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RESEARCH ARTICLE

MONO-HERBAL TREATMENTS FOR WOUND HEALING

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ABSTRACT

Wounds are unpreventable events in life. Healing is a survival mechanism and it maintains normal anatomical structure and function of the skin through tissue regeneration. Plants play an important role in wound treatment, and induce healing and regeneration of the lost tissue by multiple mechanisms. Therefore, a survey was carried out with the help of local herbal halers in study area regarding use of plants in the treatment of wounds. It was found that, total 27 plant species are used by herbal healers in wound treatment. Plant parts used and treatment procedures are given in detail. Proved biological activities of 22 species are mentioned as experimental evidence in support of traditional use.

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INTRODUCTION

Traditional folk medical practices are based on nature, observations and experiences. Several million people are depending on traditional system of medicine to fulfill primary health care needs (Fransworth, 1998). These systems use knowledge, skills and practices of indigenous people for maintenance of health (Pushpangadan and Atal, 1984). Use of herbals in wound treatment is persistent from ancient times. Natural products, isolated from plants, promote wound healing through several cellular mechanisms (Suguna e al., 1999, Fernandez *et al*., 2002, Kumar *et al*., 2007; Pawar *et al*., 2012, Suntar *et al*., 2012). These natural drugs minimize demand for antibiotics and their side effects (Lazarus *et al* 1994; Adetutua *et al*., 2011). Wounds results in the loss of continuity of epithelium with or without loss of underlying connective tissue (Strodbeck, 2001). Healing is a survival mechanism and it maintains normal anatomical structure and function of the skin through tissue regeneration (Hasegawa *et al*., 2005; Alam *et al*., 2011). Non-healing or chronic wounds results in very high health care expenditure. Therefore, most people in developing countries depend on herbal remedies for effective treatment of wounds (Agyare *et al*., 2016). Wound healing is a very slow process.

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It provide source for infection and prolong the recovery of injured patients (Alam *et al*., 2011, Sabale *et al*., 2012). It needs to be administer rapidly (Ikobil *et al*., 2012). Plant based medicines have shown high degree of success in wound healing (Karl and Lacrix, 1995, Phillipson, 2001). Traditional healers use crude extracts of different plant products for the treatment. This form of medicine makes significant contribution in the life of rural communities (Sofowora, 1993; Okeke *et al*., 2006). It has enormous potential in the field of wound management and treatments, low cost and therefore affordable without side effects (Alam *et al*., 2011). Some of the orthodox wound healing drugs are either inaccessible or expensive (Ikobil *et al*., 2012). In developed countries 25% medical drugs are plant originated (Perumal *et al*, 2008). More than 70% wound healing pharma products are plant based (Ignacimuthu *et al*., 2006, Chopda *et al*., 2016). Thus, medicinal plants are rich source for treatment of wounds.

Study Area: Warud is a tahsil place in Amravati district in the Indian state of Maharashtra. It is situated between 21°28′0″N 78°16′0″E and 21.46°N 78.26°E. Warud tahasil is the eastern end of Amravati district, major part of which borders Madhya Pradesh. The Northern border of Warud tahsil is the mountainous stretch of Satpura Hills. Average rainfall is around 900mm/annum.

METHODOLOGY

Survey was carried out during 2010-2014, based on dialogs with herbal healers living in the region, to get first-hand information about the medicinal plant species and mode of their uses.

Table 1. List of Plants Used in Herbal Treatment for Wound Healing.

Sr. No.	Botanical Name and Family of the Plant	Local Name	Plant Part Used	Mode of Treatment	Proved Bioactivity
	Abutilon pannosum (G. Frost) Schltdl. (Malvaceae)	Kasali	Whole plant	Paste is applied on the wounds.	-
	Adansonia digitata L. (Malvaceae)	Gorakh-imli, Gol-Khamari	Stem bark	Stem bark powder is given with cow-milk.	Yusha *et al.* (2010), Vimalnathan and Hadson (2009), Vertuani *et al.* (2002).
	Alangium salvifolium (L. f.) Wang. (Alangiaceae)	Ankol, Ankul, Potya-ankol.	Seed	Seed oil is applied on wound scars to remove scars.	Tanwer and Vijayvergia (2012), Inayathulla *et al.* (2010).
	Argemone mexicana L. (Papaveraceae)	Bhilai, Kakbhilai.	Leaf	5 ml leaf juice and 5 ml cow-ghee are mixed together thoroughly; mixture is applied on wound.	Osho and Adetunji (2010), Das and Murthy (2011), Sourabie *et al.* (2012).
	Argyreia nervosa (Burm. f.) Bojer, (Convolvulaceae)	Samudrashosh, Sandarshok	Leaf	Mature leaves are tied on the wounds.	Bacchav *et al.* (2009), Gokhale *et al.* (2002), Singhal *et al.* (2011)
	Bauhinia variegata L., (Fabaceae)	Koylar	Root, Stem bark and Flowers	Paste of roots, stem bark and flowers is applied on wounds.	Sharma (2010), Sharma *et al.* (2011), Kumar *et al.* (2014), Kulshrestha *et al.* (2011).
	Careya arborea Roxb. (Lecythidaceae)	Kumbha, Kumbhi.	Stem bark	For healing, stem bark extract is used to wash old wounds. Wound scars are also washed with bark extract daily, up to a month, to remove scars.	Ahmed *et al.* (2002), Ramnathan *et al.* (2006), Prabhakaran *et al.* (2014).
	Clematis heynei M. A. Rau & Al. (Ranunculaceae)	Bandarshiti.	Leaf	Wounds are washed with dried leaves extract till complete wound healing.	-
	Crateva magna (Laur.) DC. (Capparaceae)	Varna-varni	Stem bark, Leaf	Stem bark powder and leaf powder is used together for the treatment of gangrene and old flowing wounds.	Pattanaik *et al.* (2012, 14).
	Curculigo orchioides Gaertn. (Hypoxidaceae)	Kali Musali	Root	Root paste is applied on cuts and wounds for blood clotting and wound healing.	Jaiswal *et al.*(1984), Asif *et al.* (2010a), Ratnam *et al.* (2013), Agrahari *et al.* (2010).
	Dioscorea alata L. (Dioscoreaceae)	Dukkar-kand	Leaf	Paste of leaves is applied on wound regularly for healing.	Sakthidevi and Mohan (2013).
	Diospyros melanoxylon Roxb. (Sapindaceae)	Tembhurni, Tendu	Fruits	Juice of immature fruits is applied regularly on wounds for healing.	Ande *et al* (2012), Gollapalli *et al* (2013).
	Dolichandrone falcata (Wall. ex. DC.) Seem. (Bignoniaceae)	Medshing	Stem bark, leaf, fruit, seed	a) Paste of stem bark or leaf or fruit is applied on wounds. b) 1gm stem bark powder is given to eat with 10 ml water thrice a day upto 7-days. c) Seed paste prepared in water is used for wound healing.	-
	Eclipta prostrata (L.) L. (Asteraceae)	Kala-Maka	Whole plants	Whole plant juice is applied on wound scars daily for a month to remove scars.	Peraman *et al.* (2011).
	Embelia ribes Burm. f. (Myrisinaceae)	Vavding,	Fruit	Fruit powder is applied on wounds for healing.	Vaghela (2011), Akbar (2012).
	Euphorbia nerifolia L.(Euphorbiaceae)	Thor, Thuar	Latex	Latex is mixed with powder of roasted gram and small tablets (gram seed sized) are prepared. One tablet is given twice a day to treat gangrene.	Rashik *et al* (1996), Bigonya (2007),
	Gloriosa superba L. (Liliaceae)	Kal-lavi	Tuber	Tuber paste prepared in cow urine is applied on wounds for healing and on wound scars to remove scars.	John *et al.* (2009).
	Leonotis nepetifolia (L.) R. Br. (Lamiaceae)	Deepmal	Inflore-scence	Inflorescence is burnt to ash; ash is mixed with coconut oil and mixture is applied on wound.	Sinha (2012), Veerabadran *et al.* (2013)
	Millettia extensa (Benth.) Baker (Fabaceae)	Nas-Muli	Root	Root paste, prepared in water, is applied on wounds.	-
	Moringa concanensis Nimmo.(Moringaceae)	Ran-shevaga	Leaf	Leaf paste is applied on wound.	Pal (2014), Vijaykumar *et al* (2017),
	Ougeinia oojeinensis (Roxb.) Hochr. (Fabaceae)	Tiwas, , Tiwsal	Stem bark	Stem bark powder is mixed with edible oil and the mixture is applied on wounds.	Sahu *et al.* (2010)
	Paracalyx scariosus (Roxb.) Ali (Fabaceae)	Ranghewada	Seed	Seed oil is used to remove deep wound scars.	Ramoji *et al.* (2014b).
	Phoenix sylvestris (L.) Roxb. (Arecaceae)	Tad, Shindi	Stem bark	Stem bark powder and coconut oil mixture is applied on wounds.	Sharma *et al* (2015), Das *et al* (2017)
	Securinega virosa (Roxb. ex. Willd.) Baill. (Euphorbiaceae)	Pandharphali,	Leaf	Leaf juice is applied on wounds.	Yerima *et al.* (2009), Aiyelero *et al.* (2012), Danlami *et al.* (2013), Dickson *et al.* (2007).
	Sterculia urens Roxb. (Sterculiaceae)	Kad	Leaf	Dried leaf powder is mixed with coconut oil and paste is prepared. This paste is applied on old flowing wounds till complete healing.	-
	Stereospermum chelenoides (L. f.) DC. (Bignoniaceae)	Padar	Root, Fruit	a) 10 ml fresh root juice, 1-teaspoonful honey and 1 teaspoonful crystal sugar are mixed. Mixture is given twice a day up to 7-days to treat diabetic wounds. b) Root paste is applied on diabetic wounds. c) 1 gm fruit powder is given with 10 ml water, 3-times a day, up to 3-days to treat diabetic wounds	Kharat *et al.* (2012), Shanta *et al.* (2013).
	Typha angustifolia L. (Typhaceae)	Pankanis, Jangli bajara	Inflore-scence	Inflorescence is burnt to ash. Ash is mixed with coconut oil and paste is prepared.Paste is applied on wounds.	Varghese *et al.* (2009), Varpe *et al.* (2012).

All relevant information was carefully recorded. Local name of the plants, parts used and modes of use were noted down. Plants were identified with the help of standard floras (Cooke 1958, 67; Dhore 2002, Hooker 1872-75, Naik 1998, Sharma *et al*., 1996, Singh *et al*., 2000, Singh *et al*., 2001, Yadav and Sardesai 2002). Literature survey was carried out to know the traditional and ethnic uses of the drug plants reported here. In recent years several workers from different fields are trying to understand the biological activities of medicinal plants experimentally. This experimental data, of some plants, is given along with the species reported in enumeration part itself.

RESULTS

Wound healing potential of 27 plant species belonging to 21 families have been given in tabulated format.

DISCUSSION

India has a rich tradition of plant based health care system. Traditional knowledge provides number of formulations for wound healing (Sabale *et al*., 2012; Sarkar *et al*., 2016). Irula tribe of Kerala use 26 plant species for the proper and fast healing treatment of external cuts and wounds (Abdul *et al*., 2014). However, only few investigations have been made to assess the wound healing properties of plants used by tribal people. Traditional medicinal treatments have been recognized by the WHO for primary healthcare system (Das *et al*., 2012). Unfortunately, younger generations are not interested in learning these treatments. Therefore, risk of knowledge loss in future is vey high (Abdul *et al*, 2014).

Increased resistance of microorganisms to the modern drugs, environmental pollution and degradation resulted into incurability of certain ailments. This has renewed interest among the researchers to explore natural medicines for the benefit of society (Eassawi and Srour, 2000; Chah *et al*., 2006). Medicinal plants are rich target for the development of alternative drugs. Combination of traditional knowledge and modern techniques can produce safe drugs for wound healing. However, credibility assessment, standardization and safety evaluation of medicinal plants is needed before the recommendation of the drug for wound healing (Alam *et al*., 2011; Mittal *et al*., 2016). There is a need for isolation and characterization of the bioactive compounds responsible for effective treatment of wounds (Menke *et al*., 2007; Adetutua *et al*., 2011; Agyare *et al*., 2016). Also, cytotoxicity studies should be performed on the promising agents of wound healing (Agyare *et al*., 2016).

In-spite of tremendous advances in pharmaceutical industry, wound healing drugs are still limited (Udupa *et al*., 1995). Nature has provided us source of traditional medicine from which modern drugs can be developed. However many potential drug plants are still unexplored (Mrityunjoy *et al*., 2007). Appropriate transformation of traditional medicine in commercial use can help in dealing with proper wound management (Mehta, 2016). As risk of traditional knowledge loss in near future is very high, similarly medicinal plants are also on the verge of local extinction. Many of these plants are becoming rare in the wild due to its continuous use as medicine, soil erosion, deforestation and habitat loss. There is urgent need of soil conservation and protection of forests and natural habitats.

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