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RESEARCH ARTICLE

Ethnomedicinal knowledge of Mogiya tribe around Ranthambhore National Park: With special reference for treating sports injuries

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Abstract

The present study was conducted in Ranthambhore National Park, located in the eastern region of Rajasthan, in District Sawai Madhopur. To record the ethnomedicinal knowledge of the local Mogiya tribe, a field survey was conducted. The Mogiya tribes that live in and around Ranthambhore National Park use 106 plant species from 48 families to treat a variety of illnesses. A thorough list of these plants, along with their botanical names, regional names, portions used and therapeutic uses, is provided in this publication. Several of the plants identified in this study have substantial therapeutic promise, particularly with regard to sports-related injuries. Following close examination and comparison with earlier research, we were able to pinpoint particular plants that show promise in treating common sports-related ailments like sprains, strains, inflammation and muscle soreness. These plants may offer natural options for the treatment of sports injuries because they contain active chemicals that have analgesic, anti-inflammatory and tissue-regenerative qualities. The results demonstrate how additional clinical research and drug development based on Mogiya traditional knowledge could advance contemporary sports medicine.

Keywords: ethnomedicinal knowledge; Mogiya tribe; Ranthambhore National Park; sports injury

Introduction

The study area, Ranthambhore National Park, lies in the District of Sawai Madhopur, Rajasthan, in Northwestern India and is known as the land of Tigers, with an area of 5042 square kilometres, located between 22°45’ N and 26°41’ N latitudes and 75°59’ E and 77°00’ E longitudes (Fig. 1).

Fig. 1. Map of the study area (Source- Maps of India).

This area's climate is subtropical, with winter, summer and monsoon seasons. The forest of Ranthambhore National Park is a ‘Tropical dry deciduous forest’. The average annual rainfall in this area is 873.40 mm (1). The main tree species of Ranthambhore National Park are Dhok (*Anogeissus latifolia*), Babul (*Accasia nilotica*), Gurjan (*Lannea coromandelica*), Gum kathira (*Sterculia urens*), Khajur (*Phoenix sylvestris*) and Khair (*Accacia catechu*) (2).

Native to this region, the Mogiya tribe has long relied on the forest for their livelihood as expert hunters who are frequently hired by nearby communities to keep wild animals away from fields. Even during royal hunting expeditions during state times, they were highly regarded for their hunting and tracking prowess; their remarkable tracking skills were acknowledged (3). They still live close to forest regions, maintaining their vast knowledge of medicinal plants passed down through the years, even if many have moved outside park boundaries (Fig. 2). The Mogiyas, well-known for their athletic ability and slender, strong physiques, use Indigenous plants to heal common ailments; this information may one day be verified and used to treat sports injuries in the contemporary period (4).

Fig. 2. Households of Mogiya tribe.

Though many attempts have been made to document the ethnomedicinal knowledge of Rajasthan (5-13), most of the work is limited to the southern part of Rajasthan. There is no systematic study to date to document the ethnomedicinal knowledge of the Mogiya tribe. The present study was planned with the aim of surveying and documenting the ethnomedicinal knowledge of the Mogiya tribal who are residing near and around the Ranthambhore National Park (Fig. 3).

Sports injuries have been a recurring problem for Olympic athletes and modern professionals alike and both modern sports medicine and traditional plant-based therapies are being employed. The relationship between ethnobotany and sports medicine is an important body of knowledge that still shapes modern treatment strategies (14). Through a variety of therapeutic benefits, such as better tissue healing, pain reduction, increased circulation and anti-inflammatory properties, traditional communities around the world have honed their skills in using medicinal plants to treat common sports-related conditions. Current research has confirmed the active compounds that give these effects their effects. Beyond its historical value, ethnobotanical knowledge provides athletes looking for natural alternatives with a comprehensive approach that promotes injury prevention and overall healing in addition to acute therapy (15).

Materials and Methods

Tours were made regularly to villages of the Mogiya tribe near and around the Ranthambhore National Park. Ethnomedicinal information was gathered through interviews with Mogiya individuals over the age of 40. To ensure the authenticity of the data, these interviews were conducted multiple times with individuals from various villages throughout different times of the year. Only specific and reliable information, which was cross-verified with other informants, was included in the study. A standardized questionnaire listing local plant names and the plant parts used for preparations was utilized for data collection. In total, 50 individuals were interviewed and the data collected represents primary information. Samples of recorded plants were identified with the help of local floras (16). The collected plants were identified up to the species level at the Herbarium of the University of Rajasthan, Jaipur. 21 specimens out of all the collected specimens were deposited in the Herbarium of Maharshi Dayanand Saraswati University, Ajmer (India), for further reference.

Further, this information was used to identify the plants and which parts can be used to treat sports injuries like strain, sprain, abrasion and joint pain.

Results and Discussion

The ethnobotanical survey of the Mogiya tribe has revealed important information on their traditional medicine practices, especially in the management of sports injuries. The research presents a valuable traditional knowledge database with possible implications for contemporary sports medicine and pharmaceutical research. Our research shows that the Mogiya tribe has a broad understanding of the medical uses of the flora in their area, using 106 kinds of medicinal plants from 48 families (Table 1).

Interestingly, the Mogiya people use a more balanced use of various plant growth forms, including trees (32 %), shrubs (25.5 %), herbs (29.2 %) and climbers (13.3 %), in contrast to other reported tribal tribes that mostly rely on trees for medicinal purposes. This varied approach may

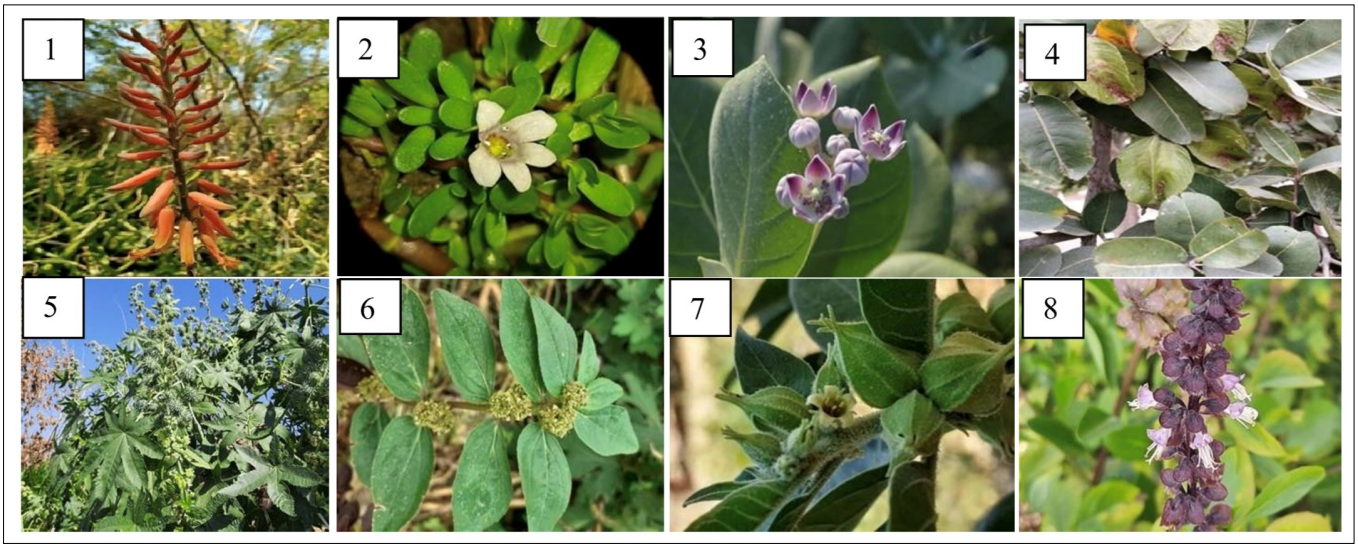

Fig. 3. Some ethnomedicinal plants used by Mogiya tribe. 1) *Aloe vera;* 2) *Bacopa monneiri ;* 3) *Calotropis procera;* 4) *Terminalia arjuna;* 5) *Ricinus communis;* 6) *Euphorbia hirta;* 7) *Withania somnifera;* 8) *Oscimum basilicum.*

Table 1. Ethnomedicinal plants used by Mogiya tribe

Family species (17)	**Vernacular name**	**Plant part used**	**Medicinal use**
Acanthaceae *1. Justicia adhatoda* L.	Vasa, Adusa, Adsuta	Decoction of whole plant	Antiasthametic, Cough remedy, anti-inflammatory, sprain and muscle pain.
2. Andrographis paniculata (Burm.f.) Wall. ex Nees	Kalmegh (Creat, King of Bitter)	Decoction Whole Plant	Antidiabetic, Antidysentric and anthelmintic
Amaranthaceae *3. Achyranthes aspera* L.	Andhajhara, Apamarg	Powder of Root and seeds	Antiasthmatic
Annonceae *4. Annona reticulata* L.	Ramphal	Seed powder	Diarrhea and dysentery
Apiaceae *5. Centella asiatica* (L.) Urb.	Mandukparni	Extract of leaves	Neurotronic, in skin disease, Hypotensive, Cardio depressant, Insomnia, Epilepsy, Anti-asthmatic, Tuberculosis and abdominal disorders, wound healing
6. Coriandrum sativum L.	Dhaniya	Fruit	Digestive Antacid
7. Trachyspermum ammi (L.) Sprague	Ajowain	Fruit	Tonic
Apocynaceae *8. Nerium oleander* L.	Kaner	Extract of Root and leaves	Haemorrhoids and ulcer
9. Wrightia tinctoria (Roxb.) R.Br.	Swetakutaja, Khirni	Fruit and Leaves juice	Skin Disease, Stomach-ache, Toothache, Aphrodisiac, Anthelmintic, Flatulence and bilious infections.
Asclepiadaceae *10. Calotropis procera* (Aiton) W.T.Aiton	Aak, Madar	Resin	Antiasthmatic antitussive, Anti-inflammatory, joint and muscle pain
11. Gymnema sylvestre (Retz.) R.Br. ex Sm.	Gudmar	Chewing shoot	Antidiabetic, General Health of Liver
12. Leptadenia pyrotechnica (Forssk.) Decne.	Kheep	Extract of Shoot & Root	Skin problems and Female contraceptive
13. Cynanchum viminale (L.) L.	Sambhar-bel, Som-lata	Juice of the Whole plant	Skin disease
14. Vincetoxicum indicum (Burm.f.) Mabb.	Dama Bel	Leaves	Antiasthmatic
Asteraceae *15. Sphaeranthus indicus* L.*	Gorakh mundi (East Indian Global Thistle)	Powdered Fruit	To treat localized swelling and skin diseases and to improve sexual vigour
16. Acmella calva (DC.) R.K.Jansen	Akarkara	Dried powdered and fresh root	Toothache, Against stammering
17. *Tridax procumbens* L.	Rakt rodhani Kalali	Juice of leaves	Blood coagulate
18. Cyanthillium cinereum (L.) H.Rob.	Sahdevi	Fresh Whole plant	Amoebiasis Abdominal spasm, Alexipharmic herpes, eczema, elephantiasis, conjunctivitis, rheumatism cough, anthelmintic
Bignoliaceae *19. Tecomella undulata* (Sm.) Seem.	Rohida	Powdered dried bark and leaves	To treat liver problems in wound healing.
Bomacaceae *20. Bombax ceiba* L.*	Samel	Dried Powdered Bark and Gum,	Aphrodisiac
Boraginaceae *21. Cordia dichotoma* G.Forst.	Lasora	Fruit, Powder of Leaves and Stem Bark	To treat diarrhoea, leprosy, gonorrhoea and abdominal burning sensation.
Brassicaceae *22. Raphanus raphanistrum* subsp. *sativus* (L.) Schmalh.	Muli	Fresh Roots and Fruit	Piles, diuretic laxatives and expectorant
Burseraceae *23. Commiphora wightii* (Arn.) Bhandari	Guggul	Gum resin	Astringent, antiseptic, carminative and aphrodisiac, Anti-inflammatory, muscle and joint pain
Cactaceae *24. Opuntia tuna* (L.) Mill.	Nagphani	Phyllode	Antidepressant and Immunomodulator
Caesalpiniaceae *25. Cassia absus* L.	Chaksu	Leaves, Seeds	Thermogenic, haematinic and Expectorant to treat diarrhoea, cough and Asthma.
Combretaceae *26. Terminalia anogeissiana* Gere & Boatwr.	Dhok	Bark, leaves	To treat cough
27. Terminalia arjuna (Roxb. exDC.) Wight & Arn.	Arjuna	Dried Bark, Leaves and Fruits	Astringent and Cardiotonic, Anti-inflammatory, inflammation and pain
28. Terminalia bellirica (Gaertn.) Roxb.*	Bahera, Vibhitaki	Dried Bark and Fruits	To treat Anaemia, Diarrhoea, Leukoderma and insomnia,
29. Terminalia chebula Retz. *	Haritaki Harara	Dried Bark and Fruits	Diuretic, cardiotonic and Laxative, wound healing and anti-inflammatory
30. Woodfordia fruticosa (L.) Kurz*	Dhawara phool	Resin and extract of leaves	To treat dysentery and menorrhagia, wound healing and abrasions
Convolvulaceae *31. Convolvulus arvensis* L.	Shankh pushpi	Decoction of whole plant	Laxative, used to treat cough, flu and jaundice
32. Rivea hypocrateriformis (Desr). Choisy	Phang	Decoction of shoot and extract of leaves	Contraceptive, treating cough, headache, skin disease and treating external conditions such as burns, piles and to relieve pain
Cucurbitaceae *33. Bryonia alba* L.	Shivlingi	Whole plant	Tonic and to treat male impotence

34. Citrullus colocynthis (L.) Schrad.	Tumba, Indrayan	Fruit seeds and roots.	Blood purifier, Purgative, Anthelmintic, & Emmenagogue,
35. Corallocarpus epigaeus (Rottler) Hook.f.	Mirchia kand	Rhizomes	To treat Syphilitic cases, old venereal complaints, chronic dysentery and snake bites.
36. Cucurbita pepo L.	Safed kaddu, Kumrha, Pentha	Fruit	To treat white spots on the skin, Anti-inflammatory, Anti-ulcer and Antidiabetic
37. Momordica charantia L.*	Karela	Extract of shoot and fruit	Antidiabetic
Ebinaceae 38. *Diospyros ebenum* J.Koenig	Tendu	Dried leaves and Fruit	Treatment of old wounds, Stomach disorders and laxative
Euphorbiaceae *39. Phyllanthus emblica* L.	Amla	Fruits, Seeds	Cooling, refrigerant, diuretic and laxative to treat dysentery and asthma.
40. Euphorbia caducifolia Haines	Dandathoor	Leaves, Phylloclade	To treat wounds, cutaneous eruptions and other skin diseases
41. Euphorbia hirta L.*	Doodhi	Decoction of whole plant	To treat asthma, bronchial infections, helminthic infestations and abscesses
42. Euphorbia scordiifolia Jacq.	Chhoti Doodhi	Decoction of whole plant	Blood purifier, sedative, haemostatic, aromatic, stimulant and astringent.
43. Putranjiva roxburghii Wall.	Putrajeeva	Leaves	*To treat eye disorders, burning sensation, elephantiasis, difficulty in micturition and habitual abortions.*
44. Ricinus communis L.*	Arandi (Castor seed)	Stem	To treat Rheumatism, anti-inflammatory, swelling and sprain
Fabaceae *45. Abrus precatorius* subsp. *Precatorius*	Lal chirmi	Leaves, Roots and Seeds	Used as laxative, expectorant and aphrodisiac medicines and to treat ulcer
46. Vachellia nilotica subsp. *tomentosa* (Benth.) Kyal. & Boatwr.	Desi Babul	Bark	Astringent and Anti-diabetes
47. Senegalia polyacantha subsp. *Polyacantha*	Khardira (Cuthch Tree)	Bark	Anthelmintic, Antipyretic, Astringent and aphrodisiac
48. Senegalia pennata (L.) Maslin	Shikakai, Ritha, Kichi	Leaves and Pods	Biliousness Emetic, expectorant, purgative, antidandruff, skin disease
49. Albizia lebbeck (L.) Benth.	Sirish (Siris tree, east Indian walnut)	Bark and Seed	Astringent to treat Piles and diarrhoea
50. Bauhinia variegata L.	Kachnar	Decoction of stem, stem bark, leaves, seeds, roots, flower buds and flowers	Anti-bacterial, Anti-fungal, Anti-malarial, pain-reducing and swelling-reducing
51. Butea monosperma (Lam.) Kuntze *	Palash, Tesu, Kamarkas	Flower and Bark	To treat kidney stones, blood dysentery and leucorrhoea
52. Cassia fistula L.*	Amaltas	Seed	Purgative
53. Cyamopsis tetragonoloba (L.) Taub.	Guar	Pod	Stabilizes blood sugar level, Laxative and as a digestive tonic
54. Mimosa pudica L.	Laajwanti, Chuimui (Sensitive plant)	Root, Leaves, stem	To treat Piles and fistula, sinus and sores
55. Mucuna pruriens (L.) DC.	Kaunch (Common cowitch, cowhage)	Roots, Fruits and Seeds	Anthelmintic Aphrodisiac, nervine tonic, to treat dropsy and cholera
56. Pongamia pinnata (L.) Pierre	Karanja (Indian Beech, Pongam oil tree)	Root, Bark, Leaves and Seed Oil	To treat Ulcers, sores, diarrhoea, cough and leukoderma.
57. Prosopis cineraria (L.) Druce	Khejri	Leaves and Pod	To treat leprosy, asthma, dysentery, leukoderma and dyspepsia
58. Cullen corylifolium (L.) Medik.	Bakuchi, (babchi, brachia)	Roots, Leaves, seed, seed oil.	To treat Dental caries and diarrhoea, ulcers, scabies and leprosy, leukoderma
59. Pueraria tuberosa (Roxb. ex Willd.) DC.	Bidarikand	Rhizome	Used as Antitumor, anticonvulsant, antidiabetic, antifertility, anti-inflammatory, antioxidant and anti-stress
60. Tephrosia purpurea (L.) Pers.	Sharpunkha (Wild indigo)	Leaves and seed	As a Tonic, laxative, anthelmintic, blood purifier, to treat bronchitis, diarrhoea, asthma and rheumatism
61. Trigonella foenum-graecum L.	Methi	Leaves and seed	Antibacterial, gastric stimulant, antidiabetic and a galactagogue to treat Joint pain
Gentianaceae *62. Enicostema axillare* subsp. *littorale* (Blume) A.Raynal	Nay, Nami, Nahi	Whole Plant	To treat Asthma, Malaria, Typhoid
63. Swertia chirayita (Roxb.) H.Karst.	Kariyata, Bhunimba (Chirayata)	Root and Shoot	Tonic, febrifuge, to treat fever, anaemia, asthma, dyspepsia and liver disorders.
Labiatae *64. Asparagus racemosus* Willd.	Shatawaru,	Root	Used as a General tonic to treat Leukorrhea and improve lactation
65. Ocimum americanum L.	Jangli tulsi (bapachi), Kal Tulsi, Mamri, (Hoary basil)	Leaves	To treat Toothache, bronchitis and Cold

66. Ocimum basilicum L.	Jangli tulsi, gulal tulsi, kali tulsi (Sweet basil holy basil)	Leaves, Seeds	Anthelmintic, antipyretic, diaphoretic, expectorant, earache,
67. Ocimum tenuiflorum L.	Tulsi, manjari (sacred basil, holy basil)	Leaves and Seeds	Diaphoretic, anti-periodic, useful in cataracts, bronchitis, Demulcent
Lamiaceae *68. Vitex negundo* L.*	Nirgundi	Seeds	Cardiac stimulant and to treat liver disorders, anti-inflammatory, joint pain and sprain.
Liliaceae *69. Urginea indica* Kunth *Urginea indica* (Roxb.) Kunth	Kolikanda, Jangli piyaj (Indian Squill, True squill, Sea onion)	Bulb	Diuretic, expectorant and useful in bronchitis.
Linaceae *70. Linum usitatissimum* L.	Alsi (Linseed)	Bark, Leaves, Flower, Seeds	To treat Gonorrhoea, Demulcent, gout and rheumatic swellings
Malvaceae *71. Abutilon indicum* (L.) Sweet	Atibala	Seeds, Seed oil and decoction of root	Aphrodisiac, Sedative, Demulcent, Diuretic and Laxative
72. Gossypium herbaceum L.	Cotton seed	Seeds	To increase lactation, useful for haemorrhages, diarrhoea and nausea
73. Helicteres isora L.	Maror phalli	Fruit	To treat diarrhoea and constipation in infants
74. Sida alba L.	Khiriti badi (country-Mallow)	Decoction of the Whole plant	To treat Spermatorrhoea, facial paralysis and sciatica pain
Martyniaceae *75. Martynia annua* L.	Hathajori, Bichu (Devil's claw Tiger claw)	Leaves, Flowers, Fruits.	To treat Epilepsy, Alexipharmic and anti-inflammatory
Meliaceae *76. Azadirachta* A.Juss.	Neem	Bark, leaves, seed oil and gum	Antibacterial, Antifungal, Insect repellent, Insecticidal, used to treat Rheumatism and Herpes, Skin problems and Dental Problems, anti-inflammatory, wound healing and sprain
77. Melia azedarach L.	Bakayan Mahaneem, Bakain (Persian liliac, bead tree)	Root, Bark, Leaves, Flower and Seed	Antioxidative, Analgesic, Anti-Inflammatory, Insecticidal, Deobstruent and Antidiabetic
Menispermaceae *78. Cissampelos pareira* L.	Jalijmini	Decoction and poultice of Whole plant	To treat ulcers, wounds, rheumatism and cholera
79. Tinospora cordifolia (Willd.) Hook.f. & Thomson	Giloy	Stem	To treat Fever, Typhoid, malaria and General antibiotics
Moraceae *80 .Ficus benghalensis* L.	Bargad (Banyan)	Young prop roots, Leaves, Fruit and Resin	To treat Vomiting, diarrhoea, diabetes, dysentery and male impotence, anti-inflammatory, muscle strain
81. Ficus racemosa L.	Gulaar	Bark and Fruit	To treat liver disorders, inflammatory conditions, haemorrhoids and urinary problems, anti-inflammatory and swelling
Musaceae *82.Musa × sapientum* L.	Keli	Decoction of Leaves	To treat hypertension and migraine
Nitraiaceae *83. Peganum harmala* L.	Isband	Dried powder of whole plant	Antimicrobial, antidiabetic, Osteogenic & Immunomodulatory.
Nitraiaceae *84. Boerhavia diffusa* L.	Sonthi, Punarnava (Spreading hogweed)	Decoction of Root	To treat long-term fever, Asthma and Liver ailments and to rejuvenate from age-related problems
Oleaceae *85. Nyctanthes arbor-tristis* L.	Harsingar, Parijata (Coral Jasmine, Night Jasmine)	Leaves and flowers	Anti-bilious, expectorant and laxative.
Oxalidaceae *86. Oxalis corniculata* L.	Badi changeri	Leaves	To treat influenza, urinary tract infections, diarrhoea, traumatic injuries, sprains and poisonous snake bites.
Papaveraceae *87. Argemone mexicana* L.	Satyanashi beej	Root, shoot, Juice, Seed and Seed oil.	To treat tumours, warts, skin diseases, jaundice, leprosy, piles and worm infestations
Pedaliaceae *88. Pedalium murex* L.	Bada Gokhru	Fruit, Root and leaves	It is used as a general tonic and to treat Genito-urinary disorders, spermatorrhoea, nocturnal emissions and menstrual irregularities.
Plantaginaceae *89. Bacopa monnieri* (L.) Wettst.	Brahmi	Leaves	To reduce stress and anxiety and as a tonic for the brain
Plumbaginaceae *90. Plumbago zeylanica* L.	Chitrak	Leaves and Root	To treat liver disorders, stubborn chronic rheumatoid arthritis and skin diseases, anti-inflammatory, swelling and sprain

Portulacaceae *91. Portulaca oleracea* L.	Kulfa	Leaves	Febrifuge antiseptic, antiulcerogenic, anti-inflammatory, antioxidant and wound-healing properties
Rhamnaceae *92. Tapinanthus pentagonia* (DC.) Tiegh.	Ber	Bark, leaves and Fruits	Used as a haemolytic, sedative, diuretic, analgesic and antioxidant
93. Ziziphus nummularia (Burm.f.) Wight & Arn.	Jhahrberi (Wild jujube)	Paste of leaves, Fruit.	To treat dysentery, Scabies, Skin diseases and cold cough
Rubiaceae *94. Mitragyna parvifolia* (Roxb.) Korth.	Kadamb	Stem bark and Fruits	To treat fever, colic, muscular pain, burning sensation and gynaecological disorders.
Rutaceae *95. Aegle marmelos* (L.) Corrêa	Bel patra	Fruits, leaves.	To treat Dysentery, diarrhoea and Toothache.
Salvadoraceae *96. Salvadora oleoides* Decne.	Pilu	Root, Leaves, Fruit, Seed	Use as a vesicant, purgative and Aphrodisiac
97. Salvadora persica L.	Chota pilu, Jaal	Plant, Root, Stem, Shoot, Fruit	To treat biliousness and rheumatism
Solanaceae *98. Datura metel* L.	Datura kala	Leaves	To treat epilepsy, convulsion, syphilis and inflammation of the breasts
99. Solanum nigrum L.	Makoi	Infusion of Leaves	To treat dysentery, stomach complaints, fever, ulcers and skin diseases. Used as a tonic, laxative and appetite stimulant.
100. *Solanum surattense* Burm.f.	Bhat Kateli	Decoction of whole plant	To treat cough and asthma
101. *Solanum xanthocarpum* Schrad.	Peeli Kanteli	Root, Stem, leaf, flower, fruit	To treat dental infections and Asthma
102.*Withania somnifera* (L.) Dunal	Ashwagandha, Asgandh	Root	To treat hypertension, stress and Rheumatism, anti -inflammatory and muscle recovery
Sterculiaceae 103. *Sterculia urens* Roxb.	Kadaya	Gum, Leaves	To treat ulcers and piles, Gum is used as a cooling agent and for menstrual problems.
Verbenaceae 104. *Clerodendrum phlomidis* L.f.	Arni	Leaves	To treat rheumatoid arthritis, constipation and loss of appetite
Zygophyllaceae 105. *Balanites aegyptiaca* (L.) Delile	Hingota	Fruit	To treat jaundice, intestinal worm dysentery, haemorrhoids and stomach aches.
106. *Tribulus terrestris* Muhl.	Gokhru chota	Fruit	To treat kidney problems and male sexual problems, including erectile dysfunction

* Plants have antioxidant activity

indicate a sustainable usage pattern that disperses harvesting demand among different ecological niches and implies a thorough awareness of plant resources.

Twenty plants out of the species that have been described showed particular effectiveness in treating sports injuries, ranging from sprains and strains to more complicated problems, including sciatica and tendon injuries (Table 2, Fig. 4). Commonly used plant parts for treating such injuries include bark, stem, leaves, latex, seeds and gum resins (Fig. 5). Among these species, three belong to the Combretaceae family, two to the Fabaceae family, with the remainder categorized as shown in Fig. 6. Since these uses were not mentioned in earlier reviews of indigenous knowledge for sports injuries, this specialized knowledge offers a treatment method that has not yet been documented. *Adhatoda vasica, Terminalia arjuna, Vitex negundo* and *Withania somnifera* are among the herbs used for these purposes. Their anti-inflammatory, analgesic and tissue-regenerative qualities are well-known in traditional medicine, consistent with their use for sports-related trauma. There are some intriguing similarities between the Mogiya tribe's method of treating sprains and strains and contemporary sports medicine practices (55). They exhibit a deep understanding of injury management by using a variety of plant species in conjunction with concepts akin to the RICE (Rest, Ice, Compression, Elevation) method. Because it could result in complementary therapeutic approaches, this convergence of traditional and modern approaches merits more research. Targeted remedies for intricate musculoskeletal problems are offered by applying *Sida alba* for sciatica and *Trigonella foenum* for joint-related ailments. These applications are especially notable because they

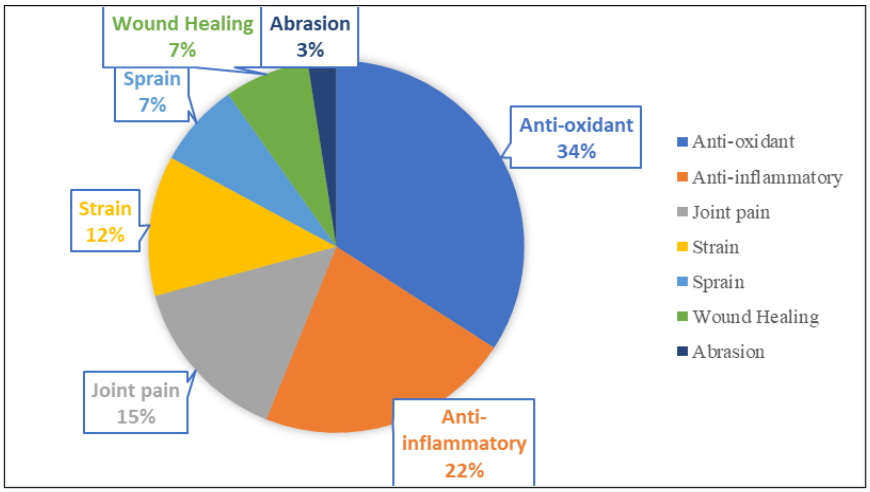

Fig. 4. Therapeutic applications.

Table 2. List of plants used to treat sports injuries

S.No.	Plant Name	Common Name	Plant Part and Dosage	Active Compounds	Sports Injury Applications	Ref.
1	*Justicia adhatoda L.*	Malabar Nut,Vasa, Adusa	Leaves, roots (2–3 g)	Vasicol, Vasicine, Vasicinone	Anti-inflammatory for muscle strain relieves joint pain, reduces swelling	(18-20)
2	*Bauhinia variegata*	Mountain ebony, Kachnar	Bark & root, (3–6 g)	*Flavonoid, Sterols, Tannins*	Reduce muscle inflammation, help in bone healing	(21, 22)
3	*Centella asiatica* (L.) Urb.	Gotu kola, Mandukparni	Whole plant (300–600 mg)	Asiaticoside, Madecassoside	Promote wound healing, improve circulation	(23–26)
4	*Calotropis procera* (Aiton) W.T.Aiton	Apple of Sodom, Aak, Madar	Latex, Root bark	Calotropin, Uschairn	Topical Pain Relief, Anti-inflammatory	(27, 28)
5	*Commiphora wightii* (Arn.) Bhandari	Guggul	Gum resin (500 mg)	Guggulsterones	Reduce Joint inflammation, helps in osteoarthritis	(29, 30)
6	*Cissampelos pareira* L.	Velvet Leaf, Jalijimini	Root extract; 5–10ml twice daily	Hayatine, Cissampareine	Muscle spasms, ligament strain	(31, 32)
7	*Terminalia arjuna* (Roxb. exDC.) Wight & Arn.	Arjuna	Bark (1–2 g)	Arjunolic acid, Tannins	Strengthens muscles, improves endurance	(33)
8	*Terminalia chebula* Retz. *	Haritaki Harara	Fruit (3–6 g)	Chebulinic acid, Tannin	Anti-inflammatory, Joint pain relief	(34)
9	*Trigonella foenum-graecum* L.	Fenugreek, Methi	Seeds; 2–5 g powder with warm water	Diosgenin, 4-Hydroxyisoleucine	Anti-inflammatory, muscle soreness	(35)
10	*Woodfordia fruticosa* (L.) Kurz*	Dhawara phool	Resin and extract of leaves	Tannins, Flavonoids, Polyphenols	Wound healing and abrasions	(36, 37)
11	*Ricinus communis* L.	Arandi (Castor seed)	Stem	Ricinoleic acid, Ricinine, Flavonoids	Anti-inflammatory, swelling and sprain	(38, 39)
12	*Vitex negundo* L.	Chaste tree, Nirgundi	Leaves, Seed 3–5 g)	Vitexin, Casticin	Joint pain relief, muscle relaxant, Anti-inflammatory	(40, 41)
13	*Mytragyna parvifolia*	Kadamb	Bark and leaves; 3–5 g powder daily	Mitragynine, Speciogynine	Muscle strain, joint pain, inflammation	(42)
14	*Sida alba* L.	Country Mallow, Khirinti badi	Root powder; 1–3 g daily	Ephedrine, Pseudoephedrine	Joint pain, muscle strain	(43)
15	*Rivea hypocrateriformis* (Desr). Choisy	Phooli	Root powder; 2–3 g twice daily	Ergoline alkaloids, Flavonoids	Muscle sprain, tendon injuries	(44)
16	*Azadirachta* A.Juss	Neem	Leaves, Bark	Nimbin, azadirachtin	Anti-inflammatory, Pain relief, Wound healing	(45, 46)
17	*Ficus benghalensis* L.	Bargad (Banyan)	Young prop roots, Leaves, Fruit and Resin	Ketones, Flavonoids, Sterols, β-sitosterol	*Anti-inflammatory, muscle strain*	(47)
18	*Ficus racemosa* L.	Gulaar	Bark and Fruit	Glucoside, Gallic acid, Tannins	Anti-inflammatory and swelling	(48)
19	*Plumbago zeylanica* L.	Chitrak	Leaves and Root	Plumbagin, Naphthoquinones	Anti-inflammatory, swelling and sprain	(49–51)
20	*Withania somnifera* (L.) Dunal	Ashwagandha	Root (300-600 mg)	Withanolides	Muscle recovery reduces inflammation, improves strength	(52–54)

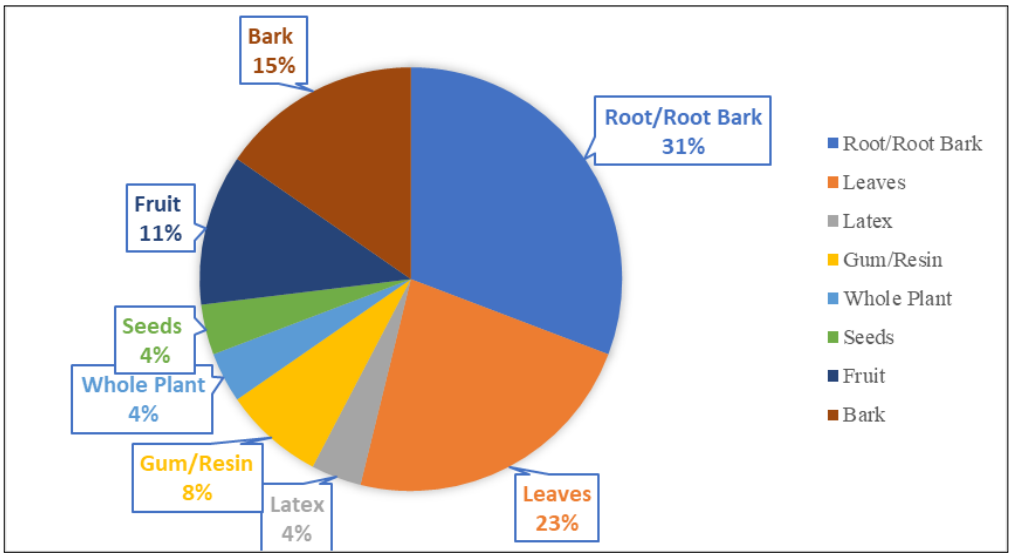

Fig. 5. Plant parts used in medicine.

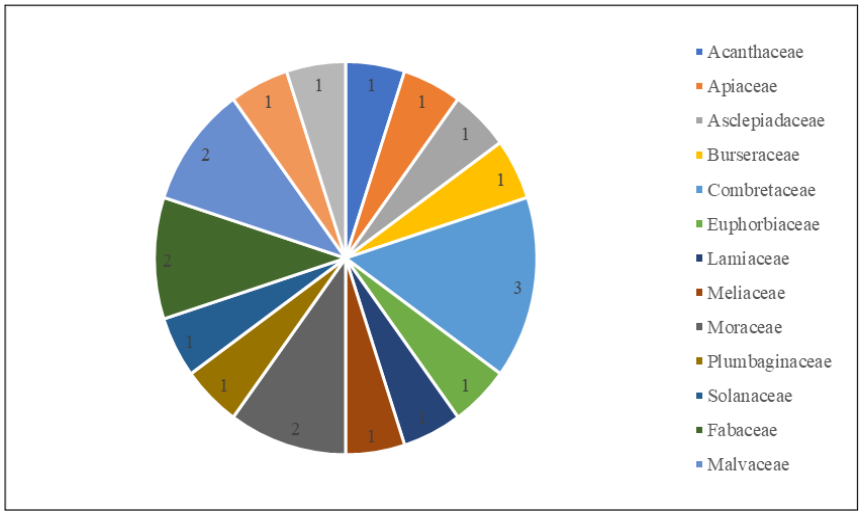

Fig. 6. Plant families distribution.

frequently treat ailments that are difficult to treat in traditional sports medicine. The Mogiya tribe's claims of these plants' anti-inflammatory and pain-relieving qualities align with scientific research on their phytochemical components, indicating a plausible explanation for their traditional application. The Mogiya tribe's administration techniques, which include external treatments through pastes and poultices and oral ingestion, show an intuitive awareness of the best delivery mechanisms for various illnesses. This information may benefit the creation of contemporary drug-delivery systems for treating sports injuries (56).

With significant presence from the Combretaceae and Fabaceae families, the taxonomic distribution of plants used to treat sports injuries suggests possible chemotaxonomic trends that may direct further phytochemical research. According to their historical uses, these families are known to contain substances with tissue-regenerative and anti-inflammatory qualities.

This study shows the importance of traditional knowledge systems in tackling today's healthcare issues. The plants found to help treat sports injuries are new prospects for pharmacological research and possible medication creation. Additionally, the Mogiya tribe's holistic approach, which considers functional and physical healing, aligns with contemporary sports medicine trends prioritising thorough rehabilitation.

Future studies should concentrate on finding active ingredients, examining their mechanisms of action and verifying the effectiveness of these conventional treatments through controlled trials. Furthermore, conservation initiatives are crucial since these medicinal plants and the traditional knowledge accompanying them constitute a cultural legacy and potential resources for long-term healthcare solutions.

Scientific validation of different extracts of these plants using animal models is a primary need of this era for the commercial benefit of this knowledge. At the same time, conservation efforts for such biodiversity should be of primary concern, as some herbaceous species are very hard to find in forests compared to a decade earlier, as stated by these tribes.

Conclusion

This ethnobotanical study of the Mogiya tribe reveals several significant findings regarding the treatment of sports injuries. The research documented 20 medicinal plant species with specific applications for sports-related conditions and identified from a broader collection of 106 medicinal plants used by the tribe. These plants demonstrate promising properties for treating common sports injuries, particularly through their anti-inflammatory, antioxidant and healing properties. Multiple plant parts, including bark, stem, leaves, latex, seeds and gum resins have been used to treat various sports injuries, including sprains, strains, joint pain and wound healing.

The two critical recommendations emerge from this research: (i) There is a pressing need for scientific Validation of these plant extracts through animal model studies to verify their therapeutic properties and potential commercial applications. (ii) Conservation efforts must be prioritized, as some herbaceous species have become increasingly scarce in forest areas over the past decade, according to tribal observations. This research documents valuable traditional knowledge and identifies promising directions for future pharmacological research while highlighting the urgent need for biodiversity conservation in these areas.

Authors' contributions

EM carried out the research design. AP carried out the field visit and interaction with tribals. NS carried out the analysis of data in view of sports injury. AC carried out the compilation and preparation of the manuscript. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: The authors do not have any conflicts of interest.

Ethical issues: None

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