



## **Traditional Medicinal Plants of Gopalganj (Bihar) and Their Potential to Heal Wounds: A survey**

**Ashok Kumar Ram<sup>1</sup> and \* Md. Sarfaraz Ahmad<sup>2</sup>**

<sup>1</sup>JaiPrakash University, Gopalganj (Bihar)

<sup>2</sup>Associate Professor, Department of Botany, Gopeshwar College Hathwa (Gopalganj, Bihar)

Corresponding author's : [mdsarfarzahmad786@gmail.com](mailto:mdsarfarzahmad786@gmail.com)

### **ABSTRACT**

*Gopalganj is blessed with the population of 2562012 as per the census of 2011, illness, body harming accidents and their remediation is a quotidian procedure. Therefore, instead of relying on market formulations locale of India has always made better utilization of traditional medicinal plants available. This survey was conducted in the zones of Gopalganj of Bihar to determine wound healing potential of some very important medicinal plants. The survey knocked the doors of Vaid, Hakims and local healers also the household women were included. Many useful findings appeared and portrayed the heritage in restoration of health by various means.*

**Keywords:** Traditional plants, Vaid, Hakims, Wound healing, Sub-cutaneous skin action

Received 17.01.2020

Revised 21.02.2020

Accepted 14.03.2020

### **INTRODUCTION**

Nature consistently remained as a brilliant imprint to speak to the exceptional marvels of mutualism. Customary information on herb drugs has been transmitted from age to age for a large number of years. Researchers and specialists over the world are watching plants as a future wellspring of medications since natural meds have a solid customary or calculated base and the potential leads for treating various ailments with fewer reactions. Regular items from plants have been the premise of the treatment of human sickness. Ethnopharmacology is the diverse investigation of how individuals get medications from plants, creatures, organisms or other normally happening assets. As of not long ago, the field has concentrated for the most part on creating drugs dependent on the therapeutic utilization of plants by indigenous individuals. The revelation that indigenous information about therapeutic plants may hold hints for restoring western ailments has gotten one of the most generally utilized contentions for saving society and natural decent variety [1]. The customary utilization of plants by indigenous networks mirrors the social viewpoints just as biodynamic components that have massive pharmacological potential to fix numerous ailments [2].

Gopalganj is the small district in North-Western Bihar covering an area of 2033 Km<sup>2</sup>. It lies between 26° 39' N Latitude and 83° 54' East Longitude. The altitude is 73 feet MSL. The soil of the district is thick alluvium intermittent deposited by river Gandak. The pH of the soil is mostly alkaline ranges from 7-8. The temperature ranges from 40°C in winter (December-January) and more than 44°C in hot summer (May-June). The average annual rain fall is about 1170.90 mm. The district occupies one of the great archaic significance of places like Bhore, Thawe Durga Mandir and Daha River; its reference appears in the epics like the Ramayan and Mahabharat. Now the Grah of Bhuishrwa in Bhore, the forest of Thawe near Thawe Durga Mandir and bank of river Daha is the best depository of Ethno-Medicinal Plants. In spite of these grasslands, the riverain banks of the river Gandak and their tributaries, the road side of National Highway-28, the Saran Main Canal and its Sub-canal, the Railways sides are the rich Ethno Medicinal reservoir of the district. Keeping its geographical indication in mind Gopalganj district is rich on heritage as well as agricultural land therefore botanical choice of plants have been made with reference as it possess two phenomena, there should be enough information about skin and its curing phenomena. Skin covers the external surface of the body. Skin contributes in thermoregulation, serve as water repellent,

and synthesize a number of useful compounds like vitamin D and most importantly it act as a protective barrier between the external environment and internal tissue[3]According to medical dictionary; breaching of skin or underlying tissue due to any accident, act of violence or surgery is called as wound[4].Following an injury, the skin has a tremendous capacity to heal.

When skin get injured, the repair process entails removal of the damaged tissue and laying down of a new extracellular matrix (ECM) over which epidermal continuity can be reestablished [5]. Wound repair must occur in a physiologic environment to promote tissue repair and regeneration. However, several clinically significant factors are known to impede wound healing including hypoxia, infection, tumors, metabolic disorders such as diabetes mellitus, the presence of debris and necrotic tissue, certain medications, and a diet deficiency in protein, vitamin, and minerals etc.[6].

Today, the principles of topical wound therapy involve elimination of necrotic tissue, control of bacterial loads, management of wound exudates, maintenance of open proliferative wound edges, and provision of a moist and protected wound surface [7]. Medical treatment of wound includes administration of drugs either locally (topical) or systemically (oral or parenteral) or both in an attempt to aid wound repair [8].Antimicrobial dressings including disinfectants, antiseptics and antibiotics are applied topically to exert a broad spectrum of non-selective antibacterial action [9].

It has been estimated by WHO that at least 80% of the world population, mainly in the developing countries, still dependent on herbal medicines for their primary health care needs. Use of traditional medicine is based on its accessibility, affordability and its firm embedment within the faith systems of people. Traditional knowledge is a valuable asset for any country as it plays a vital role in making the nation more progressive and transforming its society[10].Traditional medicine is a collection of therapeutic experience of various physicians on indigenous/traditional system of medicine [11]. According to WHO, "Traditional medicine refers to health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being".

Traditional medicine is called in various ways such as alternative medicine, complementary medicine, natural medicine, herbal medicine, phyto-medicine, non-conventional medicine, indigenous medicine, folk medicine, ethno medicine *etc.* [12]. People in the rural places where modern health care services remains inaccessible are still use their knowledge, skill and practices on various plant products for treating various ailments [13]. It has been estimated that 70% of wound healing Ayurveda drugs are plant based, 20% of mineral based and remaining 10% consists of animal products as their base material [14]. Traditional wound management involves disinfection, debridement and providing a moist environment to encourage the establishment of a suitable environment for the natural healing process[15].

Present paper offers relative information related to the Traditional medicinal plants of Gopalganj (Bihar) and their properties to heal wounds in an effective way. This survey has focused on families and plant parts used conventionally in the healing of wounds.

## **MATERIAL AND METHODS**

### **Ethnobotanical survey**

Documentation of traditional knowledge to record the folk and tribal knowledge on dicot medicinal plants of Gopalganj, frequent visits were made to various localities of Gopalganj District, including remote and tribal settlements. The survey was carried out during the period of March 2018 to February 2019. The first phase of the survey was aimed to gathering information about the folk and tribal healers, vaid, hakim of each area and establishing an appropriate relationship with them. After establishing rapport with them, information about the dicot medicinal plants was collected. The ethnobotanical data were collected according to the methodology suggested by [16,17].Informants were randomly selected for the study. For the present study about 45 informants including folk as well as household health practitioners, Vaid and Hakims were selected based on their specialized knowledge, experiences and acceptability among the peoples of that particular area. Random sampling is used for the selection of sample from the study area. In the present study investigator considered traditional practitioners tribal practitioners, Vaid and Hakims as those who are not having formal degrees in any medicinal discipline but practicing herbal therapy based on Ayurvedic written text or oral tradition. Therefore healers were taken as informant sample. Among the 45 informants, 32 male and 13 female herbal practitioners were included. Male informants also constitute 17 tribal healers from the study area. For quantitative ethnobotanical analysis 10 key informants were selected from this group based on their experience (not below 15 years) based on a method done earlier by[18]. The interviews with traditional practitioners were planned based on the geographical factors, seasons and transportation convenience. Informants were made aware about

the objectives of the study and verbal consent was sought from each informant to use their knowledge on antilithiatic medicinal plants for the present study. Interviews with the native traditional practitioners were arranged by the help of local peoples. Semi structured, open ended questions were used to gather information. Information on local name of the plants, parts used, method of preparation of medicine, quantity, dosage of medicine, mode and time of administration of medicine *etc.* were sought from them with the help of a schedule. Information on medicinal plants and their way of administration was used in this study with their consensus. Selected informants were interviewed in two or more times for getting necessary data regarding the study. Informal meetings and interviews were conducted at the first time and only then after semi-structured interviews were organized. Field trips were accompanied by practitioners and local informants for identification and collection of plant species used in the study area. Traditional practitioners were requested to get along to the field survey and necessary voucher specimens were collected, identified with the help of those informants. Traditional medicinal knowledge has connection with religious beliefs and rituals. Especially tribal healers are solemnly doing their treatment only after some religious preliminaries. Therefore, in addition to the medicinal wisdom, customs, taboos, religious rites and other belief system of the community was also made to consider in the survey. Their claims were compared and then confirmed with the available literature on the use of diuretic and linthontriptic medicinal plants. Field Information such as local name for plants, habitat collection localities were noticed in the field note at the time of survey. Besides this, aged and experienced elderly knowledgeable men and women among rural folks and tribes were also consulted.

## RESULT AND DISCUSSIONS

The area has been honored naturally with one of the most extravagant vegetation of Ethno-restorative Plants from which the rough medications can without much of a hustle could be created. Rustic populace is monetarily, socially and instructively receiving much in reverse from the Mother Nature. The point of the present investigation is to make neighborhood mindfulness in regards to the significance, of Ethno restorative plants for biodiversity preservation just as network upliftment. The survey focused on the parts of trees or plants used in healing of wounds whether it was bark, leaves, gum or fruit. A chart has been mentioned below (graph 1) which represents the prevalence of tree or plant part used. Knowledge collected from the Traditional health practitioners has been tabulated below.

**Table 1: The table below describes the knowledge collected by the traditional health practitioners Hakims and Vaid.**

S.No.	Botanical Name	Common Name	Part of plant used	Administration	Information Source	Target Wound
1	<i>Abrus precatorious</i> (L.)	Gunja	Seed	Crushed seeds are boiled in water and filterate is applied the wound.	Hakim of regional area	Epidermal wounds
2	<i>Acalypha indica</i> (L.)	Khokali	Leaves and Bark	Thick paste usually made by grinding is applied to the bleeding regions.	Vaid of regional area	Wounds of hands
3	<i>Achyranthus aspera</i> (L.)	Apamarga	Whole Plant	Extracts usually made by keeping it in oil for two to three days.	Hakim of regional area	Wounds which spread
4	<i>Adathoda vasica</i> Nees(L.)	Vasak	Leaf	Thick paste made by mixing it with turmeric.	Hakim of regional area	Wounds of cattle
5	<i>Aegle marmelos</i> (L.)	Bel	Leaf	Leaves are generally ground and then used.	Vaid of Local regions.	Wound of face with pus expulsion
6	<i>Albizia lebbeck Benth</i> (L.)	Shirisa	Stem	Crushed dried powders.	Hakim of regional area	Wounds of cattle.
7	<i>Alstonia scholaris</i> (L.)	Saptapama	Leaf and Stem	Thick paste is generally brought in use.	Vaid of regional area	Human skin wounds
8	<i>Annona Squamous</i> (L.)	Sitaphal	Root, Leaf, and	Fruits are generally consumed while	Local people, Hakim	Human Wounds

			Seed	powder from dried leaves seeds and effectively applied on wound.	s and Voids	
10	<i>Argemone Mexicana</i> (L.)	Pili kateya	Root and Latex	Latex are extracted from tree, while dried roots are used.	Regional peoples and specially Voids	Epidermal wounds
11	<i>Anthocephalus cadamba</i> Miq.(L.)	Kadam	Stem	Extracts from stem are generally used In application over wounds.	Regional peoples and Voids	Abrasion, Avulsion
12	<i>Azadiracta indica</i> A Juss.(L.)	Neem	Leaf Oil	Used in several ways thick pastes, oils are used for several antifungal treatments.	Local people	Incisions
13	<i>Calendula officinalis</i> (L.).	Marigold	Flower	The flower is poured in oil and oil is further reduced to half of its volume.	Hakims and Voids of regional area	Laceration and Punctures.
14	<i>Calotropis gigantean</i> (L.)	Rajarka	Latex	The latex which is taken out from tree was took for drying.	Local peoples and Voids	Incision and punctures
15	<i>Calotropis procera</i> Ait.	Akanda	Root and stem	The dried root and stem were ground to fine powder to mount the wound.	Local people	Avulsion and Incisions
16	<i>Cannabis sativa</i> (L.)	Bhang	Leaf	Dried powder is used for varied purposes.	Local people and Hakims	Avulsion and Incision
17	<i>Capparis aphylla</i> Roth.	Karira	Root and stem	Dried leaf and root powder mounted over wounds	Hakims and Voids of regional area	Epidermal wounds
18	<i>Carica papaya</i>	Papita	Latex	Latex were dried and mounted over wound.	Local people and Hakims	Incisions through any sharp edges work
19	<i>Carthamus tinctorius</i> (L.)	Kusum	Seed	Seeds were ground and extracted in oil.	Hakims and Voids of regional area	Avulsions
20	<i>Cayratia trifolia</i> (L.)	Grape	Root	Roots are dried and extracted in oil.	Local people, Voids and Hakims	Laceration, Incision
21	<i>Centella asiatica</i> (L.)	Mandukpar ni	Whole plant and Seed	Stem, leaf and root are dried extracted by oil.	Local people, Voids and Hakims	Avulsion and Incision
22	<i>Chenopodium album</i> (L.)	Pigweed	Leaf	The leaf is mounted on wounds.	Hakims and Voids of regional area	Epidermal wounds
23	<i>Clerodendron serratum</i> Sprengn(L.)	Bharangi	Root and Leaf.	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Local people and Hakims	Lacerations
24	<i>Clitoria ternatea</i> (L.)	Aparajita	Root, Leaf and Seed	The plant is boiled with water and the decoction is used to wash the wound.	Local people, Voids and Hakims	Incisions
25	<i>Coccinia grandis</i> (L.)	Kundari	Whole plant.	Boil the plants together with water. The decoction is then taken to treat wounds that refuse	Local people, Voids and Hakims	Lacerations

Ram and Ahmad

				to heal. Treatment of ulcers Wash it only put water and be drinking it.		
26	<i>Coriandrum sativum</i> (L.)	Dhaniya	Fruit.	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Incisions
27	<i>Datura fastuosa</i> (L.)	Dhatura	Leaf	Cooked with other herbs and used to treat internal wounds	Hakims and Vaid of regional area	Abrasion
28	<i>Echinops echinatus</i> (L.)	Utakanta	Root	Used in several ways thick pastes, oils are used for several antifungal treatments.	Local people, Vaid and Hakims	Cattle wounds
29	<i>Emblica officinalis</i> Geartn	Amla	Fruit and Leaf.	The juice is used. The juice is applied on fresh wounds.	Local people, Vaid and Hakims	Animal wounds
30	<i>Euphorbia hirta</i> (L.)	Dhudhi	Root	Squeezed with the juice of the leaves of botuje ( <i>Jatropha curcas</i> ) soaked in water. It is used in the treatment of internal ulcers. Treatment of ulcers Boil with water and drink preferably together with other herbs.	Local people, Vaid and Hakims	Animal wounds
31	<i>Euphorbia neriifolia</i> (L.)	Snuhi	Aquous extract of Latex	Treatment of wounds Wash the plant part and boil with water. The juice gotten is used to bath the affected part.	Hakims and Vaid of regional area	Animal wounds
32	<i>Euphorbia thymifolia</i> R.Br.	Dugdihika	Whole plant.	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Epidermal Human wounds
33	<i>Evolvulus alsonoides</i> (L.)	Shankpushpi	Fruit	Treatment of wounds Wash the plant part and boil with water. The juice gotten is used to bath the affected part.	Local people, Vaid and Hakims	Epidermal animal wounds
34	<i>Ficus benghalensis</i> (L.)	Bargad	Stem	Treatment of wounds Wash the plant part and boil with water. The juice gotten is used to bath the affected part.	Hakims and Vaid of regional area	Wounds of cattle
35	<i>Ficus glomerata</i> Roxb.	Gular	Whole plant and Root	Boil the plants together with water. The decoction is	Local people, Vaid and Hakims	Wounds of cattle

Ram and Ahmad

				then taken to treat wounds that refuse to heal.		
36	<i>Ficus hispida</i> Linn. F.	Kakodambara	Stem	Used in several ways thick pastes, oils are used for several antifungal treatments.	Local people, Vaid and Hakims	Animal wounds
37	<i>Ficus lacor</i> Buch. Ham.	Plaksha	Stem	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Local people, Vaid and Hakims	Human wounds
38	<i>Ficus religiosa</i> (L.)	Peepal	Stem, Leaf and Shoot	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Hakims and Vaid of regional area	Human wounds
39	<i>Gmelina arborea</i> Roxb.	Gamhar	Root and Leaf	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Animal wounds
40	<i>Gymnema sylvstre</i> R.Br.		Leaf	Leaves were ground and extracted in oil.	Local people, Vaid and Hakims	Animal wounds
41	<i>Heliotropium indicum</i> (L.)	Hatisura	Leaf	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Human wounds
42	<i>Hemidesmus indicus</i> R.Br.	Anantamul	Root	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Hakims and Vaid of regional area	Human wounds
43	<i>Ipomoea paniculata</i> R.Br.	Kushmanda	Root	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Human wounds
44	<i>Jasminum grandiflorum</i> (L.)	Chameli	Whole plant	Seeds were ground and extracted in oil.	Local people, Vaid and Hakims	Human wounds
45	<i>Jatropha curcas</i> (L.)	Psycic nut	Leaf	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Hakims and Vaid of regional area	Animal wounds
46	<i>Jatropha gossypifolia</i> (L.)	Ratnajot	Root, Stem, Leaf and Seed	Seeds were ground and extracted in oil.	Local people, Vaid and Hakims	Animal wounds
47	<i>Lagenaria vulgaris</i> Seringe	Bottle gourd	Seed	Used in several ways thick pastes, oils are used for several antifungal treatments.	Local people, Vaid and Hakims	Animal wounds

Ram and Ahmad

48	<i>Lantan camara</i> (L.)	Kuri	Whole plant	Used in several ways thick pastes, oils are used for several antifungal treatments.	Hakims and Vaid of regional area	Human wounds
49	<i>Lantan indica</i> (L.)	Umbels , verbena	Leaf	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Animal wounds
50	<i>Linum usitatissimum</i> Linn.	Alasi	Seed and Oil	Seeds were ground and extracted in oil.	Local people, Vaid and Hakims	Incisions and Avulsions
51	<i>Lippia nodiflora</i> Mich.	Jalapippai	Fruit	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Incisions and Avulsions
52	<i>Luffa acutangula</i> (L.)	Kritamul	Seed	Seeds were ground and extracted in oil.	Hakims and Vaid of regional area	Abrasion
53	<i>Madhuca indica</i> J.F.Gmel	Moha	Whole plant	Used in several ways thick pastes, oils are used for several antifungal treatments.	Local people, Vaid and Hakims	Laceration
54	<i>Mallottus philippinensis</i> Muell. Arg.	Kamal tree	Seed and Fruit	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Laceration
55	<i>Melia azedarach</i> (L.)	Bakain	Stem	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Local people, Vaid and Hakims	Abrasion
56	<i>Mimosa pudica</i> (L.)	Chui mui	Whole plant	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Abrasion
57	<i>Moringa oleifera</i> Lamk	Sahjan	Root	Roots were ground and extracted in oil.	Local people, Vaid and Hakims	Laceration
58	<i>Mucuna pruriens</i> Bak.(L.)	Kawatch	Root	Whole plants were ground and extracted in oil.	Hakims and Vaid of regional area	Incision
59	<i>Murryaya koenigii</i> Spreng(L.)	Kadipatta	Root	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Incisions
60	<i>Nardostachys jatamanshi</i> D.C.	Jatamanshi	Root	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Avulsions
61	<i>Nerium indicum</i> Mill.	Kaner	Root	Roots were ground	Local people,	Abrasions

Ram and Ahmad

				and extracted in oil.	Vaids and Hakims	
62	<i>Oscimum sanctum</i> (L.)	Tulsi	Leaf	Used in several ways thick pastes, oils are used for several antifungal treatments.	Hakims and Vaids of regional area	Avulsions
63	<i>Plumbago zeylanica</i> (L.)	Chitra	Root	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaids and Hakims	Abrasion and Avulsion
64	<i>Portulaca quadrifolia</i> (L.)	Lonia	Leaf	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaids and Hakims	Incisions and Avulsions
65	<i>Psidium guajava</i> (L.)	Amrud	Leaf	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaids and Hakims	Abrasion and Avulsion
66	<i>Rannunculus scleratus</i> (L.)	Celert leaved butter cup	Whole plant.	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Hakims and Vaids of regional area	Incisions and Avulsions
67	<i>Rubia cordifolia</i> (L.)	Maddur	Root	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Household ladies	Abrasion and Avulsion
68	<i>Salvia officinalis</i> (L.)	Sage	Whole plant.	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Domestic healers,	Incisions and Avulsions
69	<i>Saraca indica</i> (L.)	Ashoka	Stem	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Hakims and Vaids	Incisions and Avulsions
70	<i>Sesamum indicum</i> (L.)	Til.	Leaf, Seed and oil	Seeds were ground and extracted in oil.	Hakims and Vaids of regional area	Abrasion and Avulsion
71	<i>Shorea robusta</i> Gareth Ait	Sal	Stem, Seed, and Resin.	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaids and Hakims	Wounds of cattle
72	<i>Sida cordifolia</i> (L.).	Madder	Root	Roots were ground and extracted in oil.	Local people, Vaids and Hakims	Incisions and Avulsions
73	<i>Swertia chirata</i> Buch.Ham	Chireta	Stem and Leaf	Roots and leaves are air dried and	Local people, Vaids and	Wounds of cattle



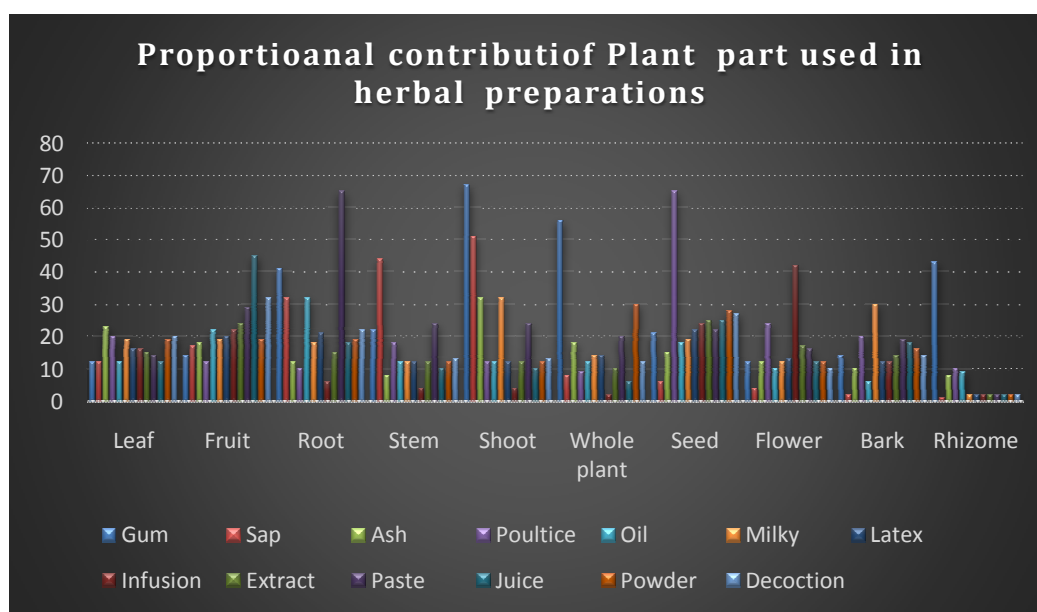
Ram and Ahmad

				ground to fine thereafter used for wound healing.	Hakims	
74	<i>Syzygium cumuni</i> Skeels.	Jamun	Stem and Fruit	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Abrasion and Avulsion
75	<i>Tagetes erecta</i> (L.)	Bhuidri	Flowers and Leaves	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	All epidermal injuries
76	<i>Terminalia arjuna</i> Bedd.	Kahu	Stem	Stem were ground and extracted in oil.	Hakims and Vaid of regional area	Incisions and Avulsions
77	<i>Terminalia chebula</i> Retz.	Haritki	Fruit	Used in several ways thick pastes, oils are used for several antifungal treatments.	Local people, Vaid and Hakims	Abrasion and Avulsion
78	<i>Terminalia belerica</i> Roxb.	Bibhitaka	Fruit	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	All epidermal injuries
79	<i>Trachyspermum ammi</i> (L.)	Ajwain	Seed	Seeds were ground and extracted in oil.	Local people, Vaid and Hakims	Wounds of cattle
80	<i>Tribulus terrestris</i> (L.)	Gokhru	Fruit	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Hakims and Vaid of regional area	Abrasion and Avulsion
81	<i>Trichosanthes dioica</i> Roxb.	Parwal	Leaf and Stem	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Incisions and Avulsions
82	<i>Tridax procumbens</i> (L.)	Ekdandi	Leaf	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Local people, Vaid and Hakims	All epidermal injuries
83	<i>Veronia anthelmintic</i> Willd.	Somraj	Seed	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Abrasion and Avulsion
84	<i>Eclipta alba</i> (L.) Syn: <i>Wedelia calendulacea</i> Less.	Bhringraj	Leaf	Leaves were ground and extracted in oil.	Hakims and Vaid of regional area	All epidermal injuries
85	<i>Withania somnifera</i> Dunal.	Ashwagandha	Tuber and Root.	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Wounds of cattle

Ram and Ahmad

86	<i>anthium saccharatum</i> Wallr.	Chhota gokhru	Root.	Roots were ground and extracted in oil.	Local people, Vaid and Hakims	Incisions and Avulsions
87	<i>Ziziphus jujube</i> (L.)	Ber	Root.	Roots were ground and extracted in oil.	Local people, Vaid and Hakims	Abrasion and Avulsion
88	<i>Eucalyptus globules</i> Labill.	Safeda	Oil	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Local people, Vaid and Hakims	All epidermal injuries
89	<i>Cissus quadrangularis</i> Roxb.	Hadjod	Whole plant	Squeezed then the juice is used in addition to other herbs.	Hakims and Vaid of regional area	All epidermal injuries
90	<i>Jasminum auriculatum</i> Vahl	Jasmine	Extracts of leaf and flower	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Wounds of cattle
91	<i>Butea monosperma</i> Lam.	Flame of the forest (Agha)	Alcoholic bark extract	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Local people, Vaid and Hakims	Abrasion and Avulsion
92	<i>Peperomia pellucida</i> (L.) Kunth	Pepper elder	Ethanol extract of leaf.	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Local people, Vaid and Hakims	Wounds of cattle
93	<i>Helianthus annuus</i> (L.)	Sunflower	Leaf, Seed, Flower and Root.	Whole plants were ground and extracted in oil.	Local people, Vaid and Hakims	Incisions and Avulsions
94	<i>Solanum xanthocarpum</i> Schard . & H. Wendl	Janglikateli	Ethanol extract of leaf and fruit.	Squeezed then the juice is used in addition to other herbs. It is used in the treatment of internal ulcers.	Hakims and Vaid of regional area	Abrasion and Avulsion
95	<i>Acacia Arabica</i> (L.)	Babul	Stem, Leaf, Fruit and Seeds	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	All epidermal injuries
96	<i>Boerhaavia diffusa</i> (L.)	Punarnava	Whole plant	Whole plants were ground and extracted in oil.	Local people, Vaid and Hakims	Wounds of cattle
97	<i>Tinospora cordifolia</i> (Wild) Miers	Giloy or Gaduchi	Stem	Boil the plants together with water. The decoction is then taken to treat wounds that refuse to heal.	Local people, Vaid and Hakims	Abrasion and Avulsion
98	<i>Citrus media</i> (L.)	Sweet oranges	Fruit	Root and leaves are air dried and ground to fine thereafter used for wound healing.	Local people, Vaid and Hakims	Wounds of cattle
99	<i>Murryaya koenigii</i> (L.)	Kadipatta	Root	Boil the plants together with water.	Hakims and Vaid of	Incisions and

				The decoction is then taken to treat wounds that refuse to heal.	regional area	Avulsions
100	<i>Celastrus paniculatus</i> Willd.	Jotismati	Seed	Used in several ways thick pastes,oils are used for several antifungal treatments.	Local people, Vaid and Hakims	Abrasion and Avulsion



**Proportional availability of plant part used in herbal preparations**

Graph 1: The above graph represents the proportional distribution of plant parts used in the region of Gopalganj; Bihar by the traditional health practitioners.

### DEMOGRAPHIC FEATURES OF INFORMANTS

Demographic features of the informants a total of 50 local informants including 37 males and 13 females were interviewed. Based on demography these informants were categorized into different categories. In the present survey male participants were higher than females. The prevalence of male informants is due to the fact that females of the study area were reluctant in conversation with male strangers (the interviewers), the local informants, Hakims of different zones of Gopalganj district. The traditional health practitioners (THPs) hold significant information on the medicinal uses of local plant species to treat various ailments. THPs were classified into five groups on the basis of their experience such as THPs having less than 1 years' experience (9), THPs with 2-5 years' experience (15), THPs of 6-10 years' experience (7), and above 10 years of experience (6) and 3 THPs have more than 20 years' experience. Among others, maximum informants having traditional knowledge regarding the use of medicinal plants were fall in secondary school education level or even below this and often spoke only Punjabi language. The maximum information was collected from the informants above 60 years age possess significant traditional knowledge whereas little information was shared by young respondents.

To evaluate highlights of the survey a sum of 50 nearby sources including 37 males and 13 females were met. In view of demography these sources were classified into various classifications. In the present overview male members were more in number than females. The pervasiveness of male witnesses is because of the way that females of the survey region were hesitant in discussion with male outsiders (the questioners). The customary wellbeing Practitioners (THPs) holds noteworthy data on the restorative employments of nearby plant species to treat different diseases. THPs were arranged into five gatherings based on their experience, for example, THPs having under 2 years' understanding (9), THPs with 2-5 years' understanding (15), THPs of 5-10 years' understanding (7), THPs of 10-20 years' understanding (6) and 3 THPs have over 20 years' understanding. Among others, most extreme sources having conventional information in regards to the utilization of restorative plants were fall in optional school

instruction level or even beneath this and regularly communicated in just Punjabi language. The most extreme data was gathered from the witnesses over 60 years age have huge customary information though little data was shared by youthful respondents.

Plant part(s) used, method of arrangement and application even however all plant parts are huge in the treatment of various afflictions; in any case in the present investigation as appeared in Fig.3, leaves were the most generally used plant part with 38% application in customary restorative plans, trailed by entire plant (14%), root (10%), stem (8%), organic product, seed, bloom (7% each), bark (5%), shoot and rhizome (2% each). [19, 20] also revealed leaves as regularly used plant part in natural prescription utilized by the occupants of islands and Italy. It has been accounted for that the utilization of leaves is better for the endurance of therapeutic plants gathered by cultivators contrasted with the assortment of entire plant, roots and stem, which may make extreme danger nearby greenery [21]. Even however some plant species, for example, p. what's more, *Ranunculus sceleratus* (L.) are consider as harmful; anyway used to treat different sicknesses by nearby occupants. It has been accounted for that plant species with strong bioactive mixes are regularly portrayed as toxic and therapeutic also, and an advantageous or an unfriendly outcome may relies upon technique for medicate arrangement and usage [22]. It was seen that occupants of the investigation territory use previously mentioned species in unassuming amount, along these lines no poisonous impact was referenced by respondents. Nearby occupants of the examination region utilize various techniques for example decoction, remove, juice, powder, glue, imbue, poultice, tea, and debris and so forth to set up a formula for the treatment of different sicknesses. Decoction was the most well-known strategy for medicate readiness (121 applications), trailed by powder, juice, glue, concentrate and imbue. Though, smooth latex and oil were utilized in 12 applications each, poultice in 10 applications, cooked nourishment, tea and debris with 5 applications each and plant sap with 2 applications. Such a wide exhibit of readiness techniques has additionally been accounted for beforehand from various parts of Gopalganj and in different plain regions of Bihar. The customary healers of the investigation region additionally utilize in excess of two plant species alongside different fixings for example milk, nectar, egg, spread, salt, sugar and water and so forth. The across the board utilization of decoction and powder in the examination territory is equivalent to [23,24] who revealed decoction as a most ordinarily used technique for planning followed by powder. Decoction is utilized as one of the significant practices to get ready medication in conventional mending framework, since it is anything but difficult to make by blending in with tea, water or soup. While making decoction, plant material is bubbled in water until volume of the water decreased to one-fourth of its unique volume [25], while unrefined concentrate is gotten by pressing or smashing the plant parts [26]. Plant part(s) used, method of readiness and application Even however all plant parts are noteworthy in the treatment of various diseases; all things considered in the present investigation as appeared in the writing, leaves were the most normally used plant part with 38% application in conventional therapeutic plans, trailed by entire plant (14%), root (10%), stem (8%), natural product, seed, bloom (7% each), bark (5%), shoot and rhizome (2% each). [19, 20] also detailed leaves as usually used plant part in natural drug utilized by the occupants of islands and Italy. It has been accounted for that the utilization of leaves is better for the endurance of therapeutic plants gathered by botanists contrasted with the assortment of entire plant, roots and stem, which may make extreme danger neighborhood verdure [21].

Even however some plant species, for example, are consider as toxic; anyway used to treat different sicknesses by nearby occupants. It has been accounted for that plant species with intense bioactive mixes are regularly portrayed as noxious and restorative too, and a useful or an unfavorable outcome may relies upon strategy for medicate planning and usage [22]. It was seen that occupants of the examination territory use previously mentioned species in unobtrusive amount, in this way no dangerous impact was referenced by respondents. Nearby occupants of the examination territory utilize various techniques for example decoction, extricate, juice, powder, glue, implantation, poultice, tea, and debris and so on to set up a formula for the treatment of different afflictions. Decoction was the most well-known technique for medicate planning (121 applications), trailed by powder, juice, glue, concentrate and implantation (76, 62, 45, 34 and 32 applications, separately). Though, smooth latex and oil were utilized in 12 applications each, poultice in 10 applications, cooked nourishment, tea and debris with 5 applications each and plant sap with 2 applications. Such a wide cluster of readiness strategies has likewise been accounted for beforehand from various parts of Nation. The conventional healers of the investigation zone additionally utilize in excess of two plant species alongside different fixings for example milk, nectar, egg, spread, salt, sugar and water and so forth. The across the board utilization of decoction and powder in the investigation territory is practically identical to [27] and [24] who revealed decoction as a most ordinarily used strategy for readiness followed by powder. Decoction is utilized as one of the significant practices to

get ready medication in customary recuperating framework, since it is anything but difficult to make by blending in with tea, water or soup [28].

## CONCLUSION

Usage of plants for therapeutic purposes in India has been recorded long back in old writing since they are basic for human endurance. Conventional therapeutic framework is broadly circulated in India. A significant extent of populace for the most part having a place with provincial zones is as yet subject to customary arrangement of meds for their different wellbeing needs. It is apparent that any arrangement of human services exclusively won't proficient to adapt up to the social insurance requests of open. In this manner, customary and social restorative information has a catalyzing impact in satisfying medicinal service requirements. There are various plants which have been accounted for their injury recuperating movement because of essence of important phyto-constituents. The majority of these examinations include arbitrary screening of plant or concentrates for wound mending action. Since in real analyses and utilization, all the plant items as referred to in the table have indicated effective outcomes, there are expanded needs to detach and research every dynamic fixing that has a positive job in the mending procedure.

The mix of customary and current information can deliver better medications for twisted mending with less reaction. Such kind of conventional information on plant can frame a reason for clinical, therapeutic, pharmacological and novel medication conveyance framework for wound healing items or applicers.

## ACKNOWLEDGEMENT

The authors gratefully acknowledge the necessary Laboratory facilities and constant supervision provided by the Department of Botany, Gopeshwar College, Hathwa for their generous support during the research work.

## REFERENCES

1. Etkin, N.L. (1988). Ethnopharmacology: bio-behavioral approaches in the anthropological study of indigenous medicines. *Annual review of Anthropology*, 17(1), 23-42.
2. Pan, S.Y., Zhou, S.F., Gao, S.H., Yu, Z.L., Zhang, S.F., Tang, M.K and Ko, K.M. (2013). New perspectives on how to discover drugs from herbal medicines: CAM's outstanding contribution to modern therapeutics. *Evidence-Based Complementary and Alternative Medicine*, 2013.
3. Saini S., Dhiman A and Nanda S. (2016). Traditional Indian medicinal plants with potential wound healing activity: a review. *International Journal of Pharmaceutical Sciences and Research*, 7 (5) pp.1809.
4. Gupta L.C., Gupta K. and Gupta A. (2008) *New Concise Medical Dictionary*. AITBS, Delhi.4 (3) pp.221-227.
5. MacKay D.J and Miller A.L. (2003). Nutritional support for wound healing. *Alternative medicine review*, 8(4) pp. 227-226.
6. Garg H.G. and Longaker, (2000). Scarless wound healing.p89.
7. James Q. and Rosso D. (2011). Wound care in dermatology office; *Journal of American Academy of Dermatology*; 9 pp. S1, 1-7
8. Bairy K.L. (2002). Wound healing potentials of plant products. *Journal of Natural Remedies*, 2(1) pp.11-20.
9. Singh A., Singh P., Singh G and Pandey A.K. (2014). Plant used in primary health practices in Vindhya Region of Eastern Uttar Pradesh, India. *International Journal of Herbal Medicine*, 2(2) pp.31-37.
10. Payyappallimana U. (2009). Role of traditional medicine in primary health care an overview of perspectives and challenges. *Yokohama Journal of Social Sciences*; 14(5) pp.51-77.
11. Ramya S., Alaguchamy N., Maruthappan V. M., Sivaperumal R., Sivalingam M., Krishnan A and Jayakumararaj R. (2009). Wound healing ethno-medicinal plants popular among the Malayali tribes in Vattal Hills, Dharmapuri, TN, India. *Ethnobotanical Leaflets*, 7(10) pp.6.
12. Mittal A., Sardana S. and Pandey A. (2013) Herbal boon for wounds. *International Journal of Pharmacy and Pharmaceutical Sciences*; 5 (6) pp.1-12.
13. Purna S.K and Babu M. (2002) Collagen wound dressing a review. *Burns*; 26 (4) pp.54-62.
14. Mukherjee P.K., Mukherjee K., Pal M., Saha B.P. (2000). Wound healing potential of *Nelumbo nucifera* (Nymphaeaceae) rhizome extract. *Phytomedicine* 7(3) pp. 66-73.
15. Cotton C. M and Wilkie P. (1996). *Ethnobotany: principles and applications* (No. Sirsi) Chichester: *John Wiley & Sons*.432 (2) pp.456-458.
16. Rasik, A.M., Raghbir, R., Gupta, A., Shukla, A., Dubey, M.P., Srivastava, S. and Kulshrestha, D. K. (1999). Healing potential of *Calotropis procera* on dermal wounds in Guinea pigs. *Journal of Ethnopharmacology*, 68(1-3) pp.261-266.
17. Martin T.E. (1995). A new medicinal plant life-history evolution tested on an incubation paradox. Proceedings of the Royal Society of London. *Series B: Biological Sciences*, 269(1488) pp.309-316.
18. Bradacs G., Heilmann J and Weckerle C.S. (2011) Medicinal plant use in Vanuatu: A comparative ethnobotanical study of three islands. *Journal of Ethno pharmacology*. 137 pp.434-448.

19. Leto C., Tuttolomondo T., La Bella S. and Licata M. (2013) Ethnobotanical study in the Madonie Regional Park (Central Sicily, Italy)-Medicinal use of wild shrub and herbaceous plant species. *Journal of Ethno pharmacology*, 146 (8) pp. 90-112. .
20. Zheng X.l and Xing F.W. (2009). Ethnobotanical study on medicinal plants around Mt. Yinggeling, Hainan Island, China. *Journal of Ethno pharmacology. A. Bioactive compounds in plants-Benefits and risks for man and animals. The Norwegian Academy of Science and Letters, Oslo*. 242 (8) pp.237-238.
21. Bernhoft A., (2010). A brief review on bioactive compounds in plants. *Bioactive compounds in plants-benefits and risks for man and animals*, 50, pp.11-17.
22. Sadeghi, Z., Kuhestani, K., Abdollahi, V and Mahmood, A. (2014). Ethno pharmacological studies of indigenous medicinal plants of Saravan region, Baluchistan, Iran. *Journal of ethnopharmacology*, 153(1) pp.111-118.
23. Boudjelal A., Henchiri C., Sari M., Sarri D., Hendel N and Benkhaled A. (2013) Herbalists and wild medicinal plants in M'Sila (North Algeria): An ethno pharmacology survey. *Journal of Ethno pharmacology*. 148. pp.395-402.
24. Ahmad L., Semotiuk A., Zafar M., Ahmad M., Sultana S., Liu Q.R., Zada M.P., Abidin S.Z.U and Yaseen G. (2015). Ethnopharmacological documentation of medicinal plants used for hypertension among the local communities of DIR Lower, Pakistan. *Journal of ethnopharmacology*, 175, pp.138-146.
25. Cechinel-Filho V. (2012). Plant bioactives and drug discovery: principles, practice, and perspectives, *John Wiley & Sons* 17 (2) 336-338.
26. Mehmood A, Ghulam, M., & Muhammad, N. (2013). Antibacterial and antifungal activity of *Dodonaea viscosa* (L.) Jacq., a wild plant of Azad Jammu and Kashmir. *International Journal of Biosciences (IJB)*, 3(9), 1-7.
27. Singh H., Husain T., Agnihotri P., Pande P.C and Khatoon S. (2014). An ethnobotanical study of medicinal plants used in sacred groves of Kumaon Himalaya, Uttarakhand, India. *Journal of ethno pharmacology*, 154(1) pp. 98-108.

#### CITATION OF THIS ARTICLE

A K Ram and Md. Sarfaraz Ahmad. Traditional Medicinal Plants of Gopalganj (Bihar) and Their Potential to Heal Wounds: A survey. *Bull. Env. Pharmacol. Life Sci.*, Vol 9[4] March 2020 : 74-87