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Fractures healing activities of African medicinal plants are poorly investigated

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Abstract

Fracture is defined as complete or incomplete separation in the continuity of bone. Given its biodiversity, Africa has many medicinal plants used for the treatment of various diseases. The main objective of this review was to have information's about the plants used in Africa for fracture healing. In the present study, one hundred and forty-six (146) authors claim that one hundred and thirty-two (132) plants are used in different countries for the treatment of fractures. These plants are distributed in sixty-nine (69) different families. Among these 132 plants, 84% are used in Asia and only 09.84% in Africa for the treatment of fractures. The most cited plant for fractures healing was *Cissus quadrangularis* with 21, 23% of citations. The plants used in Africa for the treatment of fractures are not very well known. It would be necessary to deepen ethnobotanical surveys and research in that field.

Keywords: Fracture, medicinal plants, healing activity, Africa, *Cissus quadrangularis*

Introduction

Fracture is defined as complete or incomplete separation in the continuity of bone. In other words, a fracture is a lesion or break of the bone tissue. The main causes of fractures are: shock, aging bones, some infections, osteoporosis and osteogenesis. Given its biodiversity, Africa has many medicinal plants used for the treatment of various diseases. Indeed, during their lives, most Africans would have used medicinal plants at least once to treat themselves. Several studies reveal the use of plants in the treatment of fractures. But most of these plants are not known, due to lack of investigation and research in the field. The main objective of this review is to have information about the plants used in Africa for fracture healing.

Method

Information's were collected from four main research sites including: Google, Google Scholar, PubMed and Science Direct.

Results

The results of these investigations are summarized in the table. These results shows that one hundred and forty-six (146) authors claim that one hundred and thirty-two (132) plants are used in different countries for the treatment of fractures. These plants are distributed in sixty-nine (69) different families. Among these 132 plants, 84% are used in Asia and only 09.84 are used in Africa for the treatment of fractures. In the present study, the most cited plant for the treatment of fractures was *Cissus quadrangularis* with 21, 23% of citations.

Table 1: Plants used in different countries for fractures healing

Families	Plant names	Countries	References
Acanthaceae	<i>Asystasia gangetica</i>	Cameroon	[1]
	<i>Blepharis integrifolia</i>	India	[2]
	<i>Brilliantaisia ovariensis</i>	Cameroon	[1]
	<i>Dicliptera paniculata</i>	India	[2]
	<i>Justicia gendarussa</i>	Bangladesh	[3]
Amaranthaceae	<i>Chenopodium ambrosioides</i>	Brazil	[4]
	<i>Spinacia oleracea</i>	India	[5], [6]
Anacardiaceae	<i>Holigarna grahamii</i>	India	[2]
	<i>Pistacia lentiscus</i>	India	[7]
Apiaceae	<i>Cicuta maculata</i>	India	[2, 8]
Apocynaceae	<i>Ichnocarpus frutescens</i>	Bangladesh	[9]
Araceae	<i>Amorphophallus paeoniifolius</i>	India	[2]
	<i>Rhaphidophora pertusa</i>	India	[10, 11]
Araliaceae	<i>Rhizoma notoginseng</i>	China	[12]
Arecaceae	<i>Calamus tenuis Roxburgii</i>	India	[13]
	<i>Phoenix loureiroi</i>	India	[10, 11].
	<i>Pothos scandens</i>	India Madagascar	[2, 14-16] [17]
Asclepiadaceae	<i>Cryptolepis buchanani</i>	India	[8]
	<i>Davallina orientalis</i>	Japan	[18]
Asteraceae	<i>Blumea clarkei</i>	Bangladesh	[9]
	<i>Cosmos caudatus</i>	Malaysia	[19]
	<i>Elephantopus mollis</i>	Cameroon	[1]
	<i>Helianthus annuus</i>	India	[20-22]
	<i>Spilanthes africana</i>	Cameroon	[1], [23]
Berberidaceae	<i>Epimedium sagittatum</i>	China and brazil	[24] [25]
Bombacaceae	<i>Bombax ceiba</i>	India	[26]
Boraginaceae	<i>Ehretia cymosa</i>	India and Ghana	[8, 27]
	<i>Symphytum officinale</i>	Spain	[8] [28]
	<i>Symphytum uplandica</i>	India	[8]
Brassicaceae	<i>Lepidium sativum</i>	Inde, Saudi Arabia,	[29-32] [33-35] [36, 37] [38]
Burseraceae	<i>Commiphora weightu</i>	India	[8]
Cactaceae	<i>Cereus grandiflorus</i>	Bangladesh	[3]
Caesalpiniaceae	<i>Bauhinia purpurea</i>	India	[39]
Cannabaceae	<i>Cannabis sativa</i>	India	[8]
Caprifoliaceae	<i>Radix Dipsaci</i>	China	[12]
	<i>Sambucus williamsii</i>	India and China	[40-42] [12] [43]
Clusiaceae	<i>Mesua ferrea</i>	India	[8, 44]
Combretaceae	<i>Terminalia arjuna</i>	India	[8], [13], [45]
	<i>Terminalia bellerica</i>	Nepal	[46]
	<i>Terminalia chebula</i>	Nepal	[46]
	<i>Terminalia cuneata</i>	India	[2]
Compositae	<i>Flos Carthami</i>	China	[12, 47]
Cornaceae	<i>Alangium salvifolium</i>	India	[10]
Crassulaceae	<i>Kalanchoe petittiana</i>	Ethiopian	[48]
Cucurbitaceae	<i>Cucurbita pepo</i>	China	[49]
	<i>Momordica multiflora</i>	Cameroon	[1]
Dipterocarpaceae	<i>Shorea robusta</i>	Inde	[13], [50]
Ebenaceae	<i>Diospyros chloroxylon</i>	India	[10]
	<i>Diospyros montana</i>	India	[2]
Equisetaceae	<i>Equisetum arvense</i>	India, Iran, Nepal and Iraq	[51-55] [28]
	<i>Equisetum telmateia</i>	Spain	[28]
Euphorbiaceae	<i>Antidesma acidum</i>	India	[2]
	<i>Baliospermum solanifolium</i>	India	[2]
	<i>Bridelia stipularis</i>	India	[2]
	<i>Euphorbia hirta</i>	India	[13]
	<i>Glochidion heyneanum</i>	India	[2]
	<i>Ricinus communis</i>	India	[2]
Fabaceae	<i>Abrus precatorious</i>	India	[2]
	<i>Cassia fistula</i>	Sri Lanka and India	[2] [56-58]
	<i>Cassia occidentalis</i>	India	[2, 59]
	<i>Dalbergia sissoo</i>	India	[60] [61]
	<i>Erythrina fusca</i>	India	[10]
	<i>Millettia pinnata</i>	India	[2]
	<i>Ormocarpum cochinchinense</i>	India	[62-64]

	<i>Pterocarpus marsupium</i>	India	[13, 65-67] [68]
	<i>Senna tora</i>	India	[2]
	<i>Tamarindus indica</i>	India	[2]
	<i>Trigonella foenum</i>	India	[7]
	<i>Vicia ervilia</i>	India	[7] [69]
Flacourtiaceae	<i>Casearia tomentosa</i>	India	[2]
Labiatae	<i>Radix salviae</i>	China	[70-72] [73]
Lamiaceae	<i>Ocimum basilicum</i>	India	[2]
	<i>Salvia miltiorrhiza</i>	India	[8]
Lauraceae	<i>Cinnamomum wightii</i>	India	[2]
	<i>Persea macrantha</i>	India	[2, 74]
Leguminosae	<i>Griffonia simplicifolia</i>	India	[8]
Lecythidaceae	<i>Careya arborea</i>	Bangladesh	[69]
Malvaceae	<i>Althaea officinalis</i>	India	[7]
	<i>Urena lobata</i>	India, Cameroon	[2] [11]
Marentaceae	<i>Phrynium imbricatum</i>	India	[9] [75-78]
Menispermaceae	<i>Cyclea arnotii</i>	India	[79]
	<i>Tinospora cordifolia</i>	India	[2]
	<i>Tinospora sinensis</i>	India	[2]
	<i>Acacia arabica L.</i>	India	[8, 13]
Mimosaceae	<i>Mimosa intsia</i>	India	[10, 11]
	<i>Mimosa rubicaulis</i>	Nepal and India	[5, 80]
	<i>Ficus benghalensi</i>	India	[2]
Moraceae	<i>Ficus religiosa</i>	India	[10]
	<i>Moringa oleifera</i>	India	[2, 81, 82]
Moringaceae	<i>Moringa oleifera</i>	India	[2, 81, 82]
Myrtaceae	<i>Myrtus communis</i>	India, Turkey and Mexico	[7, 83, 84]
Oleaceae	<i>Nyctanthes arbor-tristis</i>	India	[2] [85]
Orchidaceae	<i>Coelogyne cristata</i>	India	[8]
	<i>Pholidota articulata</i>	India, Nepal and China	[86, 87] [8] [88] [89]
Palmae	<i>Daemonorops draco</i>	China	[90]
Papilionaceae	<i>Flemingia stricta</i>	Bangladesh	[9]
Pinaceae	<i>Cedrus deodara</i>	India	[2]
Piperaceae	<i>Piper longum</i>	India	[8, 11]
	<i>Peperomia pellucida</i>	Cameroon	[91] [92]
	<i>Piper sarmentosum</i>	India, Malaysia	[8, 93, 94]
Poaceae	<i>Bambusa arundinacea</i>	India	[8], [13]
	<i>Cynodon dactylon</i>	India	[2]
Poaceae	<i>Sorghum annuum</i>	Algeria	[95]
Polypodiaceae	<i>Rhizoma drynariae</i>	China	[96]
Portulacaceae	<i>Portulaca oleracea</i>	Spain	[28]
Rhamnaceae	<i>Ziziphus mauritiana</i>	Nepal	[5] [11] [97]
Ranunculaceae	<i>Cimicifuga racemosa</i>	Germany	[98]
	<i>Nigella sativa</i>	Iraq	[99]
Rosaceae	<i>Geum japonicum</i>	China	[100-102]
Rubiaceae	<i>Borreria pusilla</i>	Bangladesh	[9]
	<i>Fructus gardeniae</i>	China	[12]
	<i>Morinda citrifolia</i>	India and Polynesia	[20, 103-108]
	<i>Mussaenda frondosa</i>	India	[13, 67]
	<i>Ophirrhiza rugosa</i>	Bangladesh	[9]
Rutaceae	<i>Rubia cordifolia</i>	India	[13]
	<i>Citrus limon</i>	India	[2]
	<i>Zanthoxylum rhetsa</i>	India	[2]
Sapotaceae	<i>Madhuca longifolia</i>	India	[109, 110]
Saxifragaceae	<i>Berginia ciliate</i>	Nepal	[46]
Scrophulariaceae	<i>Torenia travancoria gamble</i>	India	[9]
Smilacaceae	<i>Sarsaparilla smilax</i>	Saudi Arabia	[29]
Solanaceae	<i>Lycii radices</i>	Korea	[111] [112, 113]
Sterculiaceae	<i>Glossostemon bruguieri</i>	India	[7]
Ulmaceae	<i>Ulmus campestris</i>	India	[7]
	<i>Ulmus davidiana</i>	China	[114]
	<i>Ulmus wallichiana</i>	India	[8] [115] [116] [117] [118]
Uvulariaceae	<i>Uvularia perfoliata</i>	India	[8]
Verbenaceae	<i>Callicarpa arborea</i>	Bangladesh	[9]
	<i>Gmelina arborea</i>	India	[119]
	<i>Vitex negundo</i>	India	[13], [120]
Vitaceae	<i>Cissus arguta</i>	Nigeria	[121]
	<i>Cissus quadrangularis</i>	India, Thailand, USA and Kuwait.	[2, 13, 40, 59, 122-140] [8] [131] [136, 141] [142]

			143] [144] [10] [145] [146]
Zingiberaceae	<i>Curcuma domestica</i>	India	[8]

Conflict of interest

The authors declare no conflicts of interest.

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Conclusion

The plants used in Africa for the treatment of fractures are not very well known. It would be necessary to deepen ethnobotanical surveys and research in that field.

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