechanism of cathartic effect. *Biol Pharm Bull.* 1994;17:651-3. Doi: 10.1248/bpb.17.651. [DOI] [PubMed] [Google Scholar].
46. B. pant Application of plant cell and tissue culture for the production of phytochemicals in medicinal plants *Infectious Diseases and Nanomedicine II*, Springer (2014), pp. 25-39.
47. O.C. Ugbogu, O. Emmanuel, G.O. Agi, C. Ibe, C.N. Ekweogu, V.C. Ude, M.E. Uche, R.O. Nnanna, E.A. Ugbogu A review on the traditional uses, phytochemistry, and pharmacological activities of clove basil (*Ocimum gratissimum* L.) *Heliyon*, 7 (2021), p. e08404
48. V.O. Ikpeazu, E.A. Ugbogu, O. Emmanuel, C. Uche-Ikonen, B. Okoro, J. Nnaemeka Evaluation of the safety of oral intake of aqueous extract of stigma maydis ( corn silk) in *Ras Acta Sci. Pol. Technol. Aliment.*, 17 (2018), pp. 387-397
49. S.N. Ijeoma, O. Emmanuel, C.I. Nosiri, E.A. Ugbogu Evaluation of toxicity profile and pharmacological potentials of Aju Mbaise polyherbal extract in rats *Sci. Afr.*, 11 (2021), p. e00681
50. Niranjan A, Prakash D. Chemical constituents and biological activities of turmeric (*Curcuma longa* L.) -a review. *J Food Sci Technol.* 2008;109-16.
51. Liu S, Liu J, He L, Liu L, Cheng B, Zhou on the benefits and problems of curcumin with respect to human health. *Molecules.* 2022. <https://doi.org/10.3390/molecules27144400>.
52. El-Saadony MT, Yang T, Korma SA, Sitohy M, Abd El-Mageed TA, Selim S, et al. Impacts of turmeric and its principle bioactive curcumin on human health: pharmaceutical, medicinal, and food applications: a comprehensive review. *Front Nutra.* 2022;9:1040259.
53. Sasidharan NK, Sreekala SR, Jacob J, Nambisan B. In Vitro synergistic effect of curcumin in combination with third generation cephalosporins against bacteria associated with infectious diarrhea. *Biomed Res Int.* 2014;2014:561456.
54. De Lobo SFD, Butkevych E, Natramilarasu PK, From A, Mousavi S, Moos V, et al. Curcumin mitigated

- immune-induced epithelial barrier dysfunction by *Campylobacter jejune*. *Int J Mol Sci*. 2019. <https://doi.org/10.3390/ijms20194830>.
55. Zhai SS, Ruan D, Zhu YW, Li MC, Ye H, Wang WC, et al. Protective effect of curcumin on ochratoxin A-induced liver oxidative injury in duck is mediated by modulating lipid metabolism and the intestinal microbiota. *Poult Sci*. 2020;99:1124-34.
56. Islam MZ, Akter J, Hossain MA, Islam MS, Islam P, Goswami C, et al. Anti-inflammatory, wound healing, and anti-diabetic effects of pure active compounds present in the ryudai gold variety of *Curcuma longa*. *Molecules*. 2024. <https://doi.org/10.3390/molecules29122795>.
57. Deepika Gulati, Priyanka, Minakshi Pal, Nidhi, Iqbal. In vitro studies of the *Ocimum sanctum*: Tulsi, Medicinal herb, *American journal of pharma tech research*. 2015;5(6).
58. Medicinal plants have been used for different ailments of human beings, all over the world just from the beginning of civilization.
59. Kumar V., Andola H.C., Lohani H. and Chauhan N. (2011). Pharmacological Review on *Ocimum sanctum* Linnaeus: A Queen of herbs. *J of Pharm Res*, 4:366-368.
60. Atal CK, Kapoor BM. Cultivation and utilization of medicinal plants, Eds. PID (SIR). 1989.
61. Govind P, Madhuri S. Medicinal plants: better remedy for neoplasm. *Indian drugs*. 2006;43(11):869-74.
62. Singh DK, Hajra PK. Floristic diversity. In *Changing Perspective of Biodiversity Status in the Himalaya*, GS Gujral, V Sharma, Eds. British Council Division. Wildlife Youth Services: New Delhi, India, 1996, 23-38.
63. Miller R, Miller S. Tulsi queen of herbs, India's Holy Basil. 2003.
64. Bano, N., Ahmed, A., Tanveer, M., Khan, G.M. and Ansari, M.T. Pharmacological evaluation of *Ocimum sanctum*. *Journal of Bioequivalence and Bioavailability*, 2017,9(3), 387-497.
65. Nadig P, Laxmi S. Study of anti-tussive activity of *Ocimum sanctum* Linn in guinea pigs, *Indian journal of physiology and pharmacology*. 2005.
66. Jyoti S, Satendra S, Sushma S, Anjana T, Shashi S. Antistressor activity of *Ocimum sanctum* (Tulsi) against experimentally induced oxidative stress in rabbits. *Methods and findings in experimental and clinical pharmacology*. 2007.
67. Joshi H, Parle M. Cholinergic basis of memory improving effect of *Ocimum tenuiflorum* Linn. *Indian journal of pharmaceutical sciences*. 2006.
68. Pandey G, Madhuri S. Pharmacological activities of *Ocimum sanctum* (Tulsi): a review. *Int Pharm Sci Rev Res*. 2010.
69. Zong A., Cao H., Wang F. Anticancer polysaccharides from natural resources: a review of recent research. *Carbohydrate Polymers*. 2012;90(4):1395-1410. Doi: 10.1016/j.carbpol.2012.07.026. [DOI] [PubMed] [Google Scholar]
70. Efferth T., Koch E. Complex interactions between Phytochemicals. The Multi-Target Therapeutic concept of Phytotherapy. *Current Drug Target*. 2011;12(1):122-132. Doi:10.2174.138945011793591626. [DOI] [PubMed] [Google Scholar]
71. Brahmacharini G. Neem -an omnipotent plant: a retrospection. *biochemistry*. 2004;5(4):408-421. Doi:10.1002/cbic.200300749. [DOI] [PubMed] [Google Scholar]
72. Ketkar A. Y., Ketkar C.M. Various uses of neem products. In: Schmutter H., editor. *The Neem Tree*. Weinheim, Germany: John Wiley & Sons; 2004. Pp. 518-525. [DOI] [Google Scholar]
73. Singh A, Singh, AK, Narayan G, Singh TB, Shukla VK. Effect of neem oil and Haridra on non-healing wounds. *Ayu* 2014;35:398-403.