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## WOUND HEALING MEDICINAL PLANTS-AN OVERVIEW

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### ABSTRACT

From the historic era, plants have been proved to be an excellent source of food, shelter and medicine for various ailments of mankind and animals. Nowadays, research has been focussed on the utility of the plant sources as an alternative medicine as they are less cost with fewer side effects. Wound healing is one of the major process which involves various stages with multiple components involvements. The present review articles reveals the importance of the stages of wound healing and the various traditional methods involved with medicinal plants. This emphasises the value of plant products used in various ailments and the methods involved for wound healing processes.

**KEYWORDS:** Therapeutic, traditional, bioactive compounds, phytochemicals, wound healing, metabolites.



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## INTRODUCTION

Wound is known as disruption of tissue integrity associated with loss of function<sup>1</sup> or a break in the continuity of tissue due to trauma or violence or carelessness<sup>2</sup> Wounds are classified as<sup>3,4</sup>

- Wounds without tissue loss
- Wounds with tissue loss
- Burn wounds
- Wounds during trauma, abrasions etc.
- Secondary events in chronic ailments (eg.) Venous stasis, diabetic ulcers etc.

Wound healing is one of the major biological process which results in the restoration of anatomic continuity and function<sup>5</sup>. Wound healing is an intricate phenomenon by which skin repairs itself and can be classified into any of three types<sup>6</sup>.

- i. **First Intention:** Edges are smoothly closed that no scar is left
- ii. **Second Intention:** Formation of granulation tissues and associated with significant loss of tissue, leaving little scars
- iii. **Third Intention:** Wound healing occurs and resulting in extensive scar formation<sup>7</sup>.

Deficiency of certain vitamins, cytotoxins, immunosuppressant, non steroidal anti inflammatory drugs suppresses wound healing<sup>8</sup>. Management of wound healing is a complicated programme and the healing properties differ for different wounds<sup>9</sup>. It is evident that the involvement of collagen is highly significant which involve in repair and lead to the formation of scar tissue composed of collagenous fibers<sup>10</sup>. The hydrophilic nature of the collagen with high content of diamino dicarboxylic amino acids and carbohydrate moieties provides surface geometry for all adhesion<sup>11</sup> and the glycoprotein on the surface promotes attraction of fibrogenic cells to collagen<sup>12</sup>. Healing requires a collaborative effort which involves platelets aggregation, blood clotting, inflammatory response to injury etc.<sup>13</sup> and it is completed until a firm knit formation by collagen<sup>14</sup>. The role of reactive oxygen species [ROS] are deleterious to the wound healing process because of its harmful effects on cells and tissues<sup>15,16</sup>. The free radical, scavenging enzymes (FRSE) are responsible for the deactivation or removal of ROS and also in the regulation of wound healing process<sup>17</sup>. The other physical and biological factors which influences the wound healing are bacterial infection, sterility, obesity, movement of wound edges, nutritional deficiency etc.<sup>18</sup> has to be arrested or destroyed or inhibited using phytoconstituents until sign of toxicity<sup>19,20</sup>.

### THERAPEUTIC VALUE OF MEDICINAL PLANTS

More than 80% of the World population depends upon traditional medicine and commercialised drugs<sup>21</sup>. Evidence of many scientific experiments documented that plants exhibit antimicrobial properties from late 19<sup>th</sup> century<sup>22</sup> and the plant drugs were used in various and *G. sylvestere* (Asclepiadeceae) is a highly potent antidiabetic, anti inflammatory, anti microbial, hepatoprotective, anti hyperlipidemic plant<sup>23,24</sup>. The leaves of *Gymnema sylvestere* contain efficient bio active component such as saponins, olcanane, triterpene saponins, gymnemic acids<sup>25</sup>. *Tagetes erecta* Linn. (Marigold) are reported to be highly effective against kidney troubles, muscular pain, ulcers and

wounds<sup>26</sup>. *Napoleona imperialis* (Lecythidaceae) is a woody, several meters high, leaves is about 12 cm long and 7 cm wide with reticulate venation and acute apex is used as analgesic, tonic, antitussive, antiasthmatic and in wound dressings<sup>27</sup> and the root bark extracts are used in treating asthma<sup>28</sup> and the leaf volatile oils are evaluated for wound healing activity on guinea pigs. Plants based drugs are used in India and China for more than thousands of years and are the partm of evolution of human, health care<sup>29,30</sup>. Around 119 plant secondary metabolites are commercially used in pharmaceutical companies and about 15% phytochemicals are from angiosperms origin<sup>31</sup> these derived medicines act as a first line of defense for health and combating diseases<sup>32</sup>. Phytoconstituents of the whole plant of neem are proved to be highly potent against virus, tumor and microbial agents<sup>33</sup>. The phytochemicals such as alkaloids, tannins, flavonoids and phenolic compounds influences certain physiological actions on the human beings and they are sometimes added in the food of pregnant and nursing women for medicinal purposes<sup>34,35</sup>. *Euphorbia heterophylla* leaf is found to be a traditional medicine as laxatives, anticonvulsant and for migraine<sup>36</sup> and the plant latex is used for fish poisoning, insecticides and ordeal poisons<sup>32,37</sup>. The leaves of *E. heterophylla* contain quercetin which acts against skin irritant, anti tumor, anti cancer and anti HIV activities<sup>38</sup> and used for treatment of various ailments in Ayurvedic system of medicine as blood purifier, immunomodular<sup>39</sup>, anti inflammatory<sup>40</sup>, anti oxidant<sup>41</sup> increases appetite and stimulation and contraction of uterus<sup>42</sup>.

### PLANT METABOLITES IN WOUND HEALING

Several evidences on wound healing plants are in advance in the recent years and they are known to be highly potent healers with efficient repair mechanisms in natural ways<sup>43</sup>. Research on the combined wound healing activity with *Gymnema sylvestere* and *Tagetes erecta* Linn. Revealed a significant increase in activity in terms of wound contraction in animals treated with alcoholic extracts of the two plants<sup>1</sup>. The powdered leaves are used externally for boils and carbuncles<sup>20,44</sup>

and the plants are reported to have good wound healing activity<sup>21,45</sup>. The various combinations of *Napoleona imperialis* exhibited good wound healing

effect compared to circatrin (An antibiotic)<sup>46</sup> and the best activity was observed with cationic ointment of *N.imperialis*<sup>2,47</sup>.

**Table 1**  
**List of plants with therapeutic practice on wound healing<sup>9</sup>**

S.No	Name of Plant	Vernacular Name	Parts of the plant as healers
1.	<i>Argemone mexicana</i>	Pivala diholara	Leaves and latex
2.	<i>Brassica juncea</i>	Mohari	Fruit
3.	<i>Thespesia populnea</i>	Ghulbhendi	Fruit
4.	<i>Pongonia pinnata</i>	Karanj	Leaves
5.	<i>Moringa oleifera</i>	Shevga	Leaves
6.	<i>Cassia alata</i>	Shimaiagase	Leaves
7.	<i>Mimosa pudica</i>	Lajala	Leaves
8.	<i>Daucas carota</i>	Gajar	Flowers
9.	<i>Calendula officinalis</i>	Zendu	Flowers
10.	<i>Nerium indicum</i>	Kaneri	Leaves
11.	<i>Datura stramonium</i>	Kateridhotora	Latex of leaves
12.	<i>Ficus religiosa</i>	Pimpel	Bark
13.	<i>Aloe vera</i>	Korphad	Leaves
14.	<i>Areca catechu</i>	Supari	Fruit

*Acalyphia indica* and *Azadirachta indica* leaf extracts were more effective against the pathogens present in the wound and their revealed to be more therapeutic against wound infection<sup>20</sup>. Early dermal and epidermal regeneration was efficient with the ethanolic extract of *Rubia cordifolia* and showed positive response towards cellular proliferation, granular tissue formation and epitheliasation<sup>48</sup>. Research on various applications of secondary metabolites of plants have been demonstrated *in vivo* (Animal models) for facilitating the healing processes of wounds such as tannins from *Terminalia arjuna*<sup>49</sup>, shikonin derivatives from *Onosma argentatum*<sup>50</sup>, asiaticoside, asiatic acid and madecassic acid from *Centella asiatica*<sup>51</sup>, Curcumin from *Curcuma longa*<sup>52</sup>, quercetin from *Hippophae rhamnoides*<sup>53</sup>.

## CONCLUSION

The review indicated that many different medicinal plants of various families have wound healing properties which indicates that the further research on the particular bioactive compounds of these plants will prove to be the best remedy. Several works on the crude extracts of the plants in the article revealed the maximum healing in the animal model. *In silico* work will prove the exact interactions of the bioactive compounds on to the target molecule which will give more authentication in the research achievement.

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