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Traditional practices of ethnomedicinal plants used for wound healing in Bodla block, Kabir Dham district, (C.G.) India

Satruhan and DK Patel

Abstract
The term "wound" refers to the disruption of the body's integrated structure brought on by physical, chemical, and biological causes. After skin and soft tissue are damaged, a process known as wound healing takes place to rebuild those areas. The body naturally heals itself by overcoming damaged tissue, but the process is quite sluggish and there is a considerable risk of microbial infection. Shortening the time needed for healing or reducing unintended consequences are two ways to improve the healing process. Plants and components derived from plants have traditionally been used extensively in managing and treating numerous types of wounds. These natural substances promote tissue regeneration and healing in various ways. The current study is based on field observation in 2022-23. The field visit and interviews were conducted regularly in randomly selected areas of the Bodla Block, Kabirdham District, Chhattisgarh, India. The paper provides ethnomedicinal uses of 62 Medicinal plants belonging to 35 families used for curing wounds. The current study makes an effort to highlight various Medicinal plants that have been traditionally utilized for the same purpose.

Keywords: Bodla block, ethnobotanical study, medicinal plant, wound healing

Introduction
The skin serves as a barrier against the entry of harmful germs, water loss, and bleeding. As a result, physical, chemical, and biological contaminants have the potential to harm or disturb the connected structure of the skin, a critical organ. The wound is the name given to this harm. Several interactions occur between various cells, cytokine mediators, and extracellular matrix throughout the active process of wound healing. In general, the process of healing a wound involves coagulation, inflammation, proliferation, and recovery.

Additionally, healing a wound is a restorative process that follows skin and soft tissue injury. In fact, after the injury occurs, an inflammatory response is created, subdermal cells start to produce more collagen, and eventually, epithelial tissue is progressively rebuilt. According to studies, fibronectin, macrophage migration inhibition factor, growth factors, matrix metalloproteinases, and hormones are among the variables that aid in wound healing.

The body naturally heals itself by overcoming damaged tissue, but the process is quite sluggish and there is a considerable risk of microbial infection. As a result, there is a desire for a component that quickens the healing process. One of the most important components of the necessary medications for soldiers is wound healers, which may aid in getting injured soldiers back on the battlefield as soon as feasible. A wound healer also reduces the need for additional medications like antibiotics as well as their potential negative effects by using them. (1994; Lazarus *et al*.). In addition, no synthetic medicine formulation on the market can make a claim for its ability to cure wounds.

In these situations, healing can only occur naturally because the medications available are either bacteriostatic or bactericidal (Lawrence *et al*., 1994; Nguyen *et al*., 2009) [51, 7]. According to studies from the World Health Organization (WHO), more than 80% of people worldwide rely on herbal medication (Ekor, 2013; Priya *et al*., 2002) [50, 40]. India has a long history of developing plant-based medical expertise. In India, tribal people and folklore traditions employ a variety of plants, plant extracts, decoctions, or pastes to cure burns, cuts, and other wounds. Recently, numerous plant extracts have been shown to have wound-healing properties, and the molecular mechanisms underlying these wound-healing processes have received substantial study.

Healing of wound

An inflammatory phase, a proliferative phase, and a remodelling phase all take place during the healing of a wound. Instantly following the damage, an inflammatory phase sets in, lasting up to 48 hours and, in rare situations, up to two weeks. Vasoconstriction and platelet aggregation are the haemostatic mechanisms of this stage, which promptly cease bleeding. The wound site then experiences phagocytosis and vasodilatation, which results in inflammation. (Li *et al*., 2007) [27].

After the inflammatory phase, the proliferative phase begins and lasts for two to three weeks. Collagen fibres build up and neovascularization takes place during this period. After the wound's edges are pushed together to diminish its size, epithelial tissues are generated over the wound site. (Guo and dipietro, 2010) [19].

Three weeks to two years may pass during the remodelling process. The tissue's tensile strength rose during this phase as a result of cross-linking between collagen fibres through vitamin C-dependent hydroxylation. (Guo and dipietro, 2010) [19].

Study Area

Kabirdham district is one of the 33 administrative districts of Chhattisgarh state in central India. The district was earlier known as Kawardha District. The district is located between 21.32' to 22.28' north latitude and 80.48' to 81.48' east longitude. The district covers an area of 4,447.5 km^2 (1,717.2 sq m). The city of Kawardha is its administrative headquarters. This district is known for the Bhoramdeo temple (Which is also known by the sobriquet, "the Khajuraho of Chhattisgarh") located at a distance of 18 km from the district headquarters, Kawardha. The boundaries of the district are the Dindori District of Madhya Pradesh to the north, the Mungeli and Bemetara Districts to the east, the Rajnandgaon District to the south, Balaghat and Mandla Districts of Madhya Pradesh to the west. The northern and western parts are surrounded by the Maikal mountain ranges of Satpura. Kabirdhamdistrict consists of 4 blocks that are 1. Sahaspur Lohara, 2. Pandariya, 3. *Kawardha*, 4. Bodla.

Bodla is a Block situated in Kabirdham district in Chhattisgarh. it is one of the 4 blocks of the Kabirdham district. It is located *20 KM towards North* of the District headquarters Kawardha. As per the government records, the block number of Bodla is 66. The block has 343 villages and there is a total of 42026 homes in this Block. According to the census 2011 information, the Total area of Bodla Tehsil is 1,880 km² including 1,871.54 km² rural area and 7.99 km² urban area.

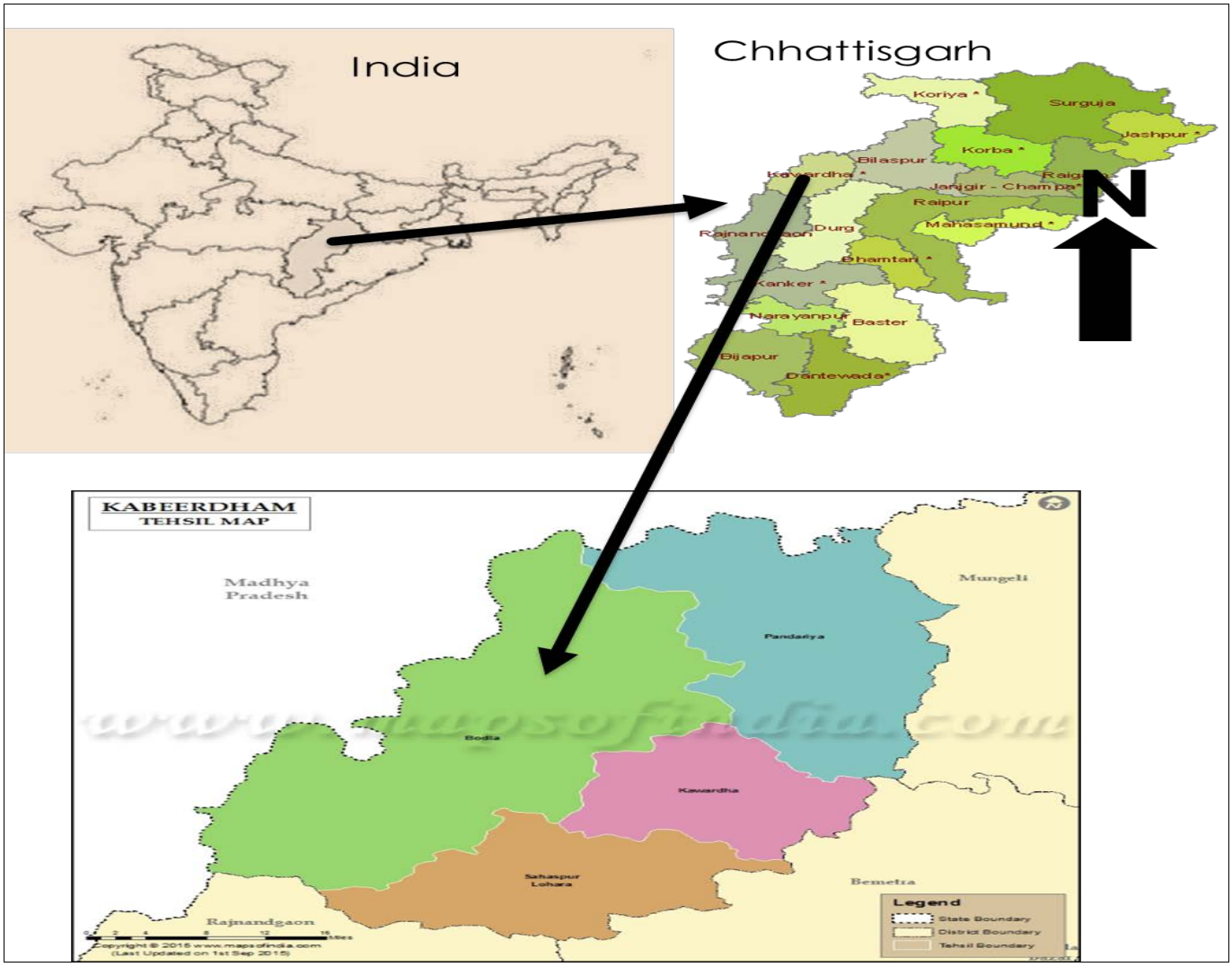

Fig 1: Location map showing Study area Bodla block, Dist. Kabirdham Chhattisgarh, India

Material and Method

The current study is based on field observation in 2022-23. The field visit and interview were conducted at regular intervals in randomly selected areas of the Bodla Block,

Kabirdham District, Chhattisgarh, India. In the preliminary stage door to door survey based on a semi-structured questionnaire was conducted and necessary data has been collected from local traditional healers i.e.; Baiga tribal.

Ethnomedicinal observations

The ethnomedicinal plants collected during the survey are arranged with their botanical name followed by local name, family, habit, plant parts used and secondary metabolite as shown in Table 1.

Table 1: List of some medicinal plants with potential for wound healing activity

S. No.	Botanical Name	Common Name	Family	Habit	Plant Parts Used	Metabolites
1.	*Acacia nilotica* (L.) Delile	Babul	Fabaceae	Tree	Leaf	flavonoid, glycosides, tannin, terpenoids, saponin, steroids
2.	*Allium cepa* Linn.	Onion	Liliaceae	Herb	Bulb	Kampferol, B-Sitosterol, Ferulic Acid, Myritic Acid, Prostaglandins
3.	*Abrus precatorius* Linn.	Kunni Kuru, Gunja	Fabaceae	Shrub	Leaf	abrasine, abrol, precol, pre-casine
4.	*Asparagus racemosus* Willd	Satawar, Satmul	Liliaceae	Shrub	Root	Steroidal saponins, Polycyclic alkaloid-Aspargamine A, alkaloid
5.	*Achyranthes aspera* L.	Chirchita	Amaranthaceae	Herb	Leaf	alkaloids, saponins, tannins, flavonoids, glycosides, steroids
6.	*Aloe vera* (L.) Burm.f	Gwarpatha	Liliaceae	Herb	Leaf	Anthaquinone, C and E Vitamins, Amino Acids
7.	*Andrographis paniculata* (Burm. f.) Nees	King of Bitter, Bhuineem	Acanthaceae	Herb	Leaf	Andrographolide, Kalmeghin
8.	*Argemone mexicana* Linn.	Pili Kateri	Papaveraceae	Herb	Leaf	Berbine,Protopine,Alkaloid
9.	*Azadirachta indica* A.Juss.	Neem	Meliaceae	Tree	Leaf and Seed oil	Azadirachtin, Azadirone, Nimbin, Nimbidin, Nimbinin, Alkaloids
10.	*Aegle marmelos* (L.) Corrêa	Bel	Rutaceae	Tree	Root, Fruit	Tannins
11.	*Adhatoda vasica* Nees	Adusa	Acanthaceae	Shrub	Leaf	Flavonoids, Tannins
12.	*Brassica juncea* (L.) Czern.	Indian Mustard	Brassicaceae	Shrub	Leaf	Alkaloids, Flavonoids, Saponins,
13.	*Butea monosperma* (Lam.) Taub.	Palas	Fabaceae	Tree	Bark	Alkaloid, Tannin, Steroid, Flavonoids, Saponin, Glycoside, Protein, Amino Acid,
14.	*Cordia macleodii* (Griff.) Hook. f. Thoms	Dahiman	Boraginaceae	Tree	Leaf	Phenols, Terpenoids, Saponins, Volatile oils, Flavonoids, Glycosides
15.	*Calotropis gigantea* (L.) Dryand.	Aak	Asclepiadaceae	Herb	Stem latex	cardiac glycosides, madrine, β-sitosterol, saponins, tannins, alkaloids, flavonoids, Cardenolides, Benzoylinesolone and calotropons
16.	*Calotropis procera* (Ait.) R. Br.	Madar /Akavan	Asclepiadaceae	Shrub	Latex and Leaf	*cardenolides, flavonoids, sterols, oxypregnanes triterpenoids, glycosides*
17.	*Catharanthus roseus* (L.) G.Don	Sadabahar	Apocyanaceae	Herb	Leaf	Alkaloid,Vinblastine,Vincristine
18.	*Carica papaya* L.	Papaya.Papita	Caricaceae	Tree	Fruit, Root	Papain, Saponins, flavonoids,
19.	*Curcuma longa* L.	Haldi	Zingiberaceae	Herb	Rhizome	Curcumin, Vitamin A, Proteins
20.	*Ceasalpinia sappan* Linn.	Sappan Wood	Fabaceae	Tree	Leaf	Phenolics, Terpenoids, Squalene, Sterols, Campesterol
21.	*Cassia tora* Linn.	Charota	Fabaceae	Herb	Leaf	Anthraquinones, Chrysophanol, Emodin, Obtusifolin,Obtusin, Chrysoobtusin, Aurantio-Obtusin,
22.	*Cissus quandrangularis*	Hadjod	Vitaceae	Shrub	Whole Plant	flavanoids, triterpenoids, Vitamin C, triterpene, β-sitosterol, ketosteroid,
23.	*Datura metel* L.	Datura	Solanaceae	Herb	Leaf	alkaloids, flavonoids, saponins, steroids and tannins
24.	*Dioscorea bulbifera* L.	Varahikanda	Dioscoreaceae	Herb	Fruit	alkaloids, flavonoids, glycosides, phenols, resins, saponins, tannins, volatile oils, carbohydrates and amino acids
25.	*Euphorbia hirta* Linn.	Dudhi	Euphorbiaceae	Herb	Whole Plant	Saponins, Tannins, Flavonoids, Alkaloids, Glycosides
26.	*Ficus religiosa* Linn.	Pepal	Moraceae	Tree	Leaf	phenols, tannins, steroids, alkaloids flavonoids, β-sitosterol lanosterol,
27.	*Ficus bengalensis* Linn	Banyan	Moraceae	Tree	Root	Saponins, Flavonoids, Tannins
28.	*Ficus racemosa* L.	Dumar	Moraceae	Tree	Bark	Racemosic acid, gluanol acetate, caoutchouc, tannins, β-sitosterol, stigmasterol, friedelin and hentriacontane
29.	*Haldinia cordifolia* (Roxb.) Ridsdale	Haldu	Rubiaceae	Tree	Bark	flavonoids, alkaloids, phytosterols and phenolic compounds

30.	*Helicteres isora* L.	Aeinthi	Malvaceae	Shrub	Leaf	carbohydrates; anthraquinon glycosides, proteins, tannin and phenolic compounds and steroids
31.	*Helianthus annuus* Linn.	Sunflower	Asteraceae	Herb	Leaf, Seed, Flower and Root	flavonoids, phenolic acids,
32.	*Hibiscus rosa- sinensis* Linn.	Gudhal	Malvaceae	Shrub	Flower	olyphenolic acid., rotocatechuic acid
33.	*Jatropha gossypifolia Linn.*	Red Bagranda/ Ratanjot	Euphorbiaceae	Herb	Resin	Jatrophenone, hydroxyjatrophone A, B, C, gadain, prasanthaline, isogadain, cyclogossine A, coumarino-lignoid and ricinoleic acid
34.	*Jatropha curcas* Linn	Barbados Nut	Euphorbiaceae	Shrub	Stem Bark	Flavonoids
35.	*Kalanchoe pinnata* (Lam.) Pers.	Patharchatta	Crassulaceae	Herb	Leaf	flavonoids, phenols, tannins, carbohydrates, glycosides
36.	*Lawsonia inermis* L.	Heena	Lythraceae	Shrub	Leaf	Coumarins, naphthoquinone, flavonoids, sterols, triterpene, and xanthones
37.	*Lantana camara* Linn	Wild sage	Verbanaceae	Shrub	Leaf	Triterpenoid, Flavonoid
38.	*Ocimum sanctum* Linn	Tulsi	Lamiaceae	Herb	Leaf	Flavonoids
39.	*Mimosa pudica* Linn.	Chuimui	Fabaceae	Herb	Root	*Bufadienolide, D-Pinitol, Norepinephrine, P-Coumaric Acid, Mimopudine, and Mimosine*
40.	*Madhuca longifolia* (J. Koenig ex L.) J. F.Macbr.	Mahua	Sapotaceae	Tree	Seed oil	Sapogenins, Carbohydrates, Triterpenoids, Steroids, Saponins, Flavonoids, Glycosides
41.	*Moringa oleifera* Linn	Munga	Moringaceae	Tree	Leaf	alkaloids, flavonoids,
42.	*Morinda citrifolia* Linn.	Indian Mulberry	Rubiaceae	Tree	Leaf, Fruit	Anthraquinones, Steroid, Phenol, Tannin, Terpenoids
43.	*Nthocephalus cadamba* (Roxb.)	Kadam	Rubiaceae	Tree	Flower	Cadambagenic Acid, Cadamine, Quinovic Acid, B-Sitosterol, Cadambine,
44.	*Nelumbo nucifera* Gaertn.	Kamal	Nymphacocese	Herb	Stem	Alkaloids, *Flavonoids*
45.	*Nerium indicum* Mill.	Kaner	Apocynaceae	Shrub	Leaf	Alkaloids, Flavonoids, Steroids
46.	*Pongamia pinnata* (L.) Pierre	Karanj	Fabaceae	Tree	Seed oil	Alkaloids Dimethoxy-Kanugin, Gamatay, Glabrin, Glabrosaponin, Kaempferol, Kanjone, Kanugin, Karangin, Neoglabrin, Pinnate, Pongamol, Pongapin, Quercitin, Saponin, B-Sitosterol, Tannin
47.	*Psidium guajava* Linn	Amrud	Myrtaceae	Tree	Leaf	Flavonoids, Guayavolic Acid, Guavanoic Acid, Guajadiol
48.	*Piper betle* Linn.	Betle Piper	Piperaceae	Herb	Leaf	Phenolic Complex, Betal-Phenol, Chavicol
49.	*Phyllanthus emblica* Linn.	Amla	Phyllanthaceae	Tree	Fruit	emblicanin-A, emblicanin-B, tannins, gallic acid, pyrogallol,
50.	*Ricinus communis* L.	Arand	Euphorbiaceae	Shrub	Seed Oil	steroids, triterpenoids, flavonoids, lignin, tannins, alkaloids, glycosides
51.	*Sida acuta* Burm.f.	Bariyari	Malvaceae	Shrub	Leaf	Alkaloids, terpenes, and flavonoids
52.	*Schleichera oleosa* (Lo ur.) Merr.	Kusum	Sapindaceae	Tree	Seed oil	alkaloids, glycosides, carbohydrates, α - amino acids, phenolic compounds, flavonoids, steroids, terpenoids, saponins, tannins, starch,
53.	*Syzygium cumini* (L.) Skeels	Jamun	Myrtaceae	Tree	Bark	Myricetin, Kempferol, Quercetin, Astragalin, Beta-Sitosterol, Beta-Sitosterol Glucoside
54.	*Sesamum indicum* Linn	Tili	Pedaliaceae	Herb	Seed	Metronidazole, E and C Vitamins, Sesamolinol, Sesamol, Sesaminol, Sesamolin
55.	*Tridax procumbens* Linn.	Coat Button	Asteraceae	Herb	Leaf	flavonoids, tannins, steroids, phenols, terpenoids, alkaloids, carbohydrates, proteins
56.	*Tephrosia purpurea* (L.) Pers.	Sarfonk	Fabaceae	Herb	Root	purpurin, tephrosin, karanjin, pongamol, steroids and flavonoid
57.	*Terminalia arjuna* (Roxb. ex-DC) Wight & Arn.	Arjun	Combretaceae	Tree	Bark	phytosterol, lactones, flavonoids, phenolic compounds and tannins and glycosides
58.	*Terminalia bellirica* (G aertn.) Roxb	Bahera	Combretaceae	Tree	Bark, Fruit	B-Sitosterol, Gallic Acid, Ellagic Acid, Chebulagic Acid, Mannitol, Glucose, Fructose, Rhamnose

59.	*Terminalia chebula* Retz.	Harra	Combretaceae	Tree	Bark, Fruit	Triterpenes, Tannins, Flavonoids, Phenolic Acids, Lignan
60.	*Tectona grandis* L.f.	Teak	Lamiaceae	Tree	Leaf	Saponin, Anthocyanin, Coumarins, Alkaloids, Proteins, Amino Acids, Carbohydrate, Flavonoids, Diterpenes, Physterol, Phenol,
61.	*Tagetes erecta* Linn.	Genda, Marigold	Asteraceae	Herb	Leaf	Flavonoids, Sterols, Alkaloids
62.	*Ziziphus nummularia* (Burm.f.) Wight & Arn.	wild jujube	Rhamnaceae	Shrub	Leaf	Alkaloids, Flavonoids, Glycosides

Results and Discussions

On the basis of an extensive collection of medicinal plants from the Bodla block region of the Kabirdham district, it results that a total of 62 plant species belonging to 35 families are reported (Table 1). For each species, the following ethnobotanical information is provided: taxon name, vernacular name, family, habit of plant, used plant parts, and metabolite. In this study, members of the family Fabaceae (8 species) are the most commonly used plants for the treatment of Wound healing. Other families like Euphorbiaceae, (4 species), Liliaceae, Malvaceae, Asteraceae, Combretaceae, Moraceae, Rubiaceae (3 species), Apocyanaceae, Asclepiadaceae, Acanthaceae, Lamiaceae, Myrtaceae (2 species), Amaranthaceae, Boraginaceae, Brassicaceae, Caricaceae, Crassulaceae, Dioscoreaceae, Lythraceae, Meliaceae, Meliaceae, Moringaceae, Nymphacocese, Papaveraceae, Papaveraceae, Phyllanthaceae, Piperaceae, Pedaliaceae, Rhamnaceae, Rutaceae, Sapindaceae, Sapotaceae, Solanaceae, Verbanaceae, Vitaceae, Zingiberaceae (1 species) were also dominant as shown in figure 2. Out of 50 plants recorded from the study area, the highest number of plants belongs to trees (24 species) and herbs (23 species) followed by shrubs (15 species) Figure 3. A comparison of the plant parts used as a medicinal source indicates that the leaf (28 species) predominates followed by bark, roots, fruit, flower, and seed oil Figure 4. It is noted that due to anthropogenic activities, pressure increases on forest and forest products hence day by day forest area decreases. So far proper conservation planning is required to preserve the floral wealth of Bodla block region. Proper identification of medicinal plants has a vital role in utilizing this natural wealth and conserving biodiversity in the state.

Table 2: Family-wise distribution of Medicinal plants useful for Wound healing

S. No.	Family	Number of Medicinal Plants
1.	Acanthaceae	2
2.	Amaranthaceae	1
3.	Apocyanaceae	2
4.	Asclepiadaceae	2
5.	Asteraceae	3
6.	Boraginaceae	1
7.	Brassicaceae	1
8.	Caricaceae	1
9.	Combretaceae	3
10.	Crassulaceae	1
11.	Dioscoreaceae	1
12.	Euphorbiaceae	4
13.	Fabaceae	8
14.	Lamiaceae	2
15.	Liliaceae	3
16.	Lythraceae	1
17.	Malvaceae	3
18.	Meliaceae	1
19.	Moraceae	3
20.	Moringaceae	1
21.	Myrtaceae	2
22.	Nymphacocese	1
23.	Papaveraceae	1
24.	Pedaliaceae	1
25.	Phyllanthaceae	1
26.	Piperaceae	1
27.	Rhamnaceae	1
28.	Rubiaceae	3
29.	Rutaceae	1
30.	Sapindaceae	1
31.	Sapotaceae	1
32.	Solanaceae	1
33.	Verbanaceae	1
34.	Vitaceae	1
35.	Zingiberaceae	1
	Total	62

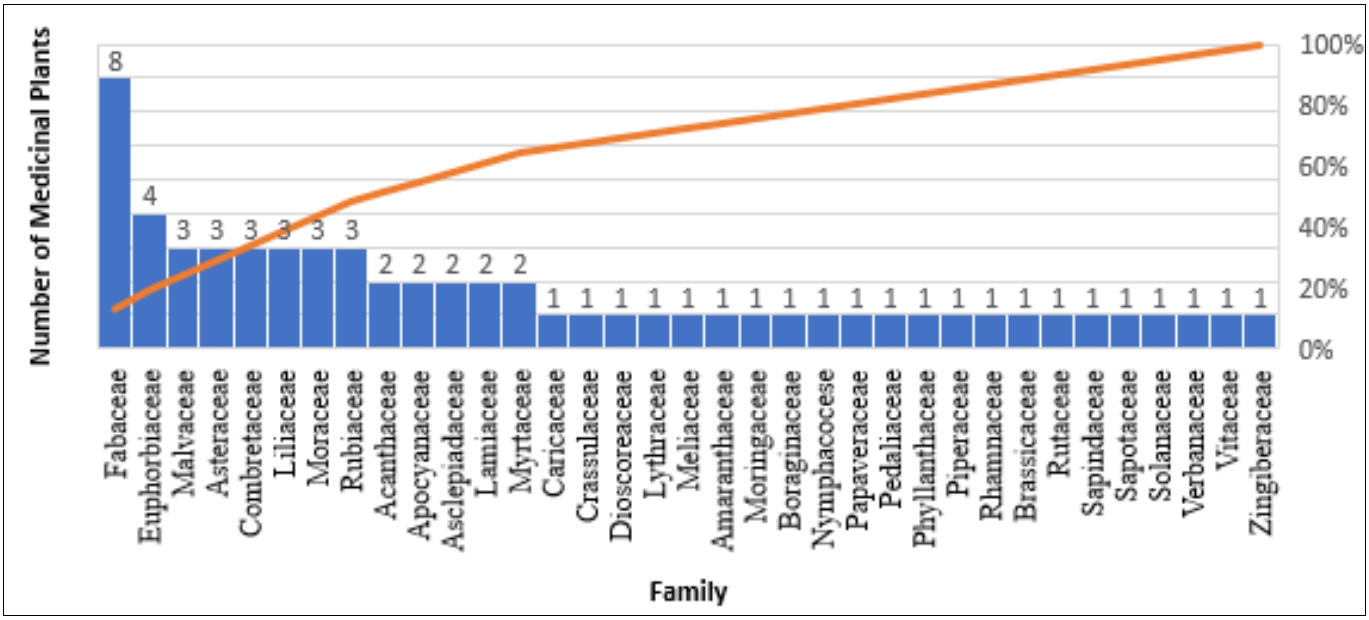

Fig 2: Family wise Distribution of Medicinal Plants Useful for Wound Healing

Table 3: Habit variation of Medicinal plants useful for Wound healing

S. No.	Habit	Number of Medicinal Plants
1.	Herb	23
2.	Shrub	15
3.	Tree	24
Total		62

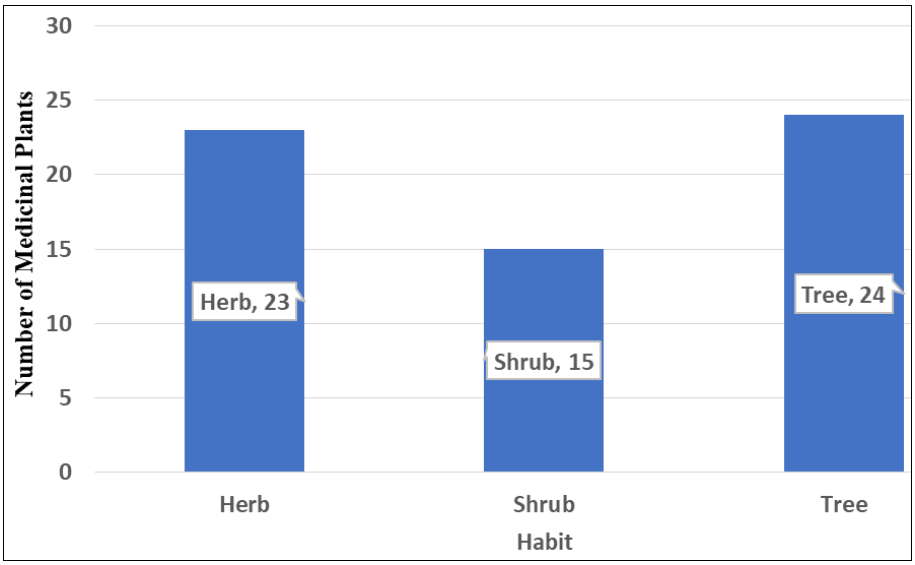

Fig 3: Habit variation of Medicinal plants useful for Wound healing

Table 4: Variation of Medicinal based on the Plant parts used for Wound healing.

S. No.	Plant Parts Used	Number of Medicinal plants
1.	Bark	5
2.	Bark, Fruit	2
3.	Bulb	1
4.	Flower	2
5.	Fruit	2
6.	Fruit, Root	1
7.	Latex and Leaf	1
8.	Leaf	28
9.	Leaf and Seed oil	1
10.	Leaf, Fruit	1
11.	Leaf, Seed, Flower and Root	1
12.	Resin	1
13.	Rhizome	1
14.	Root	4

15.	Root, Fruit	1
16.	Seed	1
17.	Seed oil	4
18.	Stem	1
19.	Stem Bark	1
20.	Stem latex	1
21.	Whole Plant	2
	Total	62

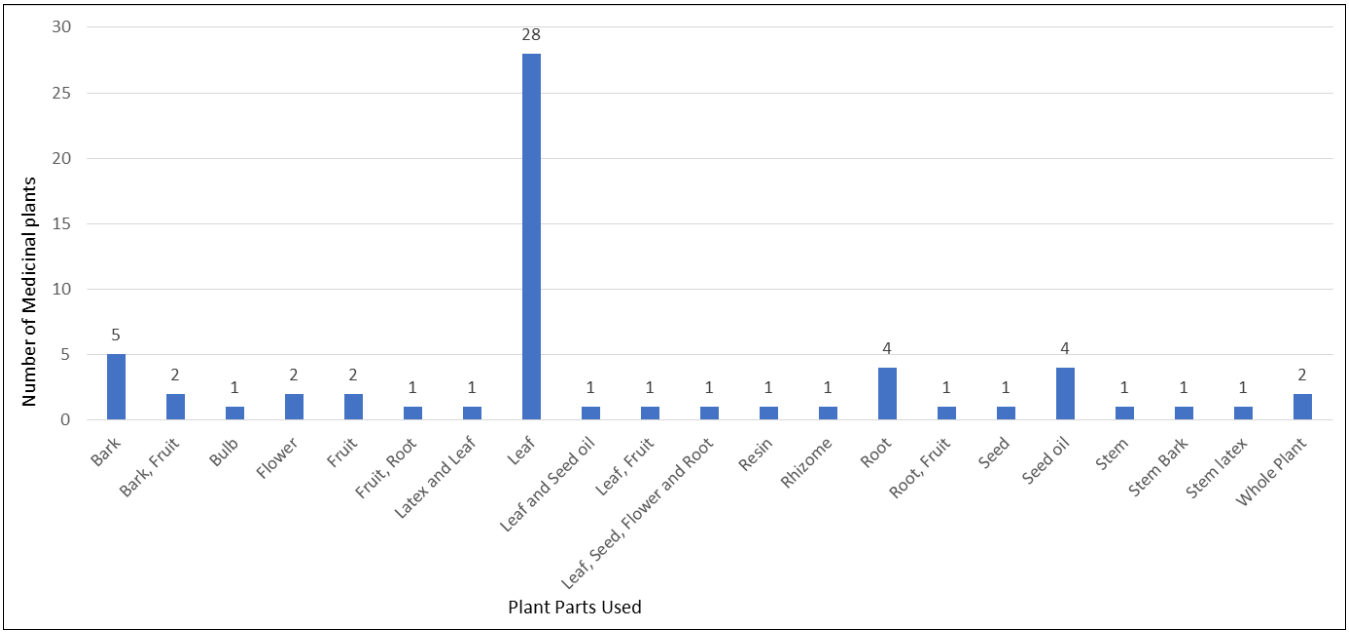

Fig 4: Used Plant parts for Wound healing

Conclusion

Plants are more potent healers because they naturally assist the mending mechanism. This study established the benefits of numerous plants used in tribal medicine, particularly for wound healing, and showed that tribal peoples still use traditional remedies. The collected data intends to inform the researchers and scientists to assist them gain a better grasp of the function and significance of plant-based components in the management and treatment of wounds.

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