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A REVIEW ON NATURAL WOUND HEALERS

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Abstract: Wounds are injuries that cause interruption to skin integrity. Herbal medicines were the first line source of medicine since the beginning of mankind. Hemostasis, inflammation, proliferation, and remodeling of the injured site can be done effectively by herbal formulations. The objective of the current review is to provide enlightenment on the herbal plants and their derivatives that can be used in wound healing, their pharmacological properties, and combinations which are the state of art evidence of our rich heritage and culture in herbal medicines.

Index Terms - Wound healing, use, herbal medicines, pharmacological action.

I. INTRODUCTION

With the advancement in technology and lifestyle, people are becoming choosier in their healthcare needs and prefer systems and medicaments that cause less adverse effects and balance the body's function more effectively [1]. In this scenario, a major portion of the global medicine market is dominated by drugs of herbal origin as the perception of people is changing towards herbal medicines. Wound healing methods are constantly evolving. Health professionals are facing constant challenges with the development of wound care methods and are nowadays relying on techniques that incorporate traditional medicines with modern drug delivery systems [2].

Traditional herbal medicines offer multi-therapeutic benefits by synergism of multi-component drugs. For example, it was found that the wound healing rate was pretty high (81.48%) in people taking the herbal drug (Hongyou ointment and Shengji powder) than in people taking mupirocin ointment, growth factor, and vaseline (57.69%) [3]. In this review we discuss the herbal drugs which are hidden in the myriad traditional folklore, their undescribed reagents, unexplored combinations and adjunct compounds that a place in the heart of the contemporary world.

II. LIST OF HERBAL MEDICINES USED IN WOUND HEALING

Chromolaena odorata

Chromolaena odorata aka *Eutropium odoratum* belongs to the family Asteraceae. It is native to Central and Northern South America, from Mexico to Brazil. The dried leaf of *C.odorata* contained carbohydrates (31%), crude protein (18%), fiber (15%), crude fat (11%), and moisture (15%)[4]. Its active phytochemical substances are Essential oils, Flavonoid aglycones (flavanones, flavanols, and flavones) including naringenin, kaempferol, quercetin, acacetin, chalcones, eupatilin, luteolin, quercetagenin, and sinensetin [5,6]. Terpenes and terpenoid[7]. Saponins and tannins. Alkaloids including pyrrolizidine[8] Phytoprostane compound including chromomoric acid. Phenolic acids including ferulic acid and protocatechuic acid[9]. The plant is known by the vernacular name Siam weed, Devil weed, Christmas bush, communist weed, tivra gandha, rumpu jepun, etc [10, 11].

The traditional uses and pharmacological actions of *C.odorata* include hemostatic and wound healing, antibacterial, anticancer, anticonvulsant, antidiabetic, antidiarrheal, antifungal, anti-inflammatory, antioxidant, anti-parasitic, and hepatoprotective action[12].

Mimosa pudica

Mimosa pudica belongs to the family Mimosaceae. The whole plant, leaves, and roots are used for wound healing properties. The plant is native to tropical America and naturalized nearly all through the tropical and subtropical parts of India. The plant is known by vernacular names like touch me not, sensitive plant, Samangaa, Laajvanti, etc [13]. The phytoconstituents are amino acid derivatives like N-dl-Alanylglycine, fatty acids like eicosadienoic acid, 2-methylamino-N-phenyl-acetamide, carbohydrate derivatives like Meglumine, amphetamine derivatives. Leaves of the plant contain mimosinic acid and mimosa mine, toxic alkaloids like L-mimosine and d-pinitol, flavonoids like 5-deoxyflavanol derivatives, kaempferol 3-rutinoside, Leutolin-3-xyloside, Acacetin-7-rutinoside and nonvolatile flavonoid glycosides such as like Quercetin-7-ringside, Quercetin-3-glucoside-7-rhmnoside are found in the plant.[14]

The traditional uses and pharmacological actions of *M.pudica* include wound healing activity, analgesic and anti-inflammatory activity, anticonvulsant, anti-diarrheal, antifertility, antioxidant, anti-malarial, antihepatotoxic, antihelminthic, anti-hyperglycemic effect[15].

Curcuma longa

Turmeric belongs to the species *Curcuma longa* of the family Zingiberaceae. The rhizomes of the plant are used for wound healing action. The plant is widely distributed over Cambodia, China, India, Nepal, Indonesia, Madagascar, Philippines, and Vietnam. The plant is known by synonyms Indian Saffron, Haldi, Manjal, halad, etc[16].

The chemical constituents of the plant include alpha-curcumin, beta-curcumin, d-camphor, alpha, and beta-turmerone. Other constituents include curcumin, d-camphene, p-methoxy cinnamic acid, germacrene D, curzerene, germacrene, alpha and beta-pinene, borneol, alpha-terpineol, myrcene, terpinolene, gamma-terpinene, limonene, beta-thujone, alpha-copaene, alpha-bergamotene, beta-bisabolene, cuminic aldehyde, cuminyl alcohol, hydroxyisogermafurenone, xanthorrhizol, curcuphenol, beta -elemene, zingiberene, isoborneol, linalool, beta -farnesene, 1,8-cineole, curzerenone. The constituents identified in the oil were: alpha-pinene, beta-pinene, camphene, 1, 8-cineol, isofurano-germacrene, borneol, isoborneol, beta-curcumin, alpha-curcumin, xanthorrhizol, germacrene, camphor, and curzerenone and the constituent in oil were found to vary with region of plant collection [17, 18].

The pharmacological action and use of the drug include wound healing, anti-inflammatory, anti-tumor, anti-cancer, repellent action, anti-platelet action, antitussive, free radical scavenging, antioxidant activity, anti-melanogenic action, anti-nephrotoxic activity[19].

Centella asiatica

Centella asiatica is a herbaceous perennial plant belonging to the family Apiacea or umbelliferacea. The plant has been identified to possess wound-healing activity [20]. The synonyms include pennywort, gotukola, mandukaparni, brahmamanduki, and are native to India, China, Pakistan, Sri Lanka, Indonesia, Malaysia, and South Africa [21]. The chemical constituents include triterpenes comprising asiatic acid, madecassic acid, madecassoside, asiaticoside, brahmoxide, brahmoc acid, brahminoside. Triterpenic glycosides of *C. asiatica* are of the ursane- or oleanane-type. A small amount of essential oil is also present. Other constituents are flavonoids like quercetin and kaempferol, and phytosterols such as campesterol, sitosterol, and stigmasterol [22].

The pharmacological action and use of the plant are wound healing, treatment of venous insufficiency, sedative and anxiolytic, anti-depressant, anti-epileptic, cognitive and antioxidant properties, gastric ulcer, antinoreceptive and anti-inflammatory properties, radioprotective, against herpes simplex virus [23].

Azadirachta indica

Neem is *Azadirachta indica* of the family Meliaceae. Neem is also known as vembu, nim, nimba, margosa tree, and picumarda. The plant is native to east India and Burma and grows well in Pakistan, Malaysia, Singapore, the Philippines, Singapore, Australia[24]. Chemical constituents of the plant include quercetin and azadirachtin. Leaves of the plant contain nimbin, nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexacosanol, and nimbiol[24].

Pharmacological action and uses of plants include wound healing, anti-inflammatory, hepatoprotective, neuroprotective, nephroprotective, immunomodulatory, anti-infertility potential, enhance dental health, anti-diabetic, cardioprotective, anti-microbial effect, anti-cancerous [25].

Aloe vera

Aloe vera is a perennial plant, that belongs to the family Asphodelaceae (Liliaceae) native to North Africa and Spain, and is grown extensively throughout the hot regions of Asia, Europe, and America. Over 250 reported species of *Aloe barbedensis* miller are extensively grown [26]. The major phytoconstituents of the plant include aloins, nataloins, barbaloins, lupeol, salicylic acid, urea, nitrogen, cinnamic acid, phenols, sulphur, cholesterol, campesterol, β -sitosterol, polypeptides like aloe emodin, aloe lectin [27].

The pharmacological action and uses of the plant include wound healing, cell proliferation, anti-allergic, purgative, anti-protozoan, anticancer, anti microbial, immunomodulation; inhibit melanin synthesis, anti-inflammation, and angiogenesis [28].

Ginkgo biloba

Ginkgo biloba belongs to the family Ginkgoaceae, is native to China, Japan, and Korea, and is cultivated across America, India, New Zealand, Argentina, Austria, Italy, France, and Germany [29]. The common name of the plant includes the Kew tree, ginkyo, maiden hair, fossil tree, and yinhsing [30]. The phytoconstituents include Ginkgolide A, Ginkgolide B, Ginkgolide C, Bilobalide, Ginkgotoxin, bilobalide, and flavonoids like quercetin-3-β-D-glucoside, quercitrin, rutin, kaempferol, sorhamnetin, biflavonoids, and terpenoids [29].

The pharmacological action and use include wound healing, Alzheimer's disease, hepatoprotective effects, acute pancreatitis, anti-oxidant, treatment of sexual dysfunction, treatment of glaucoma, hypolipidemic action, anti-bacterial action, an agonist for platelet-activating factor, treatment of dementia, cognitive impairment, vertigo, tinnitus[29,31].

Euphorbia hirta

Euphorbia hirta belongs to the family Euphorbiaceae and is commonly called asthma weed, snakeweed, rakhtavinduchuda, and milkweed. They are widely seen in the Philippines, India, Pakistan, Indonesia, Yemen, Srilanka, Taiwan, Saudi Arabia, Nepal, Australia, etc[32]. The chemical constituents include flavonoids like euphorbianin, quercitrin, leucocyanidol, and quercitol. Polyphenols, phenols, terpenoids, tannins, and phenolic acids[32].

The pharmacological actions and uses include wound healing, anti-allergic, anti-anaphylactic, analgesic, anti-diarrheal, spasmogenic, anti-inflammatory, diuretic, antioxidant, antitumor, anti-hypertensive, anxiolytic, sedative, immunomodulatory, anti-arthritis action[33].

III. CONCLUSION

Herbal medicines are an integral part of health care and the demand is at an ever-increasing phase as technology is advancing. The multiple actions of herbal drugs help cure more ailments and are eco-friendly and body friendly. And this offers a promising future in wound healing which is a challenging clinical issue. Research is being done extensively for wound management and new treatment techniques. New formulations and plant usages will provide better enlightenment in this case and will open new gateways in wound care management.

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