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Ethnomedicinal knowledge among the Tonchongya tribal community of Roangchaari Upazila of Bandarban district, Bangladesh

Md. Shahadat Hossan, Prozzal Roy, Syeda Seraj, Sadia Moin Mou, Mirza Nipa Monalisa, Sharmin Jahan, Tania Khan, Auditi Swarna, Rownak Jahan, Mohammed Rahmatullah

Faculty of Life Sciences, University of Development Alternative, Dhanmondi, Dhaka-1205, Bangladesh.

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ABSTRACT

The Tonchongyas are a small tribe residing in particularly the Roangchaari Upazila (sub-district) of the Bandarban district in Chittagong Hill Tracts Region of Bangladesh. They have many things in common with the predominant tribe of the region, the Chakmas, and it is sometimes said that the Tonchongyas are an off-shoot of the Chakma tribe. The Tonchongyas, however, claim themselves to be a different tribe. We have previously conducted an ethnomedicinal survey of the tribal practitioners of the Tonchongya tribe residing in Keyaju Para in Bandarban district in Bangladesh. Another community of this tribe was located in Roangchaari Upazila and more precisely in the villages of Bottoli Bazaar, Faruk Para, and Roangchaari Bazaar. It was of interest to conduct an ethnomedicinal survey among the tribal healers of this community to get a more complete coverage of the medicinal practices of this tribe, as well as to compare the medicinal practices of the two communities of the same tribe but residing in different areas. The eight tribal medicinal practitioners (TMPs) of the presently surveyed community used a total of 54 medicinal plants for treatment of a diverse variety of ailments. Ailments treated included common ailments or symptoms like coughs, cold, fever, urinary tract infections, gastrointestinal disorders like diarrhea or dysentery, pain, abscess, and skin diseases. But some of the ailments treated were more complicated like malaria, rheumatism, elephantitis, epilepsy, otitis, otalgia, hepatic disorders, gall bladder stones, and kidney diseases. Some plants were used as aphrodisiacs while other plants were used for treatment of esoteric disorders like mental sickness due to 'possession by ghosts or evil spirits'. Allopathic medicine can gain a lot from investigations into the medicinal plants of the Tonchongyas, and discovery of new medicines from extensive research with these plants may prove beneficial not only in having new treatments of diseases like malaria, but also treatment of possible psychological disorders like 'possession by ghosts or evil spirits'. The present survey also demonstrated large differences in the medicinal plants used and ailments treated by the TMPs of the Tonchongya community in our earlier survey. The differences highlight the importance of conducting ethnomedicinal surveys among all communities of Tonchongyas to obtain a comprehensive knowledge of their medicinal practices and whether such knowledge may have been influenced by interactions with other tribal communities residing in nearby areas.

Key words: Medicinal plants, Tonchongya, Roangchaari, Bangladesh

Introduction

Allopathic medicine or medicine that is mostly described as modern medicine owes a lot to observations of ethnomedicinal practices of indigenous communities throughout the world. Indigenous communities, indeed human beings from their advent, have relied on natural materials and particularly plant products for treatment and healing of diseases that have also afflicted human beings, right from the day of their advent. As such, indigenous communities have accumulated considerable knowledge in the medicinal properties of natural substances, and more so of the medicinal properties of various plant species. Close observations of medicinal practices of indigenous communities have resulted in the discovery of many modern drugs like atropine, reserpine, strychnine, quinine and artemisinin, to name only a few (Balick and Cox, 1996; Cotton, 1996; Gilani and Rahman, 2005). Such information from ethnic groups or indigenous traditional medicine has also played a vital role in the discovery of novel chemotherapeutic agents from plants (Katewa *et al.*, 2004). Despite the tremendous advancement of allopathic medicine in bringing relief to countless millions of people suffering in the world from manifold diseases, in recent years, there has been a resurgence of interest in traditional medicinal

Corresponding Author: Dr. Mohammed Rahmatullah, Pro-Vice Chancellor University of Development Alternative House No. 78, Road No. 11A (new) Dhanmondi R/A, Dhaka-1205 Bangladesh
 Phone: 88-01715032621; Fax: 88-02-8157339; E-mail: rahamatm@hotmail.com

systems, otherwise also known as alternative or complementary medicinal systems. This is because of a number of factors, like development of drug resistance to various allopathic medicines, as well as to adverse reactions associated with a number of allopathic drugs. Moreover, allopathic doctors and clinics are not available or affordable in many rural communities of the world, and such communities still rely on traditional medicinal systems as their first tier of primary health-care (Goleniowski *et al.*, 2006). Globally, about 85% of all medications for primary health care are derived from plants (Farnsworth, 1988).

Traditional medicinal systems exist in almost all countries of the world and it is said that such systems in various countries use more than 80,000 plant species for treatment of different diseases. However, such traditional medicinal practices suffer from lack of documentation or inadequate documentation. This is true for all countries of the world including Bangladesh, which has still a number of different traditional medicinal systems like Ayurveda, Unani, homeopathy, and folk medicinal systems, all of which systems have their practitioners, clients, and adherents. Side by side, the various tribes of Bangladesh also have their own individual tribal medicines, which vary widely from tribe to tribe in the nature of the ingredients used for treatment, although most such tribal practices rely heavily on medicinal plants for treatment. Since many of these tribes and folk medicinal practices are on the verge of disappearance, we had been conducting systematic ethnomedicinal surveys among the folk medicinal practitioners and TMPs for a number of years (Nawaz *et al.*, 2009; Rahmatullah *et al.*, 2009a-c; Chowdhury *et al.*, 2010; Hasan *et al.*, 2010; Hossan *et al.*, 2010; Mollik *et al.*, 2010a,b; Rahmatullah *et al.*, 2010a-g; Akber *et al.*, 2011; Biswas *et al.*, 2011a-c; Haque *et al.*, 2011; Islam *et al.*, 2011; Jahan *et al.*, 2011; Rahmatullah *et al.*, 2011a,b; Sarker *et al.*, 2011; Shaheen *et al.*, 2011; Das *et al.*, 2012; Rahmatullah *et al.*, 2012a-d). Our objective has been not only to document such practices before they get lost, but also to bring such practices to the attention of scientists so that appropriate scientific studies can be carried out on ingredients (primarily medicinal plants) leading to possible discover of newer and more effective drugs.

The Tonchongyas are a relatively small tribal community residing in the Chittagong Hill Tracts region in the southeastern corner of Bangladesh. Often they are confused with their more numerous neighbors, the Chakma tribe. In fact, the Chakmas claim that the Tonchongyas are an offshoot of the Chakmas, which claim is vigorously denied by the Tonchongyas, who claim that they are a separate ethnic group. The Tonchongyas' primary residence is in the hilly forested regions of the Bandarban district in the Chittagong Hill Tracts, where various communities of the Tonchongyas can be found scattered in different areas. We have previously conducted an ethnomedicinal survey of the tribal practitioners of the Tonchongya tribe residing in Keyaju Para in Bandarban district in Bangladesh. Another community of this tribe was located in Roangchaari Upazila and more precisely in the villages of Bottoli Bazaar, Faruk Para, and Roangchaari Bazaar, also in the Bandarban district. It was of interest to conduct an ethnomedicinal survey among the tribal healers of this community to get a more complete coverage of the medicinal practices of this tribe, as well as to compare the medicinal practices of the two communities of the same tribe but residing in different areas.

Materials and Methods

The area of study comprised of (I) Bottoli Bazaar, Roangchaari Upazila, Bandarban district, (II) Faruk Para, Roangchaari Upazila, Bandarban district, and (III) Roangchaari Bazaar, Roangchaari Upazila, Bandarban district. The Tonchongya communities residing in the afore-mentioned three villages had eight practicing TMPs or Vaidyas, whose details are given below.

1. Binot Chawndo, age 50, male, Bottoloi Bazaar
2. Roro Chawndro, age 56, male, Bottoli Bazaar
3. Lalliun Khum, age 42, male, Faruk Para
4. Laramthiprun, age 54, female, Bottoli Bazaar
5. Lunjum Chawndrao, age 66, female, Bottoli Bazaar
6. Salmubi Kasha, age 40, male, Bottoli Bazaar
7. Shoshivushan, age 79, male, Faruk Para
8. Zumlian Ampli, age 34, female, Roangchaari Bazaar

Informed consent was first obtained from the TMPs. The TMPs were told individually in details of the nature and purpose of our visit, and informed consent obtained to mention their names and any information obtained in any national or international publications. Several of the TMPs were quite fluent in the Bengali language, the language spoken by the mainstream population of Bangladesh including the interviewers. Other TMPs were not so fluent in the Bengali language, and conversations with them as well as detailed interviews took place through the Headman of individual Tonchongya communities, who by and large could all speak and understand fluently the Bengali language. Interviews were conducted with the help of a semi-structured questionnaire and the guided field-walk method of Martin (1995) and Maundu (1995). In this method, the TMPs

took the interviewers on guided field-walks through areas from where they obtained their medicinal plants, pointed out the plants and described their uses. Plant specimens were photographed and collected on the spot, dried, and later brought back to Dhaka for complete identification by Mr. Manjur-Ul-Kadir Mia, ex-Curator and Principal Scientific Officer of the Bangladesh National Herbarium.

Results and Discussion

The eight TMPs of the Tonchongya communities interviewed in the present survey used a total of 54 plants for treatment of various ailments. The results are shown in Table 1. Various parts of the plant were observed to be used including leaves, roots, barks, stems, and fruits. Some preparations included whole plants. In most cases, a single plant part was used for treatment of diverse ailments. For instance, the leaves of *Justicia adhatoda* were used to treat malaria, coughs, and cold. The leaves of *Calotropis gigantea* were used as emollient, as well as for treatment of elephantitis, pain, boils, and abscesses. Occasionally, two parts from the same plant were observed to be used for treatment of two or more different ailments. For instance, rhizomes of *Dioscorea belophylla* were taken in the form of curry for its astringent effect. The leaf juice of the same plant was taken orally for jaundice, but crushed leaves were applied topically as treatment for pain. These varying modes of treatment with different parts of the same plant, as well as the different modes of administration (oral versus topical) suggested an in-depth knowledge of the medicinal plants to be present among the TMPs.

In some cases, a combination of plants was used for treatment. For instance, for treatment of burning sensations during urination, frequent urination, urinary tract infections, and irregular urination, whole plants of *Celosia argentea* were mixed with roots of *Cyperus difformis*, young stems of *Curculigo orchioides* and female elephant's teeth, and small pills were made from the mixture. Two pills were advised to be taken 2-3 times daily and depending on the severity of the problem continued up to 6 days. A notable use in this case was use of an animal part, namely a female elephant's teeth within the ingredient mixture. Whether the use of such an animal part really had any beneficial effect or merely served as a placebo effect, remains to be determined scientifically. Another example of a formulation containing combination of plant parts was the combination of fruits of *Phyllanthus emblica*, *Terminalia bellerica* and *Terminalia chebula* for treatment of fever and body ache as well prescribed as an aphrodisiac and an energizer. Notably, the fruits of these three plants in combination are well known as Triphala in Ayurvedic medicine and also used in Ayurveda for multiple disease treatment as well as an energizer.

A number of plants/plant parts were used as aphrodisiacs and for treatment of urinary tract infections, suggesting that sexual problems and infections of the urinary tract may be common afflictions at least within these Tonchongya communities surveyed. Leaves and barks of *Alstonia scholaris*, infusion of fruits of *Phyllanthus emblica*, *Terminalia bellerica* and *Terminalia chebula*, whole plants of *Cuscuta reflexa*, leaves of *Desmodium motorium* were all used as aphrodisiacs. Similarly, for treatment of urinary tract infections, the various plants or plant parts used included whole plants of *Celosia argentea* (along with roots of *Cyperus difformis* and stems of *Curculigo orchioides*), leaves of *Desmodium laxiflorum*, seeds of *Hyptis suaveolens*, whole plants of *Lycopodium clavatum*, roots of *Melastoma malabathricum*, and roots of *Oxyspora paniculata*. That urinary tract infections may be common among the Tonchongya communities come as no surprise, considering the forest habitat and the generally unhealthy conditions of living. The same applies to prevalence of various gastrointestinal disorders including diarrhea (treated with *Eryngium foetidum*), and acidity, stomach ache, diarrhea (treated with *Alpinia nigra* or *Curcuma aromatica*). The forest habitat and the generally unhealthy conditions of living may also be responsible for the occurrence of various skin diseases (treated with a number of plants, e.g. *Bridelia scandens* or *Cassia alata*) as well as helminthiasis.

Some of the diseases treated by the Tonchongya TMPs are worth mentioning. Malaria was treated with *Justicia adhatoda* or *Eryngium foetidum*. In 2006, it was estimated that Bangladesh had 2.9 million malaria cases with 15,000 deaths (Alam *et al.*, 2010). Malaria is prevalent throughout Bangladesh, the highest prevalence being noted in the southeast and the northeast regions of the country (Chittagong and Sylhet Divisions, respectively). In a survey conducted in Khagrachari district in the southeastern part of Bangladesh, the average malaria prevalence was found to be 15.47% (Haque *et al.*, 2009a). It has been reported that Bangladesh has hypo-endemic malaria with *P. falciparum* as the dominant parasite species (Haque *et al.*, 2009b). Thus any of these two plants, if proved scientifically to be really effective against malaria as claimed by the Tonchongya TMPs can be beneficial for the whole world in isolating possibly new anti-malarial compounds. Rheumatism was treated by the Tonchongya TMPs with *Kalanchoe pinnata*. This disease has no known cure in allopathic medicine and as such, any compound capable of curing rheumatism can also prove beneficial to millions of human beings throughout the world, who suffer from this disease.

Diabetes is another disease which cannot be cured with allopathic medicine. The Tonchongya TMPs used *Cuscuta reflexa* and *Cassia fistula* to treat this disease. The anti-hyperglycemic activity of *Cuscuta reflexa* and *Cassia fistula* has been described (Rahmatullah *et al.*, 2010h; Nirmala *et al.*, 2008). The scientific results not only validated the Tonchongya TMPs use of these two plants for treatment of diabetes but suggest that the

plants may prove useful in the discovery of compounds, which if not effective in total diabetes cure, will be effective in the lowering of blood sugar levels, which is a clinical manifestation in diabetic patients. The TMPs used the plant *Entada phaseoloides* for treatment of skin cancer. As to the precise mechanisms how the TMPs diagnosed skin cancer or diabetes in the absence of any modern diagnostic procedures remain an open question. However, they claimed to know these two diseases and further claimed the efficacy of treatment with the aforementioned plants. The validity of the latter claim remains to be scientifically validated. However, three new compounds have been reported from this plant, two of which, namely, 2-hydroxy-5-butoxyphenylacetic acid and 2,5-dihydroxyphenylacetic acid methyl ester gave ED₅₀ values of 1.0 and 1.7 microg per ml, respectively, with cultured P-388 cells (Dai *et al.*, 1991).

Ailments treated with two of the plants, namely *Abroma augusta* and *Vitex negundo*, seemed to be esoteric in nature. The first plant was used for treatment of mental sickness 'due to possession by ghosts or evil spirits', while the second plant was used for treatment of fear due to 'evil spirits or ghosts'. Whether such beings exist or not is scientifically debatable. However, since the Tonchongyas live in forest areas where total darkness ensues at night whenever there is not sufficient moonlight, or even during sufficient moonlight (when the forest takes on an eerie appearance), such ailments might reflect the primordial fear of man of darkness, when human beings cannot see and may start imagining things. Notably, *Vitex negundo* has a very pungent odor, which odor is supposed to repel ghosts and evil spirits. Mustard oil, which also has a very pungent odor, is also occasionally used by the rural mainstream population of Bangladesh for the same purpose.

Solanum lasiocarpum, a plant used by the Tonchongya TMPs to treat syphilis is also used in the Philippines for the same purpose. *Oxyspora paniculata*, used by the Tonchongya TMPs to treat jaundice and urinary tract infection is used by the Adi tribe of Arunachal Pradesh of India for shining of teeth (Srivastava and Adi community, 2009). *Justicia gendarussa*, used by the Tonchongya TMPs for treatment of liver disorders and as an astringent, is used by the Mulla kuruma tribe of Wayanad district in Kerala, India for treatment of rheumatism (Silja *et al.*, 2008). *Sansevieria roxburghiana*, a plant used by the Tonchongya TMPs for treatment of ear infections and as an abortifacient, has been reported to be used by the Mali tribe of Munchingiputtu Mandal of Visakhapatnam district, Andhra Pradesh, India for treatment of dysentery, jaundice, malaria, and fever (Padal *et al.*, 2012). *Celosia argentea*, used by the Tonchongya TMPs for urinary tract infections and urinary disorders is reportedly used by the Konda Reddi and Koyas tribes of Khammam district of Andhra Pradesh, India for treatment of dysentery and diarrhea (Raju and Reddy, 2005). *Spondias pinnata*, used by the Tonchongya TMPs for treatment of wounds, otitis and otalgia, is used by the Tai Ahom tribe of Dibrugarh district, Assam, India for treatment of dysentery (Kalita and Phukan, 2010). The plant is also used by villagers around Gingee Hills of Villupuram district in Tamil Nadu, India for treatment of stomach ache (Muralidharan and Narasimhan, 2012).

Desmos chinensis is used by the tribals of Mizoram in northeast India for treatment of painful urination (Rai and Lalramnghinglova, 2010); the Tonchongya TMPs used this plant for treatment of nausea and dysentery. *Eryngium foetidum*, used by the Tonchongya TMPs for treatment of pain, diarrhea, and malaria is reportedly used by the Kurichya tribe of Kannur district, Western Ghats, Kerala, India for treatment of muscular pain (Rajith and Ramachandran, 2010). *Alstonia scholaris* was used by the Tonchongya TMPs for treatment of inflammation, fever, as antidote to poison, and as an aphrodisiac; the tribal people of Mizoram in India use this plant for treatment of wounds, boils, and ear ache (Bhardwaj and Gakhar, 2005), while the Santhal, Kolha, Bathudi, Kharia, Mankudia, Gond, and Ho tribes of Mayurbhanj district in Orissa, India use the plant for treatment of lice infestations (Rout and Panda, 2010). From the limited discussion (above), it appears that the use of the various plant species for treatment by the Tonchongya TMPs is more or less unique to this tribe. This only highlights the importance of conducting more ethnomedicinal surveys among other Tonchongya communities to get a fuller account of their ethnomedicinal plants.

The above point gets more importance if the survey results from a previous survey conducted among a Tonchongya community in Keyaju Para in Bandarban district (Rashid *et al.*, 2012) is compared with the present survey results. Of the 21 plant species obtained in the previous survey and the 54 plant species obtained in the present survey, only two plant species were found in common, and even then these two plant species were used for treatment of different diseases. The two plant species were *Cassia alata* and *Hyptis suaveolens*. But while the TMPs of Keyaju Para used *Cassia alata* for treatment of stomach pain due to bloating or indigestion, the TMPs of the present survey used the same plant species for treatment of ringworm, eczema, itch, scabies, and other skin diseases. Similarly, the TMPs of Keyaju Para used *Hyptis suaveolens* for treatment of diabetes, jaundice, and burning sensations during urination, the TMPs of the present survey used this plant for treatment of kidney diseases, urinary tract infections, dysuria, and as a laxative and cooling agent. The only common feature between the two treatments is urinary disorder. The results are shown in Table 2.

To conclude, the use of various plant species used by the Tonchongya TMPs in this survey (for treatment of various disorders) show unique features in the sense that such uses have not been recorded with the other Tonchongya community surveyed previously. A short analysis of ethnomedicinal uses of various plant species by a number of tribes in India (which is adjacent to Bangladesh) also shows that the presently surveyed

Tonchongya community uses plant species for treatment of different types of disorders than that noted for other tribes of India. It is therefore important to conduct ethnomedicinal surveys among all communities of the same tribe (even though they may reside in adjacent areas) to get a comprehensive picture of the traditional medicinal practices of the whole tribe. Also gathering of such detailed information opens up new pathways for scientists to study various pharmacological properties of any given plant species.

Table 1: Medicinal plants and formulations of the tribal medicinal practitioners of the Tonchongya tribal community residing in three villages of Roangchaari Upazila in Bandarban district, Bangladesh.

Serial Number	Scientific Name	Family Name	Local Name	Utilize Part	Ailment
1	<i>Justicia adhatoda</i> L.	Acanthaceae	Bondugi	Leaf	Malaria, coughs, cold.
2	<i>Justicia gendarussa</i> Burm.f.	Acanthaceae	Moghajam	Leaf	Liver disorder, astringent.
3	<i>Thunbergia grandiflora</i> Roxb.	Acanthaceae	But-taluri	Stem	Conjunctivitis, eye inflammation,
4	<i>Sansevieria roxburgiana</i> Schult. & Schult. F.	Agavaceae	Chondrokirchi	Leaf, root	Ear infection, abortifacient. Leaf is heated over a fire and then leaf juice collected which is applied to ear canal for ear infection. Roots are inserted into the vagina to induce abortion.
5	<i>Celosia argentea</i> L.	Amaranthaceae	Suichhang shak	Whole plant	Burning sensations during urination, frequent urination, urinary tract infections, irregular urination. Whole plants of <i>Celosia argentea</i> are mixed with roots of <i>Cyperus difformis</i> , young stems of <i>Curculigo orchoides</i> and female elephant's teeth and small pills made from the mixture. Two pills are taken 2-3 times daily and depending on the severity of the problem continued up to 6 days.
6	<i>Spondias pinnata</i> (L.f.) Kurz	Anacardiaceae	Aamagula	Fruit, bark	Vitamin source, wounds, otitis (inflammation or infection of the ear), otalgia (ear ache). Fruits are eaten as vitamin source. Juice obtained from macerated fruits and bark is applied to ears for otitis and otalgia.
7	<i>Desmos chinensis</i> Lour.	Annonaceae	Fualing-gait	Leaf, fruit	Nausea, dysentery.
8	<i>Eryngium foetidum</i> L.	Apiaceae	Sabung	Leaf/whole plant	Pain, diarrhea, malaria. Whole plant is taken as curry. Alternately, leaf juice is taken (one tea spoon for 4-5 days).
9	<i>Alstonia scholaris</i> (L.) R.Br.	Apocynaceae	Sechena	Leaf, bark	Aphrodisiac, antidote to poisoning, inflammation, fever.
10	<i>Calotropis gigantea</i> R.Br.	Asclepiadaceae	Aangaith	Leaf	Elephantitis, emollient, pain, boils, abscess. Leaf paste is rubbed on affected places.
11	<i>Begonia barbata</i> Wall. ex A.DC.	Begoniaceae	Shilterui (laal)	Whole plant	Irregular menstruation, dysmenorrhea (pain during menstruation), headache. Juice obtained from macerated whole plant is taken two tea spoons twice daily for 3 days.
12	<i>Begonia silhetensis</i> (A. DC.) C. B. Clarke	Begoniaceae	Shilterui (shada)	Whole plant	Irregular menstruation, dysmenorrhea (pain during menstruation), headache. Juice obtained from macerated whole plant is taken two tea spoons twice daily for 3 days.
13	<i>Oroxylum indicum</i> Vent.	Bignoniaceae	Kongcha-gula	Leaf, bark	Liver disease, arthritis, diarrhea, cicatrizant (wound healing).
14	<i>Terminalia belerica</i> (Gaertn.) Roxb.	Combretaceae	Boara	Fruit infusion	Aphrodisiac, energizer, fever, body ache. Infusion of fruits of <i>Phyllanthus emblica</i> , <i>Terminalia belerica</i> and <i>Terminalia chebula</i> is taken daily on an empty stomach on a regular basis.
15	<i>Terminalia chebula</i> Retz.	Combretaceae	Oittal	Fruit infusion	Aphrodisiac, energizer, fever, body ache. Infusion of fruits of <i>Phyllanthus</i>

					<i>emblica</i> , <i>Terminalia belerica</i> and <i>Terminalia chebula</i> is taken daily on an empty stomach on a regular basis.
16	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Crassulaceae	Jionpata	Leaf	Pain, boils, abscess, rheumatism, eczema. Crushed leaf or leaf paste is applied topically to affected areas of the body.
17	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Toruluri, Toinluri	Whole plant	Aphrodisiac, diabetes, anti-oxidant. Whole plant is taken orally in the form of chutney or curry.
18	<i>Cyperus difformis</i> L.	Cyperaceae	Daralek	Root	Burning sensations during urination, frequent urination, urinary tract infections, irregular urination. Whole plants of <i>Celosia argentea</i> are mixed with roots of <i>Cyperus difformis</i> , young stems of <i>Curculigo orchioides</i> and female elephant's teeth and small pills made from the mixture. Two pills are taken 2-3 times daily and depending on the severity of the problem continued up to 6 days.
19	<i>Dioscorea belophylla</i> (Prain) Haines	Dioscoreaceae	Khoiaa aalo	Leaf, rhizome	Astringent, jaundice, topical pain. Rhizome is eaten as curry. Leaf juice is taken for jaundice. Crushed leaves are applied topically to painful areas.
20	<i>Dioscorea wallichii</i> Hook.f.	Dioscoreaceae	Jabaul kochu	Leaf	Dandruff, itch on scalp. Leaf juice is applied to head.
21	<i>Antidesma acuminatum</i> Wall. ex Wight	Euphorbiaceae	Khurungait	Leaf	Arthritis, gout, snake bite.
22	<i>Bridelia scandens</i> (Roxb.) Wild	Euphorbiaceae	Seetalung	Leaf, root	Inflammation, scabies, dermatitis.
23	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Kalamala	Fruit infusion	Aphrodisiac, energizer, fever, body ache. Infusion of fruits of <i>Phyllanthus emblica</i> , <i>Terminalia belerica</i> and <i>Terminalia chebula</i> is taken daily on an empty stomach on a regular basis.
24	<i>Cassia alata</i> L.	Fabaceae	Dostolong	Leaf	Ringworm, eczema, itch, scabies, skin disease.
25	<i>Cassia fistula</i> L.	Fabaceae	Bandorsirole hupa	Leaf, root, fruit	Coughs, helminthiasis, diabetes, irregular urination, edema, constipation.
26	<i>Cassia sophera</i> L.	Fabaceae	Echihe	Leaf	Gall bladder stone. Leaves are eaten as vegetable. Alternately, juice obtained from crushed leaf is taken (half tea spoon) for 10 days.
27	<i>Desmodium laxiflorum</i> DC.	Fabaceae	Roghing	Leaf	Fainting, urinary tract infection, burning sensations.
28	<i>Desmodium motorium</i> (Houtt.) Merr.	Fabaceae	Turgimoton	Leaf	Aphrodisiac, loss of appetite, cicatrizant (wound healing), scabies.
29	<i>Ganoderma applanatum</i> (Pers.)	Ganodermataceae	Baghedud	Whole fungus	Energizer, anti-spasmodic, anti-oxidant.
30	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Milonipara	Young stem	Burning sensations during urination, frequent urination, urinary tract infections, irregular urination. Whole plants of <i>Celosia argentea</i> are mixed with roots of <i>Cyperus difformis</i> , young stems of <i>Curculigo orchioides</i> and female elephant's teeth and small pills made from the mixture. Two pills are taken 2-3 times daily and depending on the severity of the problem continued up to 6 days.
31	<i>Gomphostemma crinitum</i> Wallich ex Bentham	Lamiaceae	Dubahoksha	Root	Malaria, asthma, hepatic disorders. Infusion of root is taken orally for 3 days.
32	<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	Chungfulgait	Seed	Cooling agent, kidney disease, urinary tract infections, dysuria (painful urination), laxative. Seeds are soaked in water and taken as a drink.

33	<i>Leucas aspera</i> (Willd.) Link.	Lamiaceae	Dondo-upon	Root	Excessive menstrual bleeding. Juice obtained from macerated root is taken with table salt twice daily for 7 days.
34	<i>Ocimum sanctum</i> L.	Lamiaceae	Ranga tulshe	Leaf, root	Coughs, cold. Juice obtained from macerated leaves and roots is taken (one tea spoon) twice daily for 3-5 days.
35	<i>Asparagus racemosus</i> Willd.	Liliaceae	Shotmul	Leaf, root	Asthma, cough, cold.
36	<i>Lycopodium clavatum</i> L.	Lycopodiaceae	Jurbing	Whole plant powder	Urinary tract infections, irregular urination.
37	<i>Melastoma malabathricum</i> L.	Melastomataceae	Gach putti	Root	Urinary tract infection. Juice obtained from macerated root is taken (one tea spoon) with yogurt daily in the morning for 3 days.
38	<i>Oxyspora paniculata</i> DC.	Melastomataceae	Luri putti	Root	Urinary tract infection, jaundice. Juice obtained from macerated root (one tea spoon) is taken daily in the morning with yogurt for 3 days.
39	<i>Stephania japonica</i> (Thunb.) Miers	Menispermaceae	Patalput	Root	Pneumonia, cold, coughs, fever in children. Pill made from crushed root (one pill each time) is taken twice daily for one week.
40	<i>Entada phaseoloides</i> (L.) Merr.	Mimosaceae	Gilagait	Leaf, fruit	Energizer, skin cancer, wound healing.
41	<i>Passiflora foetida</i> L.	Passifloraceae	Gulahing	Fruit	Helminthiasis, asthma. Ripe fruits are eaten.
42	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Aagunijira	Leaf, flower	Dysmenorrhea, asthma, irregular menstruation.
43	<i>Drynaria quercifolia</i> (L.) J.Sm.	Polypodiaceae	Poshla	Rhizome	Epilepsy, skin disease, anti-bacterial. Pill made from rhizome is taken orally (one pill twice a day for 6-12 months).
44	<i>Mussaenda corymbosa</i> Roxb.	Rubiaceae	Aitgait	Young leaf	Arthritis, gout, joint pain. Crushed young leaves are warmed and applied or rubbed onto affected areas.
45	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Roapatakher	Leaf	Snake bite, insect bite, antidote to poison. Juice obtained from macerated leaves is topically applied for snake and insect bites and taken orally as antidote to poison.
46	<i>Solanum lasiocarpum</i> Dunal	Solanaceae	Betbiongula	Root, fruit	Syphilis, toothache, also eaten as food.
47	<i>Abroma augusta</i> L.f.	Sterculiaceae	Gaicchola	Flower	Mental sickness due to possession by ghosts or evil spirits.
48	<i>Buettneria pilosa</i> Roxb.	Sterculiaceae	Siamgaith	Leaf, root	Blood purifier.
49	<i>Grewia laevigata</i> Vahl	Tiliaceae	Khing-ar-khial	Fruit	Eaten as food, liver disease, dyspepsia.
50	<i>Vitex negundo</i> L.	Verbenaceae	Choinmain	Leaf	Fear due to evil spirits or ghosts, tranquilizer, headache, allergy. Leaves are kept or carried alongside the body.
51	<i>Cissus adnata</i> Roxb.	Vitaceae	Chamthorthegait	Root	Coughs, dyspepsia, asthma.
52	<i>Vitis sp.</i>	Vitaceae	Kangamelaw	Young leaf	Jaundice, burning sensations, dermatitis. Young leaves are eaten as curry following cooking with crabs as treatment for burning sensations or dermatitis. Leaf juice is taken for jaundice.
53	<i>Alpinia nigra</i> (Gaertn.) B.L.Burt	Zingiberaceae	Palek	Young stem, rhizome	Gastrointestinal disorders (acidity, stomach ache, diarrhea), sudden bouts of faintness, vertigo. Juice obtained from macerated young stem and rhizome mix is taken with table salt twice daily for 7 days.
54	<i>Curcuma aromatica</i> Salisb.	Zingiberaceae	Palek	Leaf, rhizome	Gastrointestinal problem, acidity, stomach ache, fainting, vertigo, diarrhea, asthma. Juice obtained from macerated mix of leaf and rhizome is taken orally.

Table 2: Comparison of medicinal plants used by the Tonchongya TMPs of Keyaju Para (earlier study) versus the Tonchongya TMPs in the present survey.

Plant (previous study)	Family	Plant (present survey)	Family
		<i>Justicia adhatoda</i>	Acanthaceae
		<i>Justicia gendarussa</i>	Acanthaceae
		<i>Thunbergia grandiflora</i>	Acanthaceae
<i>Acorus calamus</i>	Acoraceae		
		<i>Sansevieria roxburghiana</i>	Agavaceae
		<i>Celosia argentea</i>	Amaranthaceae
		<i>Spondias pinnata</i>	Anacardiaceae
		<i>Desmos chinensis</i>	Annonaceae
		<i>Eryngium foetidum</i>	Apiaceae
		<i>Alstonia scholaris</i>	Apocynaceae
<i>Holarrhena antidysenterica</i>	Apocynaceae		
		<i>Calotropis gigantea</i>	Asclepiadaceae
<i>Chromolaena odorata</i>	Asteraceae		
<i>Mikania cordata</i>	Asteraceae		
<i>Spilanthes paniculata</i>	Asteraceae		
		<i>Begonia barbata</i>	Begoniaceae
		<i>Begonia silhetensis</i>	Begoniaceae
		<i>Oroxylum indicum</i>	Bignoniaceae
		<i>Terminalia belerica</i>	Combretaceae
		<i>Terminalia chebula</i>	Combretaceae
<i>Ipomoea quamoclit</i>	Convolvulaceae		
		<i>Kalanchoe pinnata</i>	Crassulaceae
<i>Brassica juncea</i>	Cruciferae		
		<i>Cuscuta reflexa</i>	Cuscutaceae
		<i>Cyperus difformis</i>	Cyperaceae
		<i>Dioscorea belophylla</i>	Disocoreaceae
		<i>Dioscorea wallichii</i>	Dioscoreaceae
<i>Diplazium esculentum</i>	Dryopteridaceae		
		<i>Antidesma acuminatum</i>	Euphorbiaceae
		<i>Bridelia scandens</i>	Euphorbiaceae
		<i>Phyllanthus emblica</i>	Euphorbiaceae
<i>Cajanus cajan</i>	Fabaceae		
<i>Cassia alata</i>	Fabaceae	<i>Cassia alata</i>	Fabaceae
		<i>Cassia fistula</i>	Fabaceae
		<i>Cassia sophera</i>	Fabaceae
<i>Derris elliptica</i>	Fabaceae		
<i>Desmodium alata</i>	Fabaceae		
		<i>Desmodium laxiflorum</i>	Fabaceae
		<i>Desmodium motorium</i>	Fabaceae
		<i>Ganoderma applanatum</i>	Ganodermataceae
		<i>Curculigo orchiooides</i>	Hypoxidaceae
		<i>Gomphostemma crinitum</i>	Lamiaceae
<i>Hyptis suaveolens</i>	Lamiaceae	<i>Hyptis suaveolens</i>	Lamiaceae
		<i>Leucas aspera</i>	Lamiaceae
<i>Ocimum americanum</i>	Lamiaceae		
		<i>Ocimum sanctum</i>	Lamiaceae
<i>Cinnamomum camphora</i>	Lauraceae		
		<i>Asparagus racemosus</i>	Liliaceae
		<i>Lycopodium clavatum</i>	Lycopodiaceae
<i>Sida rhombifolia</i>	Malvaceae		
		<i>Melastoma malabathricum</i>	Melastomataceae
		<i>Oxyspora paniculata</i>	Melastomataceae
		<i>Stephania japonica</i>	Menispermaceae
		<i>Entada phaseoloides</i>	Mimosaceae
<i>Ficus hispida</i>	Moraceae		
		<i>Passiflora foetida</i>	Passifloraceae
<i>Plantago ovata</i>	Plantaginaceae		
		<i>Plumbago zeylanica</i>	Plumbaginaceae
<i>Thysanolaena maxima</i>	Poaceae		
		<i>Drynaria quercifolia</i>	Polypodiaceae
		<i>Mussaenda corymbosa</i>	Rubiaceae
		<i>Scoparia dulcis</i>	Scrophulariaceae
<i>Smilax zeylanica</i>	Smilacaceae		
		<i>Solanum lasiocarpum</i>	Solanaceae
		<i>Abroma augusta</i>	Sterculiaceae
		<i>Buettneria pilosa</i>	Sterculiaceae
		<i>Grewia laevigata</i>	Tiliaceae
<i>Clerodendrum viscosum</i>	Verbenaceae		
		<i>Vitex negundo</i>	Verbenaceae

		<i>Cissus adnata</i>	Vitaceae
		<i>Vitis sp.</i>	Vitaceae
		<i>Alpinia nigra</i>	Zingiberaceae
		<i>Curcuma aromatica</i>	Zingiberaceae

Common plant names are indicated in bold lettering.

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