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Full Length Research Paper

Traditional phytotherapy against skin diseases and in wound healing of the tribes of Purulia district, West Bengal, India

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An ethnobotanical survey was conducted in the remote hilly and tribal dominated areas of the Purulia district (West Bengal, India) to explore the traditional botanical uses against skin diseases and wound healing. Santhal, Bhumija, Munda, Oraon, Birhor, Mal Paharya, Kharia, Kharwar, Gond, and Ho represent the major ethnic groups residing in the area. A semi structured questionnaire was used to extract information from the informants who were mostly the traditional medical practitioners and knowledgeable villagers. A total number of 77 informants provided information on 33 plants having curative properties against the said ailments. Asteraceae and Lamiaceae were found to the predominant families, while leaves were noted as the most used plant part. Paste was found to be the most preferred method of formulation, whereas topical mode of administration was the most popular in disease treatment.

Key words: Ethnobotany, Purulia, tribes, skin diseases, wound healing.

INTRODUCTION

Botanicals have always served as a source of food, fodder, timber, fibre, and medicine for almost all tribal people residing all over the world. Plants, either as crude preparations or as isolated biomolecules, have been known to exhibit a plethora of pharmacological properties and have been attributed with antibacterial (Mukherjee et al., 2012), antifungal (Thevissen et al., 2000), anti-protozoan (Gachet et al., 2010), antiophidian (Ushanandini et al., 2009), antioxidative (Atawodi, 2005), anticancerous (Sundararajan et al., 2006), antidiabetic (Sabu and Kuttan, 2002), aphrodisiac (Mahajan et al., and antiinflamatory (Watzl, 2008) activities. Knowledge provided by the folk people has been evaluated by *in-vitro* and *in-vivo* pharmacological experiments in order to explore herbal remedy to reduce human pain and suffering. Adverse side effects, comparatively high cost and development of drug resistance are considered as the major negative aspects of using popular synthetic drugs. A huge number of ethnic communities worldwide depend on traditional medicine as a primary healthcare tool for themselves and their domesticated livestock. In the quest to alleviate human suffering, herbal remedies are considered as one of the important tools not only by the aboriginals of the third world, but a huge population of the developed countries are also utilizing the same in the treatment of various ailments.

Wound is a skin (dermal) injury which is often classified into open and closed types. Wound is further categorized

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into incised, laceration, puncture, acute, chronic, etc., depending on their cause and physiology (Nagori and Solanki, 2011). Skin infections are normally caused by various bacteria, fungi, and viruses. Atopic and contact dermatitis, warts, psoriasis, acne, condyloma, dermatophytes, chronic venous insufficiency, herpes simplex, etc., are considered among different types of skin diseases (SDs) (Millikan and Shrum, 1982; Reuter et al., 2010b, c). Medicinal plants are reported to have curative properties against SDs and in wound healing (WH).

Ethnobotany plays a crucial role among the tribal populations in ameliorating the harmful effects of SDs and also in WH. Traditional uses of botanicals against SD (Saikia et al., 2006; Joshi and Joshi, 2007; Abbasi et al., 2010) and WH (Villegas et al., 1997; Grierson and Afolayan, 1999; Khalil et al., 2007; Kumar et al., 2007; Ayyanar and Ignacimuthu, 2009) have been reported from different parts of the world. Some of the plants have been investigated pharmacologically for their efficacy against SD and WH (Villegas et al., 1997; Nayak and Pinto Pereira, 2006; Nayak et al., 2006, 2007a, b, 2008; Khalil et al., 2007). Positive and harmful effects of plant extracts on skin and in skin disorders have been discussed by Mantle et al. (2001) and Reuter et al. (2010a).

In this investigation, an ethnobotanical attempt was taken to explore the rich plant lore used by various ethnic groups residing in tribal dominated rural belts of Purulia district (West Bengal, India) in the treatment of various SDs and WH. The region, which is considered as one of the major representatives of the country's native tribes, has served as a prime attraction and working place for a number of ethnobotanical endeavours. Earlier, botanicals used by the folk people of this district against snakebite (Dey and De, 2012a), gastrointestinal disorders (Dey and De, 2012b) and in ethnoveterinary (Dey and De, 2010), have been recorded.

MATERIALS AND METHODS

Study area

The district is situated between 22°51'N and 23°42'N and 85°51'E and 86°54'E, covering an area of 6529 km^2 and altitudinal variation from 250 to 700 m above sea level. It is the westernmost district of the state, West Bengal, India (Figure 1). The temperature range is 7 to 48°C and the total annual rainfall approximates between 1240 and 1400 mm (Dey and De, 2012a, b). Santhal, Bhumija, Munda, Oraon, Birhor, Mal Paharya, Kharia, Kharwar, Gond, and Ho represent the major indigenous groups of people residing in the area. Due to extreme climate and scanty rainfall, agriculture in this area is poorly developed. Tribal and rural people mostly depend on forest products for livelihood and survival. To combat hunger on a day to day basis, forests serve as source of wild edible plants, especially the fruits. Besides, forests play a major role to provide timber and ethnomedicine to the poorest of the poor. Their ethnicity, socio-cultural lineage and religious and supernatural beliefs are deeply influenced by the dense forest and surrounding vegetation, extreme weather and rough terrain typical of the said area.

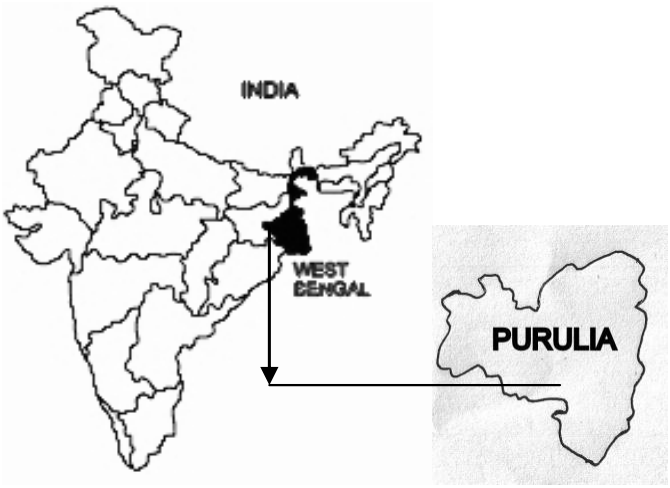

Figure 1. Map showing location of Purulia.

Survey

In order to explore the use of medicinal plants by the tribes of Purulia district, ethnobotanical surveys were conducted in villages. A standard ethnobotanical method was used as depicted by Dey and De (2010, 2012a). A semi structured questionnaire was administered to the traditional medical practitioners and the other knowledgeable people residing in the area. In the rural camps, following formal meetings, field visits were carried out to explore the plants *in-situ*. Photographic apparatus were used to document plants. Specimens were collected for herbarium preparation. The informants (a total number of 77; male: 59, female: 18) gave information regarding the local names, plant parts used, diseases treated, method of preparation and mode of administration. The informants were selected on the basis of their knowledge and tradition of ethnomedicinal practice. Formulations were found to be mostly monoherbal prepared in the forms of paste, juice, decoction or infusion. The paste was prepared by thrashing the herbs on a stone platform with little or no water, while the juice and the decoction were made with lots of water. An infusion was produced from steeping plants with healing ability. The data was verified and compared with the existing literature and the photographs and herbarium sheets were used to identify the plants with their families. The botanicals were identified from the reports covering the local flora (Prain, 1903; Paria and Chattopadhyay, 2000, 2005).

RESULTS

A total number of 33 medicinal plants belonging to 23 plant families were reported having claimed curative properties against SDs and WH by the tribes of Purulia district (Table 1). Asteraceae and Lamiaceae (4 each) represent the maximum number of plants followed by Malvaceae and Fabaceae (3 each). The remaining 19families are each represented by 1 member (Figure 2). Leaves were reported as the most popular plant part followed by others, such as whole plant, roots, stem, seeds, flowers, latex, and fruits (Figure 3). Paste as

Table 1. List of ethnobotanicals used against skin diseases and wound infection.

Scientific name	Family	Vernacular name(s)	Part(s) used	Used against	Method of preparation	Mode of administration
Achyranthes bidentata Blume	Amaranthaceae	Sitirkad	Whole plant	Boils	Paste	Topical
Ageratum conyzoides L.	Asteraceae	Tonka mani	Whole plant	Wormy skin sores	Infusion	Topical
Bauhinia variegata L.	Fabaceae	Dhaonro, Burunga	Flowers	Skin infections	Paste	Topical
Borreria hispida Spruce ex K. Schum.	Rubiaceae	Madanghanti, Satgithia	Leaves	Wounds	Paste	Topical
Byttneria herbacea Roxb.	Malvaceae	Kamraj, Idel sanga	Roots	Wounds	Paste	Topical
Bryophyllum pinnatum (Lam.) Oken	Crassulaceae	Marang upu, Patharkuchi	Whole plant	Recent wound	Juice	Topical
Caesulia axillaris Roxb.	Asteraceae	Ote kesam	Whole plant	Water sores	Paste	Topical
Calotropis procera (Aiton) W.T. Aiton	Apocynaceae	Chhoto akond	Leaves	Skin disease	Paste	Topical
Carica papaya L.	Caricaceae	Pipa	Latex	Skin irritations	Paste	Topical
Cipadessa baccifera (Roth) Miq.	Meliaceae	not found	Stem	Sores, wound	Ash	Topical
Cynodon dactylon (L.) Pers.	Poaceae	not found	Whole plant	Cut	Paste	Topical
Cyanoglossum glochidiatum Wall.	Boraginaceae	Latenga	Roots	Wounds	Paste	Topical
Exacum tetragonum Roxb.	Gentianaceae	Titakhana, Onda	Roots	Sores of leech bites	Paste	Topical
Ficus gibbosa Blume	Moraceae	Dare sahara	Stem	External injuries	Juice	Topical
Gmelina arborea Roxb. ex Sm.	Lamiaceae	Gamhar, Gambhair	Stem	Wounds	Paste	Topical
Hibiscus rosa-sinensis L.	Malvaceae	joba	Leaves, seeds	Burns	Paste	Topical
Hygrophila auriculata Heine	Acanthaceae	Bisahi, Dhela kanta	Roots	Wounds	Paste	Topical
Hyptis suaveolens (L.) Poit.	Lamiaceae	Dimbubo, Ganga tulsi	Whole plant	Dermal affections	Paste	Topical
Jatropha curcas L.	Euphorbiaceae	Bherenda, Kulajara	Seeds	Boils	Oil	Topical
Leea asiatica (L.) Ridsdale	Vitaceae	Sikni ba, Hom	Stem	Wounds	Paste	Topical
Litsea glutinosa (Lour.) C.B. Rob.	Lauraceae	Pojo, Chiur	Whole plant	Boils to ease out pus	Paste	Topical
Mimosa pudica L.	Fabaceae	Lajwati	Leaves	Fresh cuts	Paste	Topical
Nyctanthes arbor-tristis L.	Oleaceae	Seuli, Sansiari	Leaves	To smoothen rough skin	Fresh/Raw	Oral
Ocimum sanctum L.	Lamiaceae	Tulsi	Leaves	Skin disease	Decoction	Oral
Opuntia dilleni (Ker Gawl.) Haw.	Cactaceae	Phanimans, Nagphana	Roots	Body sores	Paste	Topical
Pongamia pinnata (L.) Pierre	Fabaceae	Koronjo, Karanj	Seeds	Skin diseases	Decoction	Topical
Schleichera oleosa (Lour.) Oken	Sapindaceae	Baru, Kusum	Seeds	Skin diseases	Oil	Topical
Semecarpus anacardium L. F.	Anacardiaceae	Soso daru	Fruits	Skin diseases, sores	Fresh/Raw	Topical
Sida cordata (Burm. f.) Borss. Waalk.	Malvaceae	Barial, Junka	Leaves, roots	Boils, fresh cuts	Paste	Topical
Spilanthes paniculata Wall. ex DC.	Asteraceae	Raipuru	Whole plant	Bleeding wound	Decoction	Topical
Shorea robusta Gaertn.	Dipterocarpaceae	Sal	Stem	Skin irritations	Paste	Topical
Vitex peduncularis Wall. ex Schauer in A. DC.	Lamiaceae	Oreij ata daru	Leaves	Wound	Paste	Topical
Tagetes patula L.	Asteraceae	Genda, Ganda	Leaves	Fresh cuts and bruises	Fresh/Raw	Topical

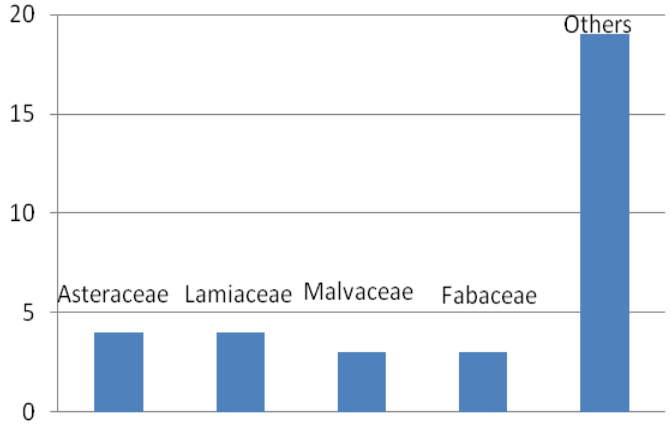

Figure 2. Family wise (number) distribution of ethnobotanicals.

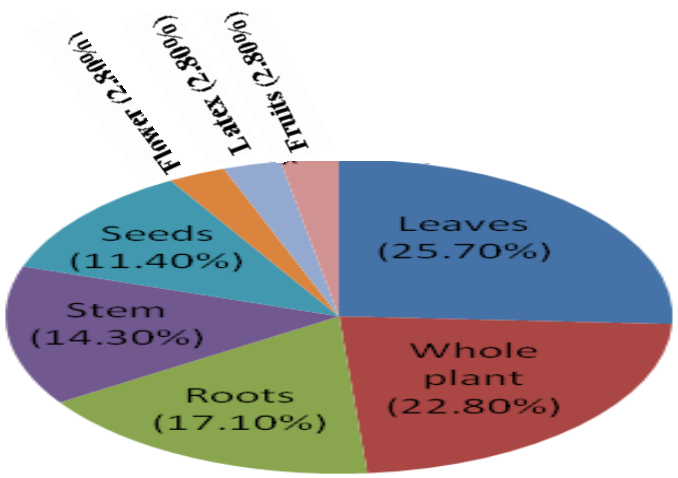

Figure 3. Percentage distribution of plant part(s) used as ethnomedicines.

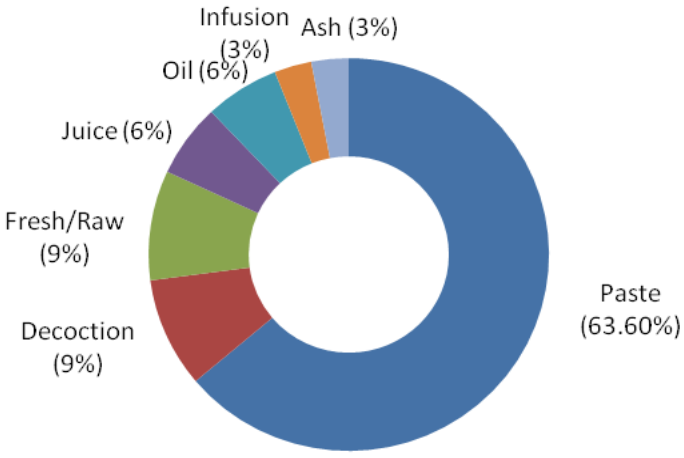

Figure 4. Percentage distribution of methods of preparation of ethnomedicines.

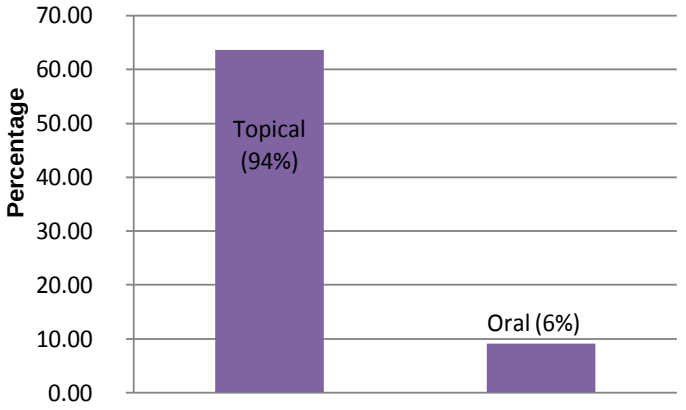

Figure 5. Percentage distribution of mode of administration of ethnobotanical formulations.

method of preparation and topical as mode of administration were preferred in preparing and applying the traditional formulations (Figures 4 and 5).

DISCUSSION

The aforementioned plants were found to be prescribed by local traditional medical practitioners. The dose of administration, especially for the oral mode, was found to be dependent on age, health and condition of the patient, disease-type, and severity of symptoms. Generally, the patients are advised to follow the medication regime strictly. Diet specifications are sometimes determined by the practitioners; otherwise, the patients are advised to follow normal diet. Patients suffering from chronic and large wounds are advised to stay out of sugar and candy temporarily. This applies particularly in case of the patients suffering from diabetes. Water sores (fungal infection of the skin caused due to excessive use of water) are very much prevalent in this locality and women are mostly affected due to their day long association with water. Men, on the other hand, are mostly affected by body sores caused by fungal and other pathogens. Ring worm is another common skin disease which affects the elders as well as the children. People are also affected by sores caused by leeches during the rainy season. Leprosy, a very common disease of the tropics (Lupi et al., 2006), causing severe wounds, affects the inhabitants of the rural parts of the district. Medicine men use some botanical remedies to relieve such patients. It was also worth to note that all herbal formulations were crude preparations. Several reports where bioactivity of herbal preparations is attributed to the synergistic activity of formulations support the idea which is being exploited in most traditional systems of medicine.

WH potential and anti-dermatological disorders activity of medicinal plants can be attributed to their antimicrobial,

Figure 6. Pharmacological perspective of reported ethnobotanicals.

Table 2. Pharmacological relevance of the ethnobotanicals used in WH and against SDs.

Medicinal plant	Relevant pharmacological efficacy
Achyranthes bidentata	Anti-inflammatory, anti oedema (Vetrichelvan and Jegadeesan, 2002)
Ageratum conyzoides	Antibacterial (related to wound healing) (Durodola, 1977), wound healing (Oladejo et al., 2003)
Bauhinia variegata	Antimicrobial (Pokhrel et al., 2002)
Bryophyllum pinnatum	Antimicrobial (Akinsulire et al., 2007), wound healing (Khan et al., 2004)
Calotropis procera	Wound healing (Rasika et al., 1999), anti-inflammatory (Arya and Kumar, 2005)
Carica papaya	Antibacterial (related to wound healing) (Dawkins et al., 2003)
Cynodon dactylon	Wound healing (Subramanian and Nagarajan, 1988)
Gmelina arborea	Wound healing (Shirwaikar et al., 2003), immunomodulatory (Shukla et al., 2010)
Hibiscus rosa-sinensis	Wound healing (Nayak et al., 2007b), antidiabetic (Moqbel et al., 2011)
Hygrophila auriculata	Antioxidative (Shanmugasundaram and Venkataraman, 2006)
Hyptis suaveolens	Anti-hyperglycemic (Mishra et al., 2011), anti-inflammatory (Grassi et al., 2006)
Jatropha curcas	Wound healing (Villegas et al., 1997; Shetty et al., 2006)
Litsea glutinosa	Antibacterial (Mandal et al., 2000)
Mimosa pudica	Wound healing (Kokane et al., 2009), antioxidative (Zhang et al., 2011)
Nyctanthes arbor-tristis	Anti-inflammatory (Saxena et al., 1984), immunostimulant (Puri et al., 1994)
Ocimum sanctum	Wound healing (Udupa et al., 2006; Goel et al., 2010), antioxidative (Shetty et al., 2008)
Opuntia dilleni	Antidiabetic (Zhao et al., 2011), anti-inflammatory (Ahmed et al., 2005)
Pongamia pinnata	Antioxidant, antimicrobial (Sajid et al., 2012)
Schleichera oleosa	Radical-scavenging (Thind et al., 2011)
Semecarpus anacardium	Antidiabetic, antioxidant (Khan et al., 2012a,b), wound healing (Lingaraju et al., 2012)
Shorea robusta	Wound healing (Wani et al., 2012)
Vitex peduncularis	Anti-inflammatory (Suksamrarn et al., 2002)
Tagetes patula	Antimicrobial (Faizi et al., 2008)

anti-inflammatory and immunomodulatory properties, antidiabetic and anti-hyperglycaemic activity, antioxidative, and free radical scavenging activities (Figure 6). Table 2 represents the relevant pharmacological efficacy of some of the presently investigated plants in relation to their WH and anti-SD potential. Interestingly, a significant correlation between ethnobotany and reported pharmacological investigations

were noted. This did not only indicate the efficacy of ethnomedicine prescribed by the tribal medicine men, it also encourages to take up ethnobotany as the starting point of any drug discovery programs subjected to *in-vitro* and *in-vivo* assays and rigorous clinical trials.

The authors have noted a trend of rapid disappearance of the traditional folk knowledge due to indiscriminate urbanization, pollution and opting out from traditional profession by the youth. This folkloric wealth must be preserved in order to conserve the age old practices which have provided a great source of medicine to the common man and served as a starting point of herb-based drug discovery programs. The traditional knowledge, plant lore and the inhabitants are to be used to formulate a way by which sustainable utilization of both the folklore and the botanicals, can be done, which in turn, will benefit the poor people residing in the area economically and may set an example to the rest of the world.

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