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OBSERVATION ON TRADITIONAL TREATMENT METHODS OF FURUNCLE & CARBUNCLE BY TRIBAL PEOPLE OF NORTH BENGAL PLAINS OF WEST BENGAL, INDIA

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ABSTRACT

Carbuncle and Furuncle are the skin infection mainly caused by the *Staphylococcus aureus* infection. Clinically the carbuncles are characterized as a red erythematous painful nodule with multiple overlying pustules filled with pus. It is treated with Antibiotic and often minor surgical process also may adopted to eradicate it, otherwise it shows a recurring occurrence. But the tribal people of North Bengal plain of West Bengal State, may cured this ailment following their purely plant based traditional healing process. In this present study an attempt is taken to discourse this traditional process of treatment of Carbuncle and 49 plant species belongs to 48 genera and 30 families were recorded from the 8 different tribal communities used profusely for the treatment of Carbuncle.

Keywords : Carbuncle, Furuncle, North Bengal, Traditional, Treatment Process.

Introduction

The plains of North Bengal is the northern part of the West Bengal state, lying south of the hills of Darjeeling district and of western Bhutan and stretches as far south as the river *Ganga*. This region comprising of Siliguri Subdivision of Darjeeling district, Jalpaiguri, Alipurduar, Koch Behar, Uttar Dinajpur, Dakshin Dinajpur and Maldah districts (Table - I). this flat montani track consists of Terai region of Darjeeling and the Duars regions of Jalpaiguri, Alipurduar and Koch Behar district, and it excluded the Purnea district of Bihar state in the West and Bangladesh in east and Northeast boundary (Map - I). This region receives a handsome amount of rainfall. The annual average rainfall is about 3900 mm. The summer is very hot, maximum temperature raised up to 38°C during the month of May. The winter seasons are comparatively very cool indeed. Minimum temperature during the month of December and January lowering down to 3°C in some places of Jalpaiguri, Alipurduar and Koch Behar districts. This damp warm climatic condition helps to develops here luxuriant diversified vegetation mostly dominated by the “*Sal*” mixed with others deciduous flora. The forest vegetation of this region mainly mixed deciduous types but the Terai region of the Darjeeling and the Duars region of Jalpaiguri, Alipurduar and Koch Behar districts have patches of evergreen forests. The riverine *Khair* – *Sissoo* forest of the Savannah vegetation and the dense jungle of shrubs creepers herbs are also available (Bandyopadhyay, 2004; Cown & Cown, 1929; Gamble, 1878; Mitra *et al.*, 2012; Praiun, 1903; Sikdar, 1981, 1984; Sikdar & Rao, 1984; Sikdar & Samanta, 1983)¹⁻⁹. This region also possesses diverse group of tribal people.

Among which the most important tribal group is the “*Toto*” – one and the only endemic tribe of the state resided at Totopara in the Madarihat sub-division of the Alipurduar district.

Furuncle (Boil) is a bump like big yellow, pus filled, and pimple on the skin. It caused by the bacterial infection of the hair follicle or the sebaceous gland of the skin. As it is deeply implanted in the skin and mostly caused an inflammation of the hair follicle or the sebaceous gland so it often termed as “deep folliculitis” or “perifolliculitis”. If several such Furuncles (Boils) are merged together to form a larger bump and they typically present as an erythematous, tender, inflammation nodule with multiple draining sinus tracts or pustules on the surface is called “Carbuncle” (Clebak, 2018; Eley & Gan, 1987; Feingold *et al.*, 1983; Hedrik, 2003; Roberts & Chamber, 2005; Stulberg *et al.*, 2002; Vandersteen, 1974)¹⁰⁻¹⁶. It may be solitary or multiple and mostly formed by Methicillin resistant *Staphylococcus aureus* infection (Trent *et al.*, 2001; Venkatasan *et al.*, 2017)¹⁷⁻¹⁸. But it may often developed by the anaerobic bacteria infection especially when it is recurrent and found in the anogenital region (Sanford *et al.*, 1994)¹⁹. The occurrence of Carbuncle are uncertain, but, there is a strong predilection for the nape, neck, face, and buttock maxillae and groin of the young to middle aged male and it is rather uncommon in the early childhood and in the female also (*l.c.*)¹²⁻¹³. Clinically the carbuncles are characterized as a red erythematous painful nodule with multiple overlying pustules filled with pus. But these systematic symptoms are not often mandatory to all cases. For the treatment normally bacterial culture is done with antibiotic resistant test before starting

antibiotic therapy and in some cases surgical methods to operate this carbuncle may also be followed to eradicate the carbuncle from its root as it deeply implanted in the skin.

With the development of the science and technology the Medical science reach a height. New drugs were discovered in a regular basis as a result the diseases which were incurable yester day are now curable today with the grace of these newly discovered synthetic drugs. Among these Antibiotics is the most important discovering of the 20th century undoubtedly. With the help of this group of drugs many bacterial infection can be mitigated (Bernord, 2008; Hirabayashi *et al.*, 2018; O' Dell, 1998)²⁰⁻²². However only one third of the infectious diseases can be treat by this antibiotic. Main reasons of this poor effectiveness of the antibiotic drugs are – primarily bacteria have the genetic ability to transmit and acquire resistance to drugs and secondarily these existing antibiotic agents are become ineffective to these newly emerging drug resistant microbial organisms. So, to use these antibiotic drugs against these pathogenic infectious microbes as a major weapon it is urgent needs to find out new source of antibiotic agents which are active against these drug resistant pathogenic microbial agents.

Till the beginning of the human civilization man totally depends on the nature for their every needs of their day to day life. Specially the tribal people collected their entire day to day needs from the nature. In the state West Bengal there are 42 tribal groups (7% in respect to the Indian Tribal Communities). These tribal people are resided in the remote rural areas of the state mostly in the forests lap where the modern facilities are least in their reach. They also treat their ailments by the herbal medicine. According to WHO about 80% of the world population are depends on the traditional medicine as it is proven safe and to be efficacious (WHO, 2009)²³. But, due to rapid pace of the westernization of the society all the tribal communities are give their traditional practices and avail the facility of the modern science in their life. So, their vast knowledge regarding the plant wealth is in the verge of lost. Moreover scrutiny of the literature (Joseph *et al.*, 2018; Mahato *et al.*, 2015; Mitra *et al.*, 2010; Veeneta *et al.*, 2021; Vina & Shoba, 2014)²⁴⁻²⁸ reveals that there is no such work has been carried out to collect information about the traditional treatment process of Furuncles and Carbuncles from this studied area. So, to save this wealth one and the only way to undertaken Ethnobiological trips in these tribal belt to collect and documents all the existing knowledge belongs with these tribal group of people before those are lost forever. With this goal this present work is taken into consideration.

Materials and Methods

To explore the usability of the medicinal plants for the treatment of the furuncle and carbuncle by the tribal of North Bengal plains several survey work has been taken into account during 2017 – 2019 in different tribal pockets of the study area (Table – I & II). All together 55 Informants were selected from 8 different tribal communities of different tribal villages of North Bengal plains (Table – III & IV). For determination of Longitude and Latitude Germin 74 GPS instrument is used in the field. Primary importance was given to select most of the informants above age of 45 Years and they were selected on the basis of a vivid discussion and suggestion of the village headman and by as informants using

purposive sampling method (Dolores & Tango, 2007)²⁹. Before interview Prior Informed Consent (PIC) were taken from all informants. A semi structured, open questionnaires were prepare to collect information about the Utility of the plants for Carbuncle & Furuncle (Jain & Mudgal, 1997; Trotter & Longan, 1983)³⁰⁻³¹.

During field trips all the information were collected along with the voucher specimens, which are later on treated as per standard methodology of herbarium technique (Das, 2020; Jain & Rao, 1977)³²⁻³³ and identified with the published literature (Prain, 1903; Mitra *et al.*, 2012; Anonymous, 1999 – 2020; Bennet, 1979, Guha Bakshi, 1984; Sanyal, 1997)^{1,9, 34-37}. The Herbarium made on the collected species is deposited at the departmental herbarium, vernacular name of each plant species is recorded carefully for future documentation. Emphasis is given on the tribal pharmacology, especially on the preparation, administration and dose of the drug. After primary report of the information all the data are crosschecked and then finalized them. Finally after a critical scrutiny of the information all the data are represented here in the table – V.

Quantitative Ethnomedicinal Data Analysis

In this present study of the different usable quantitative ethnobotanical tools used in to make the Ethnobotanical claim more profound (Haft, Barik & Lukke, 1999)³⁸, here Importance values (IV_s), is considered.

The Importance value (IV_s) measures the proportion of informants who regard a species as most important and is calculated as: $IV_s = N_{is} \div N$ [Where N_{is} = number of informants who consider the species as most important on and N = total numbers of informants].

It ranges from 0 – 1 and the value nearer to 1 indicated its applicability and authenticity. The IV value is given in the table – V

Result

Data obtained during the field study were enumerated in the Table – V

Discussion

North Bengal plains of the West Bengal state, is poorly developed in respects to its southern parts. But from the diversity of the vegetation and from the view point of the concentration of the ethnic people the scenario is just opposite to its southern halves. Tribal are mostly worshippers of nature and they depend on the natural resources mostly to meet up their day to day needs. So, for their different ailments tribal people of this area were used the herbals since past up till. Moreover, rural peoples of this region resided in a remote villages and modern medicinal facilities are less in their reach mostly to hurdle of remote condition and the poor financial background of the inhabitant of this region. As a result peoples depend on the traditional medicine most for treatment of their ailments.

During the fieldtrips it has been observed that, among the traditional healers of this region belongs to different tribal communities lacks a clear conception about the differences of Furuncle and Carbuncle. And they treated both the skin infection following the same infection process and also termed it in the same terminology *Phorah*. Though due socio – cultural differences of the different tribal community mode

of application is different but it is very interesting to note that all the medicines are for external application and out of the 62 prescription there is no preparation to intake to treat the carbuncle. All the information collected during the fieldtrips are analyzed and given in the table – V.

From the table – V, it is observed that, in the plains of Northern Bengal 49 Angiosperm plant species (42 – Dicots and 7 – Monocots), under 48 genera (41 – Dicots and 7 – Monocots) belongs to 31 families (26 – Dicots and 5 – Monocots) were used by 8 different tribal groups of people for the treatment of carbuncle. A detailed statistical analysis of the family, genera and species is given in the table – VI, Fig. – 1.

Among these 49 plant species herbaceous members (17) are most dominant plant forms followed by the Trees (16) and shrubs (12). Numerical analysis of the life forms of different plant species are given in the Fig. – 2.

Among all the tribal informants *Santals* are the most knowledgeable tribal group in the area as they provided highest numbers of information (15), followed by *Mech*, *Munda*, *Oraon* with 9 information each respectively, *Rabha* with 8 – information, etc. Tribe wise information is dealt in detail in the Table – III, fig. – 3.

From the view point of the usability of the plants it is very interesting to note that Fabaceae is the most diversified plant families with 5 Genera and Species respectively, followed by the Asteraceae (4), Apocynaceae, Malvaceae, with (3) each, Moraceae on the other hand is with 2 – Genera and 3 – species, etc. A detail conspectus of the family, genera and species and their usages are given in the table – VII, Fig. – 5.

It is also noted that for the treatment of carbuncle different plant parts are used of which leaves are used in most cases (16), followed by root & rhizome part (12) cases. A detail conspectus of use status of different plant parts for the treatment of Carbuncle is given in the fig. - 6

Cross – Culture Ethnobotany

Though the tribal people of the Northern Bengal plains possesses unique indigenous traditional knowledge for

utilization of their surroundings vegetable world to treat their ailments, but the process of treatment and the traditional knowledge is varied from one community to others. It is due to their socio – economic differences, their cultural practices and their traditional knowledge and beliefs. But in this present observation it is interestingly noted that there are multiethnic application of the 8 – plant species have been recorded (Table – V). Such applications of the plant species which are used for the treatment of the Carbuncle following the same preparation process by the multiethnic community simply enhance the authenticity of the drug.

Conclusions

It has been observed for a long period, that there is a profound knowledge gap regarding the traditional usages of the surrounding vegetable world between younger and older generations of different tribal communities throughout the state. It is because of the reason of rapid pace of westernization of the tribal societies. So, in this present study emphasis was given to collect the traditional knowledge regarding treatment of Carbuncle and Furuncle from different tribal communities of the North Bengal plains. It has been observed that a handsome numbers of 49 plant species has been recorded which are used for the treatment of Carbuncle and Furuncle. It is also very interesting to note that there are multiethnic utility of 8 – plant species which simply enhance the acceptability of the authenticity of the drug. The “IV” value of these plants species also justifies the same. A vivid perusal of the literature it is reveals that more or less all plant species are used in the treatment process possesses antimicrobial activity. As the microbial agents periodically become drug resistant due to their mutation and other factors hope these plants species after a proper screening may provide a new antibiotic molecule which will applicable to treat these resistant microorganisms and others wide range of microorganisms. Some plants species which are used for the treatment of the Carbuncle and Furuncle by the ethnic communities of this area without any known antimicrobial or bioactive molecule should placed under the scanner of the pharmacological test for determine its future acceptability.

Table I : District Profile of North Bengal Plains.

Sl. No.	Name of the District	Area	Longitude	Latitude	Population (Census, 2011)	
					Total	Density
1	Alipurduar	3,136 km ²	89°E to 89.9°E.	26.4°N to 26.83°N	1,491,250	480/km ²
2	Coochbehar	3,387 km ²	88°47'44" E to 89°54'35" E	25°57'47" N to 26°36'20" N	2,819,086	830/km ²
3	Darjeeling	2,092.5 km ²	87°59' E to 88°30'E	26°27' N to 27°13' N	1,595,181	760/km ²
4	Dakshin Dinajpur	2,162 km ²	88°20'E to 89° 30'E	24°20'N to 25°35'N	1,676,276	780/km ²
5	Jalpaiguri	3,386 km ²	88° 23'2" to 89° 7'30" E.	26° 15'47" to 26° 59'34" N	2,381,596	700/km ²
6	Kalimpong	1,044 km ²	88°28' to 88°53'E .	26°51' to 27°12' N	251,642	241/km ²
7	Maldah	3,733 km ²	87°45'50 E to 88°28'10 E.	24°40'20 N to 25°32'08 N	3,988,845	1,069/ km ²
8	Uttar Dinajpur	3,140 km ²	87°49' E to 90°00' E.	25°11' N to 26°49' N	3,007,134	958/km ²

Table II : Conspectus of District Wise Studied area

Sl. No.	Name of the District	Studied area	Longitude	Latitude	Elevation
1	Darjeeling & Kalimpong	Sukhna forest & its surrounding villeges.	88.28063965°E	26.647458 °N	130m
		Lower Bang Basti	88.38063965°E	26.747458 °N	185m
2.	Jalpaiguri & Alipurduar	Haldibari	88.780665 °E	26.33453 °N	74m
		Dhupguri	89.000614 °E	26.587000 °N	82m
		Lataguri	88.767910 °E	26.71830 °N	103m
		Nagrakata	88.917846679 °E	26.84735532 °N	184m
		Birpara	89.140319824 °E	26.72108039 °N	127m
		Totopara	89.75323 °E	26.8357066 °N	295m
		Buxa	89.61545376 °E	26.6484113 °N	123m
		Dakhshin Oldabari	88.612976074 °E	26.83632532 °N	145m
3	Coochbihar	Alipurduar	89.48638916015 °E	26.637639 °N	83m
		Chilapata	89.7943089 °E	26.8813771 °N	48m
		Sitalkunchi	89.18632507 °E		
		Kumarganj	88.742065429 °E	25.42343426 °N	31m
		Dinhata	89.4631456 °E	26.127963 °N	41m
		Patgram (Mekhliganj)	88.965911865 °E	26.33526847 °N	64m
4	Uttar Dinajpur	Tufanganj	89.66665579 °E	26.3139208 °N	38m
		Chopra (Sapnikla forest)	88.314564 °E	26.3588 °N	70m
		Islampur Village	88.24562072755 °E	26.23245427 °N	60m
		Karandighi	87.9867553711 °E	25.813491 °N	39m
5	Dakshin Dinajpur	Kulik	88.121337891 °E	25.675567834 °N	35m
		Tapan (Forest area)	88.564224243 °E	25.2800916 °N	31m
		Kumarganj Village	88.74275207 °E	25.4246717 °N	30m
		Kushmandi (Forest)	88.4262084961 °E	25.528811 °N	30m
		Hili Village	88.92539978 °E	25.2645685 °N	24m
6	Malda	Bamongola	88.38569641 °E	25.20618369 °N	35m
		Gajole Village	88.22227478 °E	25.21798713 °N	32m
		Adina forest	88.175411224 °E	25.14497382 °N	45m
		Mothabari	88.04014206 °E	24.93547903 °N	27m

Table III : Conspectus of the Informants

Sl. No.	Name of the Tribal Groups	Male	Female	Total	Total Numbers of Information Given
1	Keria	5	1	6	4
2	Mech	5	1	6	9
3	Munda	5	3	8	9
4	Oraon	6	2	8	9
5	Rabha	5	2	7	8
6	Rajbanshi	6	1	7	6
7	Santhal	7	4	11	15
8	Toto	2	-	2	2

Table IV : Age Group Distribution of the Informants

Sl. No.	Age Group Category	Age Group	Total Numbers of Informants belongs		
			Male	Female	Total
1	Young	> 45	4	-	4
2	Aged	< 45 - ≥60	11	6	17
3	Old	< 60	26	8	34
Total			41	14	55

Table V : List of Collected Plants used traditionally for the treatment of Carbuncle (Numerical Analysis of Collected Data)

Sl. No.	Scientific Name & Family	Local Name	Habit	Parts use	Tribes	Mode of Preparation	Use in Literature	IV
1	<i>Acacia catechu</i> Willd. Fabaceae	Khair	T	Bk	Me	Brak extract mixed with a paste of <i>Haldi</i> is applied for 7 – days.	Anti Haemorrhagic (43) & antileprotic (46)	0.06
2	<i>Achyranthus aspera</i> L. Amaranthaceae	Apang	H	Rt	Or	Fresh root made into paste with a pinch of camphor (<i>Karpur</i>) and the paste is applied on carbuncle once a day for 7 – 9 days.	Antibacterial activity (42)	0.04
3	<i>Acorus calamus</i> L. Araceae	Boch	H	Rh	Mu	Rhizomes are made into paste with <i>karpur</i> (camphor) and applied on the carbuncle to reduce the pain and for early suppuration.	Antimicrobial & Anti- fungal activity (43, 46)	0.07
4	<i>Ageretum conyzoides</i> L. Asteraceae	Kukursuka	H	Lf	Ra	Leaf paste is squeezed and the juice is applied on the carbuncle to hasten the healing.	Antimicrobial activity (12)	0.04
5	<i>Allium sativum</i> L. Amaryllidaceae	Lasun	H	St	Sa	Bulbous stem made into paste with a pinch full of <i>kalichun</i> (Calcium hydroxide) and applied on the infection site once a day for 3 days.	Antiulcer (27)	0.08
6	<i>Aloe vera</i> (L.) Burm. f. Asphodelaceae	Ghritokumari	Sh	Lf	Me	Fresh Leaves 1 – 2 are cut into pieces and the gel is extracted collected, this gel is applied on the infection site 3 – 4 times a day for 5 – days.	Antiulcer (27)	0.03
7	<i>Alstonia scholaris</i> (L) R. Br. Apocynaceae	Chattivam	T	Lt	Sa	Latex obtained after breaking the young leaves and twigs are warm gently and applied on the carbuncle to cure it.	Antibacterial activity (44)	0.07
8	<i>Alternanthera brasiliana</i> (L.) Kuntze Amaranthaceae	Lali	H	Wp	Or	Fresh whole plants (preferably in unflowered condition) is washed cleanly and crushed & squeezed, the extract thus obtained is warmed gently and applied on the painful infection site.		0.02
9	<i>Annona squamosa</i> Gaertn. f. Annonaceae	Ramphal	T	Lf	Ra	Fresh tender leaves 3 – 4, are made into paste with little <i>haldi</i> (rhizome of <i>Curcuma longa</i>). The paste so obtained is warmed and applied externally 2 – 3 times a day for 3 – 5 days.	Antimicrobial activity (27, 28)	0.04
10	<i>Artemisia nilagirica</i> (C. B. Clarke) Pomp. Asteraceae	Titapatti	Sh	Lf	Rj	Fresh leaves are crushed and squeezed the juice thus obtained is warm gently and applied on the carbuncle 3 – times a day to hasten the healing.	Antimicrobial activity (42)	0.03
11	<i>Artocarpus heterophyllus</i> Lam. Moraceae	Kanthal	T	Inf. Axis	Me	Inflorescence axis of the plant is made into paste with water. The paste thus obtained is warmed gently and applied on the infection site to reduce the infection.	Antibacterial (43)	0.02
12	<i>Asperagus racimosus</i> Willd. Asparagaceae	Satalu	Cl	Rt	Mu	Root made into paste with a little water and that paste applied on the infection site twice a day for 3 – 5 days.	Septic Ulcer healing agent (43)	0.04
13	<i>Averrhoa carambola</i> L. Averrhoaceae	Kamranga	T	Rt	Sa	Fresh root about 50g are made into paste with a few drops of water and that paste is applied once a day for 7 – days.		0.03
14	<i>Azadirachta indica</i> A. Juss. Meliaceae	Nim	T	Lf; Bk	Mu/ Rj/ Ra	Fresh leaves (@40g) are made into paste with <i>haldi</i> (Rhizome of <i>Curcuma longa</i>) and that is applied on the infected part twice a day for 5 – 7 days, by Munda and Rabha tribe. Stem bark (@10g) is made into paste with a little amount of water and that paste is applied on the infection site once a day for 3 – 5 days by the Rajbanshi tribe of the area.	Antimicrobial agents (27, 42,)	0.4
15	<i>Bauhinia vahlii</i> Wt. & Arnt. Fabaceae	Chihar naati	Cl	Fr	Sa	Young pods (2 – 3 pieces) are chopped into small fragment and boiled in water for 30 – 45 minutes it cooled and filtered. The filtrate is used to wash the carbuncle 2 – 3 times a day for 3 – 5 days to reduce infection.	Antimicrobial activity (18)	0.01

16	<i>Bombax ceiba</i> L. Malvaceae	Shimul	T	Bk	Sa	Fresh stem bark (@20g) made into paste with <i>Halud</i> (Rhizome of <i>Curcuma longa</i>) and a little <i>Karpur</i> (camphor) and a little water. The paste thus obtain is applied on the infection site to reduce the infection.	Used in boils (44)	0.2
17	<i>Bryophyllum pinnatum</i> Kurz. Crassulaceae	Patharkunchi	H	Lf	Sa	Fresh Leaves are made into paste with <i>Haldi</i> and applied on the infected part as poultice till recovery.	Antibacterial (44)	0.17
18	<i>Calotropis procera</i> (Ait. f.) Dryand Apocynaceae	Aakunda	Sh	Lf	Mu	Fresh leaves 3 – 5 are crushed and squeezed, the juice thus obtained is warmed gently and applied on the infected part to reduce the pain.	Antimicrobial (42)	0.09
19	<i>Cassia sophera</i> L. Fabaceae	Sonapatti	H	Sd	Or	Fresh seeds and made into paste with <i>Reri</i> oil (oil of the <i>Recinus communis</i> seeds oil), the paste thus obtained is warm gently and and applied on the carbuncle for early suppuration and cure.	Antibacterial (45)	0.08
20	<i>Centella asiatica</i> (L.) Urban Apiaceae	Thankuni	H	Lf	Rj	Fresh leaves (10 – 15) are boiled in water for 15 – 20 minutes. The aqueous extract thus obtained is used to wash the infected part 3 – 4 times a day. It is said that, it helps to reduce the infection.	Antibacterial & used in treatment of obstinate skin infection (43)	0.06
21	<i>Cotula anthemoides</i> L. Asteraceae	Aknadi	H	Lf	Ra	Fresh leaves (@10g) are made into paste and that paste is applied as poultice on the infected part till recovery.	Antimicrobial activity (28)	0.09
22	<i>Curculigo orchioides</i> Gaertn. Amaryllidaceae	Talmuli	H	Rt	Me	Fresh roots (@15g) are made into paste with a little <i>Karpur</i> and applied on the infected place to reduce the infection.	Antimicrobial activity (28)	0.06
23	<i>Curcuma caesia</i> Roxb. Zingiberaceae	Kalahaldi	H	Rh	Or	Fresh rhizome are crushed and squeezed, the juice thus obtained is warm and applied on the infected place to reduce the infection.	Antiprotozoal activity (43)	0.1
24	<i>Cuscuta reflexa</i> Roxb. Cuscutaceae	Sonalata	H	Wp	Me/Sa	About 50g of the plant made in to paste with leaves of <i>Neem</i> and <i>Halud</i> . The paste thus obtained is applied on the infected place to reduce the infection.	Antibiotic (44)	0.3
25	<i>Cyperus rotundus</i> L. Cyperaceae	Mutha	H	Rh	Sa	Fresh rhizome crushed and squeezed, the juice thus obtained is warmed and that warm juice is applied on the infected part to reduce the infection.	Anti inflammatory (43)	0.19
26	<i>Datura metel</i> L. Solanaceae	Dhatra	Sh	Sd	Rj	Seeds (@15g) and made into paste with a few drops of water and the paste is applied on the mouth of the carbuncle for early suppuration.	Anti inflammatory (43)	0.1
27	<i>Eupatorium ayapana</i> Vent. Asteraceae	Ayapaan	H	Lf	Ra/Rj/ Or	Fresh Leaves (@25g) are boiled in water for about 30 minutes and then make it cool. The while things are made into paste and applied on the	Antimicrobial activity (42)	0.29
28	<i>Ficus hispida</i> L. Moraceae	Dumur	Sh	Lat	Or/Mu	Stem of the plant is tapped with a sharp end instrument the milky latex oozing out is collect and after warming slightly applied on the mouth of the boils for early suppuration and quick healing.	Antimicrobial (45, 46)	0.21
29	<i>Ficus religiosa</i> L. Moraceae	Pipul/Pipli	T	Bk	Sa/Rj/ Or	Bark collected from the young portion of the stem are pounded and the paste is applied on the infected part to reduce the carbuncle infection and healing of the wounds	Antiseptic (43)	0.47
30	<i>Gmelina arborea</i> Roxb. Verbenaceae	Gamari	T	Tw	Me	Young twigs are made into paste and applied on the infected part to reduce the infection.	Antibiotic (46)	0.1
31	<i>Hemidesmus indicus</i> R. Br. Apocynaceae	Khirsni	Cl	Lf/St/ Rt	Me/ To/ Mu	Fresh Stem and Leaves in equal amount are made in to paste and that paste applied on the mouth of the carbuncle for early suppuration by the Mech and Munda tribe. Chikbarik people used the warm root paste on the carbuncle to release its pus.		0.27

32	<i>Hibiscus rosa-sinensis</i> L. Malvaceae	Jaba	Sh	Lf	To	Fresh leaves (@10g) are made into paste and then applied on the carbuncle mouth twice a day to reduce the infection.	Antibacterial (41)	0.03
33	<i>Justicia gendarussa</i> Burm. f. Acanthaceae	Rambasak	Sh	Lf	Kh	Fresh stem made into paste with <i>veri</i> oil and the paste is applied on the carbuncle twice a day till to cure.	Antibiotic (45, 46)	0.1
34	<i>Leucas aspera</i> (Willd.) Spreng Lamiaceae	Dandak	H	Wp	Kh	Tender plant are crushed and squeezed the juice thus obtained is warmed and the luke warm juice is applied on the Carbuncle mouth for early suppuration. It is applied 2 – 3 times a day for 4 days.	Antiseptic agents (43)	0.09
35	<i>Madhuca longifolia</i> (Konig.) J. F. Machr. Sapotaceae	Mahul	T	Bk	Sa	Stem bark made into paste and that paste is applied on the carbuncle as poultice at the bedtime for 3 days to cure the infection.	Antiulcer (27, 43)	0.16
36	<i>Melastoma malabathricum</i> L. Melastomataceae	Datrangi	Sh	Rt	Sa	The root bark is made into paste with a little lime. The paste is applied on the carbuncle as poultice at the bed time for 3 – successive days to cure it.	Antibacterial & Antiseptic (43, 45, 46)	0.18
37	<i>Moringa olifera</i> L. Moringaceae	Sajinu	T	Bk	Sa	Stem bark in fresh is made into paste and the paste is applied to stop bleeding from the carbuncle.	Antimicrobial (45, 46)	0.2
38	<i>Piper betle</i> L. Piperaceae	Paan patta	Cl	Lf	Me	Fresh tender leaves are smear with cow ghee and then put it on the flame of a lamp, it warmed and then it put on the mouth of the carbuncle and bandaged it over there till the pus of the carbuncle is not comes out.	Antiseptic (43)	0.09
39	<i>Pterocarpus santalinus</i> L. f. Fabaceae	Lal chandan	T	Bk	Sa	Fresh stem bark made into paste with a little <i>karpur</i> (camphor) and that paste is applied on the carbuncle twice or three times a day till curing.	Antiinflammatory (43)	0.2
40	<i>Ricinus communis</i> L. Euphorbiaceae	Reri	Sh	Sd	Me	5 – 7 seeds are made into paste with a little <i>handia</i> (Local rice beer) and then this paste is applied on the carbuncle three times a day to cure the carbuncle.	Antimicrobial (39)	0.1
41	<i>Shorea robusta</i> Gaertn. f. Dipterocarpaceae	Saal	T	Lf	Kh	Fresh leaves (@10g) are burned into ash. This ash made into paste with <i>veri</i> oil and it warm gently. It is then applied on the carbuncle as poultice at the bedtime for 3 – successive days to cure the carbuncle.	Antiseptic agent used in skin infection (43, 45, 46, 28)	0.1
42	<i>Sida cordifolia</i> L. Malvaceae	Berela	Sh	Lf	Me	Fresh leaves (@5g) are made into paste with <i>haldi</i> and cow milk. This paste is applied on the carbuncle for three times a day till cure.	Anti-inflammatory activity (45)	0.09
43	<i>Solanum nigrum</i> L. Solanaceae	Bon – begun	Sh	Sd	Ra	Dried seeds are made into paste with mustard oil and applied on the carbuncle 3 – 4 times a day to reduce the pain and also to excrete out the pus.	Hepatoprotective activity (45)	0.1
44	<i>Syzygium cumini</i> (L) Skeels Myrtaceae	Khudi jam	T	Sd	Kh	4 – 5 seeds are boiled in mustard oil for a brief time span. It filtered and the cooling down. This filtrate oil is applied for oil massage on the carbuncle infected place 4 – 5 times a day till cure.	Hypoglycemic activity (45, 46)	0.1
45	<i>Tamarindus indica</i> L. Fabaceae	Imli	T	Sd	Mu	Dried seeds are made into powder and that powder is made into paste with a few drops of water this paste is applied on the mouth of the carbuncle as poultice for early suppuration.	Anti inflammatory agent (43)	0.12
46	<i>Terminalia chebula</i> Retz. Combretaceae	Haritaki	T	Sd	Ra	Green fruits are broken to collect the immature seeds and then these seeds are dried and grounded into powder this powder is made into paste with warm cow-ghee and applied on the carbuncle two – three times a day till cure.	Antibacterial agent (40)	0.1

47	<i>Verbena officinalis</i> L. Verbenaceae	Niila ful	H	Upper portion	Mu / Ra	The entire above ground portion of the plant is made into paste and it applied on the carbuncle to reduce swelling and dominate the infection.	Antibacterial & anti inflammatory activity (45, 46)	0.21
48	<i>Vitex negundo</i> L. Verbenaceae	Nishinda	Sh	Tw	Sa/ Or/ Mu/ Ra	Twigs are made into paste and then this paste is applied on the carbuncle to hasten the healing process.	Anti microbial activity (45, 46)	0.62
49	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm Zingiberaceae	Banada	H	Rh	Mu/ Or	Rhizome is made into paste and that paste is applied on the carbuncle mouth 2 – 3 times a day till to cure.	Anti microbial activity (45, 46)	0.29

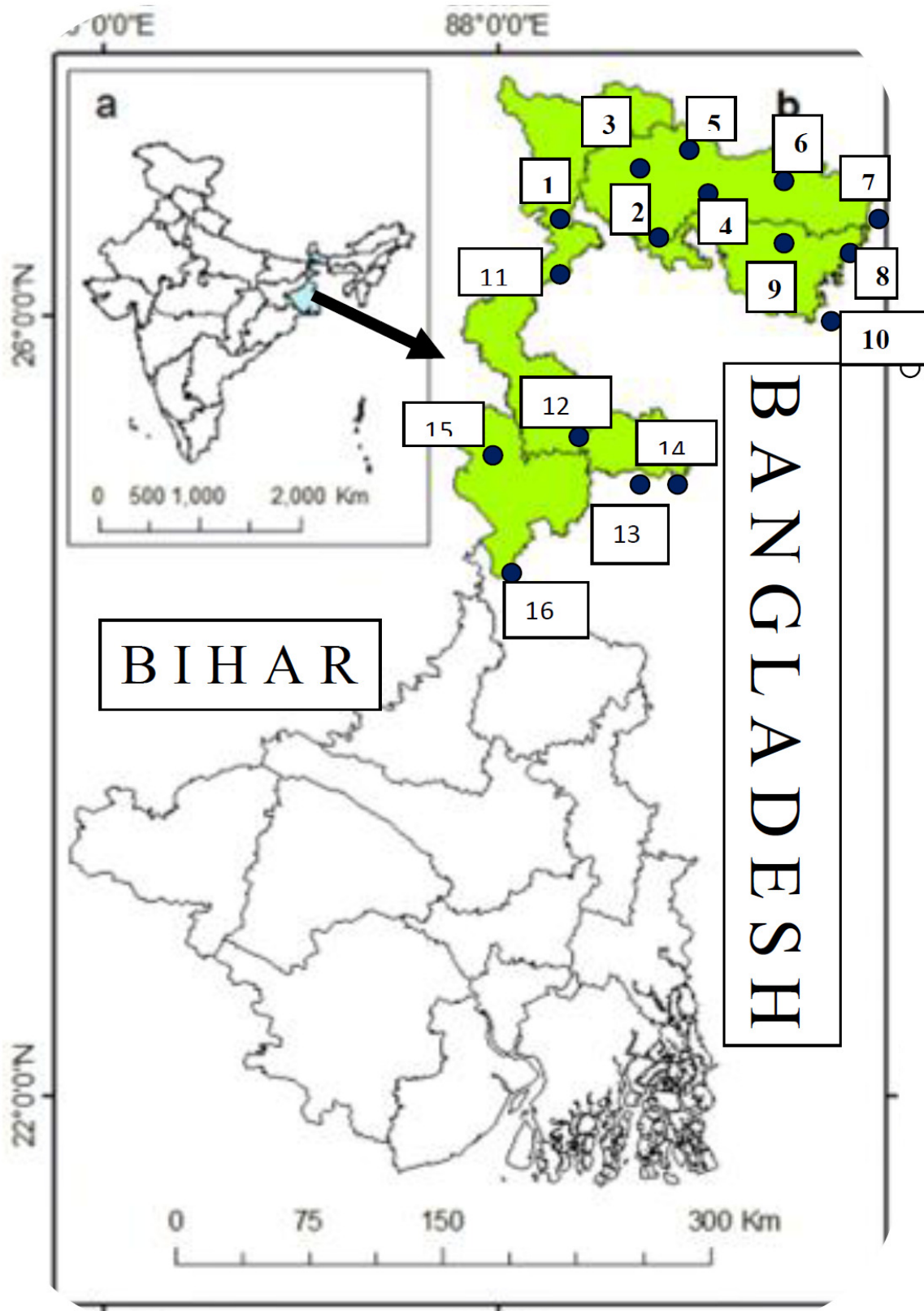
[H = Herb; Sh = Shrub; US = Undershrub; T = Tree; Rt = Root, Rh = Rhizome, St = Stem; Lf = Leaf; fl = Flower; Inf = Inflorescence; fr = Fruit; sd = Seed. Kh = Kheria; Me = Mech; Mu = Munda; Or = Oraon; Ra = Rabha; Rj = Rajbanshi; Sa = Santal, Po = Polley, T =Toto.]

Table VI : Conspectus of Family Genera Species used for treatment of Carbuncle

Sl. No.	Plant Group	Family	Genera	Species
1	Dicotyledons	25	41	42
2	Monocotyledons	5	7	7
Total		30	48	49

Table VII : Conspectus of Family, Genera and Species and their usability in Carbuncle

Sl. No.	Family	Genera	Species	Numbers of Usages
1	Acanthaceae	1	1	1
2	Amaranthaceae	2	2	2
3	Amarylladaceae	2	2	2
4	Annonaceae	1	1	1
5	Apiaceae	1	1	1
6	Apocynaceae	3	3	4
7	Araceae	1	1	1
8	Asparagaceae	1	1	1
9	Asphodelaceae	1	1	1
10	Asteraceae	4	4	4
11	Averhoaceae	1	1	1
12	Combretaceae	1	1	1
13	Crassulaceae	1	1	1
14	Cuscutaceae	1	1	1
15	Cyperaceae	1	1	1
16	Dipterocarpaceae	1	1	1
17	Euphorbiaceae	1	1	1
18	Fabaceae	5	5	5
19	Lamiaceae	1	1	1
20	Malvaceae	3	3	3
21	Melastomataceae	1	1	1
22	Meliaceae	1	1	1
23	Moraceae	3	3	3
24	Moringaceae	1	1	1
25	Myrtaceae	1	1	1
26	Piperaceae	1	1	1
27	Sapotaceae	1	1	1
28	Solanaceae	2	2	2
29	Verbanaceae	2	2	2
30	Zingiberaceae	2	2	2



Map – I : Map showing the studied area

Legend to the Map – I

- Districts of North Bengal plains Covered under present study
- Camp localities in the Tribal areas during field trips

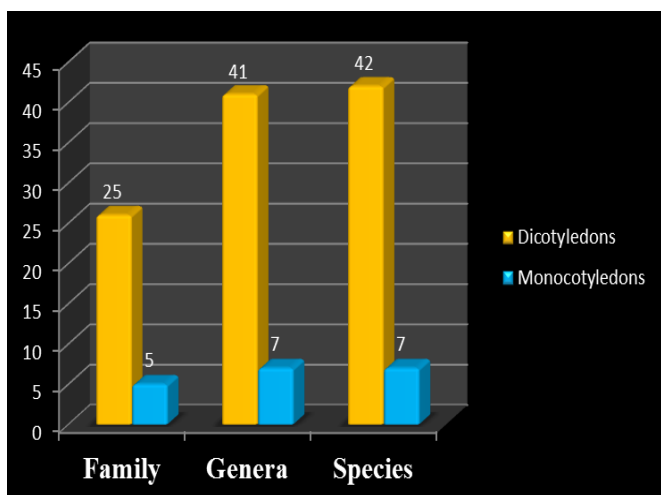


Fig. 1 : Statics of Family, Genera & Species with usages against Carbuncle

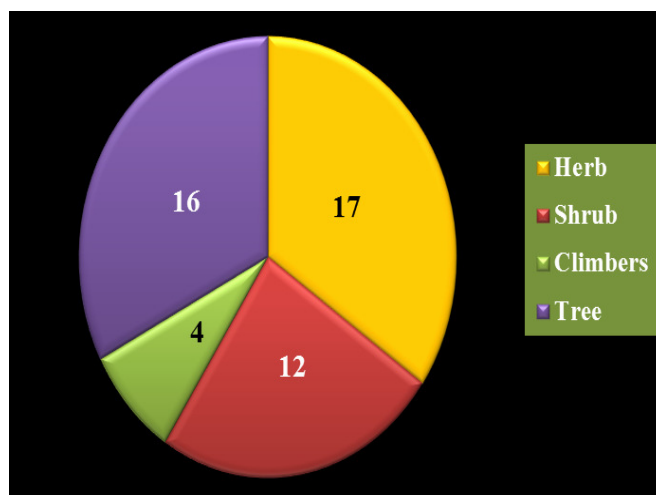


Fig. 2 : Numerical Analysis of the Life forms of Collected Plant Species

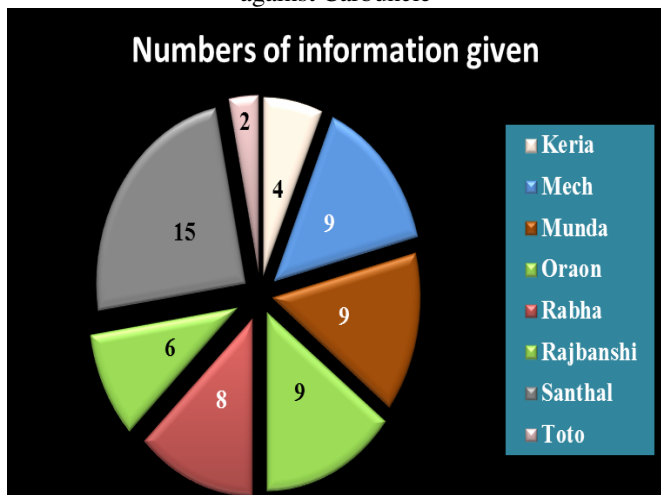


Fig. 3 : Numerical analysis of information given by different Tribal groups

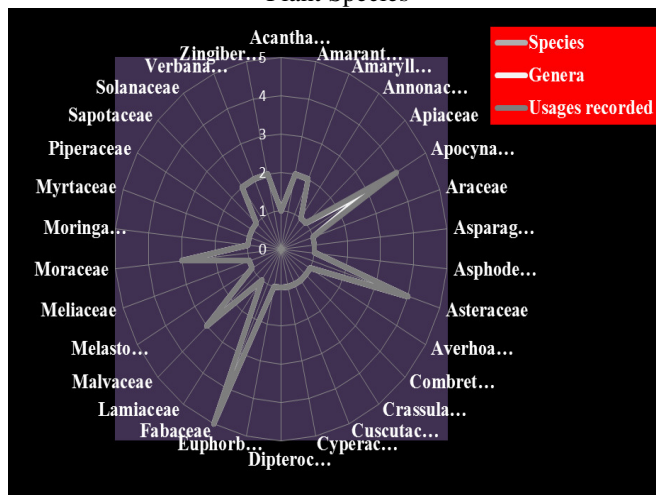


Fig. 4 : Conspectus of the Family, Genera & Species and their usability

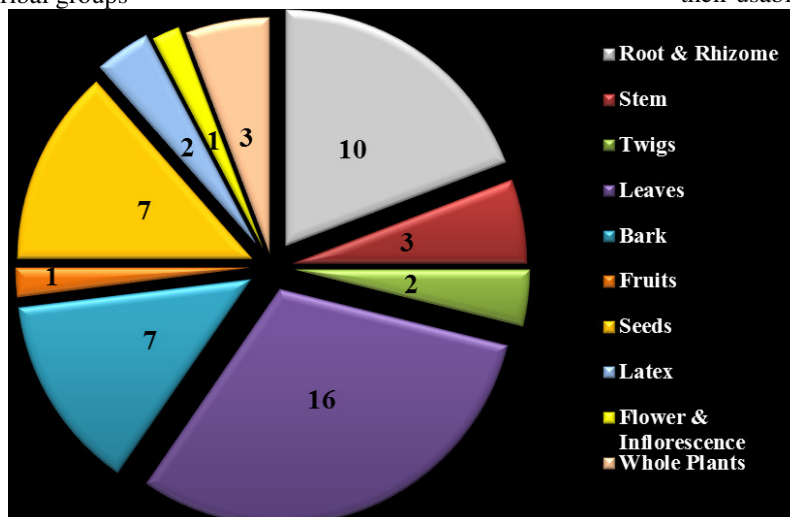


Fig. 5 : Conspectus of different Plant Parts used in Treatment Process

PLATE – I



Acacia catechu



Achyranthes aspera



Acorus calamus



Ageratum conyzoides



Allium sativum



Aloe vera



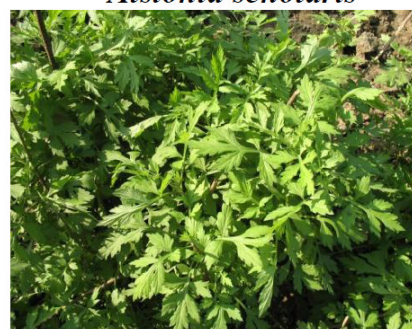
Alstonia scholaris



A. brassiliensis



Annona squamosa



Artemisia nilagirica



A. Heterophylla



A. racemosa



A. carambola



Azadirachta indica

PLATE – II



Bauhinia vahlii



Bombax ceiba



Bryophyllum pinnatum



Calotropis procera



Cassia sophera



Centella asiatica



Cotula anthemoides



Curculigo orchioides



Curcuma caesia



Cuscuta reflexa



Cyperus rotundus

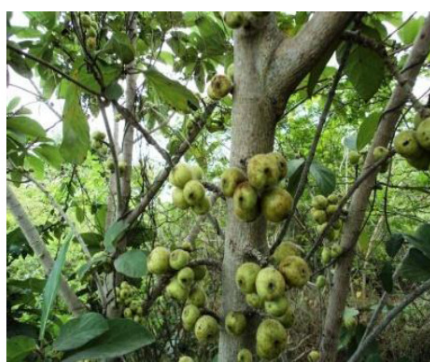


Datura metel

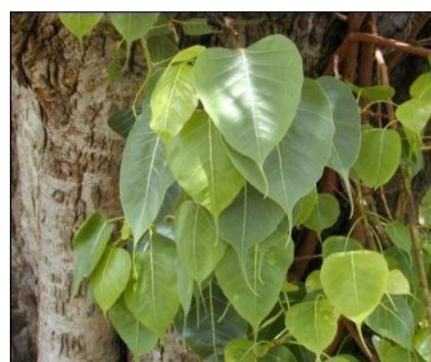
PLATE – III



Eupatorium ayapana



Ficus hispida



Ficus religiosa



Gmelina arborea



Justicia gendarussa



Moringa olifera



Melastoma malabathricum



Verbena officinalis



Zingiber zerumbet



Vitex negundu

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Conflict of Interest:

Authors have no conflict of interests.

Author(s) Contribution:

First author mainly carried out the field trips, collected data from the field, analyses the data, etc., the second author mainly helps in preparation of manuscript.

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