

Research Article

Phyto and Zootherapeutic Practices of a Marma Tribal Healer in Bandarban District, Bangladesh

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Abstract

The Marmas form the second largest tribal group in the Chittagong Hill Tracts (comprising of Bandarban, Cox's Bazaar, Khagrachaari and Rangamati districts) in the southeast corner of Bangladesh. Although their lifestyle is changing fast because of the introduction of modern amenities, they still attempt to stay in their forest habitat albeit with frequent contacts with the mainstream Bengali-speaking population. The elderly generation of Marmas relies on their own Tribal Medicinal Practitioners (TMPs) for their health-care needs. As the younger generation of this tribal people is getting educated and leaning towards allopathic doctors, the traditional medicinal knowledge (mostly involving plants) is on the verge of disappearing and so is in urgent need of documentation. Towards documenting the medicinal knowledge of the Marmas, we made two trips to Camelong Para, Bandarban Sadar town in Bandarban district to visit an old Marma TMP and document his medicinal practices. The Marma TMP was found to use 6 plants distributed into 6 families in his formulations for treatment of gastrointestinal disorders, urinary disorders, poisonous insect bites, headache, eye irritation, and fever. Additionally, he used a crab and a spider species for healing pneumonia and eye irritation. A blanket soaked in warm water was used by itself to treat puerperal fever and food poisoning. The esoteric nature of the Marma TMP's practices suggests the importance of documenting tribal practices before they are forgotten not only for conservation of floral and faunal species, but also to spur scientific interest in these ancient medicinal practices. It may be noted that most of the treatments reported here involving plants and animals are quite unique and to our knowledge, not reported before.

Keywords: Bandarban; Bangladesh; Ethno medicine; Marma; Phytotherapy; Zootherapy

Introduction

The Chittagong Hill Tracts (CHT) region at the southeast corner of Bangladesh comprises of the districts of Bandarban, Cox's Bazaar, Khagrachaari and Rangamati. The region consists of forested low hills and is inhabited by a number of tribal people, the Chakma tribe being the largest with the Marma tribe being the second largest. The Marmas are also known as Moghs, and though no accurate population statistics are available, it is estimated that around 200,000 Marma people reside in the CHT region. Although the Marmas have their own language and distinctive culture (including their own medicinal practices and TMPs), in recent

years, they have started to attend schools, learn the mainstream Bengali language, discard their TMPs in favor of allopathic doctors, in short becoming merged slowly with the mainstream population.

Human beings possibly needed medicines since their very advent, and it has been postulated that plants, because of their huge diversity and number of species (over 270,000 flowering plants), met the medicinal needs of the early humans [1]. Plants produce secondary metabolites or phytochemicals, which can be toxic, but a number of which can have therapeutic uses [2]. Indigenous peoples can be a valuable knowledgeable source of therapeutic uses of plants, since they have used plant-based medicines for possibly thousands of years, which knowledge has been preserved initially through oral traditions and later on in writing. In fact,

many important modern drugs have been discovered from plants or through close observations of the medicinal practices of indigenous peoples [3]. Some of these drugs are morphine, quinine, vincristine, paclitaxel and serpentine, to name only a few [4].

Allopathic medicine, despite its huge success over the last 200 years, has started to face multiple problems. Most allopathic medicines, which are synthetic, are now being seen to cause numerous adverse effects in the body and rapid rise in drug-resistance vectors. Also new diseases like Ebola, bird flu, Nipah and Hanta have emerged to which allopathic medicine does not have any cure. As a result, both the common people and scientists are taking another look at the plant kingdom and the therapeutic practices of the indigenous or tribal people in the quest for discovery of new drugs. Ethno medicinal surveys and documentation have started to play an important role at present.

Bangladesh, although a small country (area 147,610 square kilometers), has more than 5500 floral species, most of them being located in the two hotspots in the southeast (CHT) and the northeast (Sylhet Division). Ethnobotany or ethno medicinal studies are in a very preliminary and rudimentary stage within the country; even then over 1200 medicinal plants have been identified. The country abounds in a number of traditional medicinal systems like Ayurveda, Unani, homeopathy, folk medicine (and tribal medicine), incantations, amulets, to name a few. Among the various systems, folk and tribal medicines are the least known considering the bewildering diversity of folk medicinal and tribal medicinal practitioners. Since without proper documentation, this ethnic knowledge may disappear totally (in fact of the 100 or so tribes, around 30 smaller tribes have totally forgotten their traditional medicinal practices according to our findings), we had been conducting ethno medicinal surveys among the Folk Medicinal Practitioners (FMPs) and TMPs [5-37]. The objective of the present survey was to conduct an interview and document the medicinal practices of a Marma TMP practicing in Camelong Para, Bandarban Sadar town in Bandarban district.

Materials and Methods

The survey was carried out between October 2018 and April 2019. Two visits were made to the Marma TMP, who resided amongst a Marma community settled in a hilly forested area known as Camelong Para (Para means village in this case). The place was about 5 kilometers road distance from Bandarban Sadar town - the main town in Bandarban district, which itself fell in Kuhlalong Union of Bandarban Sadar Upazila or sub-district (Figure 1).



Figure 1: Top left: Map of Bangladesh; top right: Bandarban district; bottom left: Bandarban Sadar Upazila map showing Kuhlalong Union and place of survey (indicated by arrow).

Bandarban Sadar town is a small town nestled among forested hills with mainly the mainstream Bengali-speaking administrative personnel residing in the town in buildings. The Marmas resided in tin-roofed houses in forested areas with small agricultural plots cleared of forests besides their residential community. Residential dwellings were clustered together with very little open spaces between dwellings (Figure 2).



Figure 2: Came long Para showing Marma agricultural plots, tin-roofed dwellings surrounded by hilly forested areas.

The Marmas grew their own rice and vegetables and reared goats and chickens. Camelong Para was besides a stream, where the Marmas can obtain some fish (not much, even though nappi or fermented dried fish was their favorite food). Within the community they spoke in the Marma language, but both young and old were

observed to speak the mainstream Bengali language with fluency, but with a strong accent.

The TMP was named Mong Pru Ong, male and about 45 years' age. Initial contact was made with him through some Marma persons known to the authors in Bandarban district. Prior Informed Consent was obtained from the TMP, who was apprised as to the nature of our visit. Consent was also obtained from the community Headman. In the first visit in October 2018, following some preliminary talks, the TMP started a general discussion on the diminishing of the forests, difficulty that he now faces in obtaining medicinal plants and the lack of respect in recent years on his traditional medicinal knowledge. He also mentioned that in recent years he did not get a single apprentice and so his knowledge was disappearing through lack of transmission to the next generation and adequate practice along with disappearance of many medicinal plant species.

Actual interviews were conducted with the help of a semi-structured questionnaire and the guided field-walk method of Martin [38] and Maundu [39]. In this method, the TMP took the

interviewers through forest areas where he obtained his plants (usually) and pointed out the plants. Plant names were mentioned by him on the spot. After returning, he mentioned the uses of the plants (or plant parts) in a leisurely manner. Plants were photographed and plant specimens collected on the spot, dried, and brought back to the University for identification by a competent botanist. Voucher specimens were deposited with the Medicinal Plant Collection Wing of the University of Development Alternative. Interviews were conducted in the Bengali language. It is to be noted that the Marmas themselves used Bengali names for most of the plants. A second visit was made in April 2019 to show the TMP our report and get his affirmation on the contents of the report.

Results

The TMP used phytotherapy, zoo therapy as well as miscellaneous object in his treatment. For his phototherapeutic practices, he used 6 plants distributed into 6 families for treatment of gastrointestinal tract disorders, piles, urinary disorders, pain, dizziness, severe eye irritation, and fever. The results are shown in (Table 1, Part A).

A. Phytotherapy

Scientific Name	Family Name	Local Name	Part(s) used	Ailments treated
<i>Mikania cordata</i> (Burm.f.) B.L. Robinson	Asteraceae	Bombai lota	Leaf	Diarrhea, piles. One handful leaves are chewed and the juice orally taken once for diarrhea and three times daily for piles.
<i>Tamarindus indica</i> L.	Fabaceae	Tetul, Tetni	Seed of ripe fruit	Urinary disorders, burning sensations during urination, diabetes. One seed is roasted and taken daily orally for 30 consecutive days.
<i>Hibiscus sabdariffa</i> L.	Malvaceae	Chokkar pata, Amina pata, Tok pata	Leaf	Pain from poisonous bites of insects. Paste of leaves is topically applied to bitten area.
<i>Piper nigrum</i> L.	Piperaceae	Gol morich	Fruit	Headache, dizziness, high degree of eye irritation. Dried ripe fruits are taken orally for headache and dizziness. Juice from unripe fruits mixed with a dead spider (any spider species) is applied to eyes for eye irritation.
<i>Citrus limon</i> (L.) Osbeck	Rutaceae	Lebu	Fruit juice	See <i>Scylla serrata</i> .
<i>Santalum album</i> L.	Santalaceae	Chandan	Wood	Fever. Paste of wood and water is topically applied to the forehead.

A very interesting part of his treatment was a combination of phytotherapy with zoo therapy, where he treated severe eye irritation with juice from unripe fruits of *Piper nigrum* along with a dead spider put in the juice and which was also applied to the eyes. According to the TMP there was no specificity to the spider species, any dead spider will suffice. In his other zootherapeutic formulation (Table 1, Part B),

B. Zootherapy

Scientific Name	Family Name	Local Name	Part(s) used	Ailments treated
<i>Scylla serrata</i> (Forskål, 1775) (Swimming crab)	Portunidae	Kakra	Skin	Cold running into pneumonia. Skin is taken off the crab following rubbing the crab with stone. The skin is then taken orally with very sour lemon juice.
Spider (unidentified species)	Unidentified	Makorsha	Whole body	See <i>Piper nigrum</i> .

The TMP used the skin of a crab, *Scylla serrata* along with very sour lemon juice (juice from the fruits of *Citrus limon*) to treat cold which progressed to pneumonia. In his miscellaneous object therapy, the TMP used a blanket soaked in warm water, which was put over the head as treatment for puerperal fever and food poisoning (Table 1, Part C).

C. Miscellaneous

Item Name	Family Name	Local Name	Part(s) used	Ailments treated
Blanket (cloth blanket)	Not applicable	Katha	Full blanket	Puerperal fever, food poisoning. A blanket is soaked in warm water and applied over the head.

Table 1: Phyto- and zootherapeutic practices of the Marma TMP. (Part A to C)

Needless to say, it needs to be determined how many of these esoteric practices gave effective results or just acted as placebos. Certainly, lemon juice (juice obtained from the fruits of *C. limon*) can be useful in colds [40]; steamed lime juice (obtained from steamed fruits of *Citrus aurantifolia*, a species closes to *C. limon*) has synergistic antimicrobial effects when taken with honey against *Streptococcus pneumonia* [41]; the efficacy of adding a crab skin to lemon juice needs to be scientifically determined. Horseshoe crabs may prove useful against bacteria resistant to penicillin and other drugs [42], but the medical benefits of *Scylla serrata* in treatment of cold remain to be determined.

Discussion

The *in vivo* anti-diarrheal activity of ethanol extract of *Mikania cordata* leaves has been reported [43], thus scientifically justifying the TMP's treatment of diarrhea with *M. cordata* leaves. Hypoglycemic effect of hydromethanolic extract of *Tamarindus indica* seed has been reported in streptozotocin diabetic rats [44]. Aqueous extract of *Hibiscus sabdariffa* leaves demonstrated analgesic effect in hot plate method in albino rats [45]. Notably, the TMP used seeds of *T. indica* against diabetes and leaves of *H. sabdariffa* to treat pain arising from poisonous insect bites. Ethanol extract of fruits of *Piper nigrum* and its constituent piperine reportedly showed analgesic activity [46], validating the TMP's use of the fruits to treat headache. Oil from *Santalum album* reportedly showed anti-pyretic activity against yeast-induced fever [47].

As can be noticed from a perusal of our previous ethno medicinal surveys among folk and tribal medicinal practitioners

[5-37], there is an enormous diversity among the practitioners regarding plant selection, formulation ingredients, and mode of treatment for even the same disease. Part of is caused by non-availability of a given plant in a particular area, or non-availability due to the plant's growth in only a certain season. However, our surveys suggest certain underlying principles for plant selection, which may be followed by a majority of traditional practitioners but not all of them. For instance, bitter plants or plant parts (like *Ananas comosus* leaves) are generally considered good against helminthes [48], and *Momordica charantia* fruits, which are bitter in taste are used against diabetes [17]. On the one hand, since traditional practitioners are not registered and their activities monitored or supervised by any regulatory agency, it is difficult to say accurately as to what extent their selection of plants and mode of treatment is valid or how and where they have learned these treatment methods. In our surveys, the TMPs have always mentioned that this medicinal plant knowledge is ancient knowledge handed down orally from generation to generation. What can be safely assumed is that since these treatments have been used over centuries, so possibly trial and error methods have played a large role in ensuring that the treatments work. Otherwise, market and patient factors would have gotten rid of harmful treatments. This explanation can also explain why so many plants used by TMPs are being increasingly validated by science in their therapeutic uses.

The available scientific reports clearly indicate that there is scientific validation behind the TMP's selection of plants, even though the TMP may not be aware of the "science". Traditional medicinal practitioners have honed their phytotherapeutic knowledge over hundreds and thousands of years, so it can be said

that most if not all the TMP-selected plants have passed the test of time. This has been noted before with medicinal plants used in traditional medicine in other countries [49]. Thus overall it can be concluded that the plants used by the TMP merits scientific research for their potential towards discovery of lead compounds and new drugs.

Conclusion

The phytotherapeutic practices of the TMP appear to be novel and can be utilized for new drug discoveries. However, some practices like using a warm wet blanket to treat puerperal fever and food poisoning or to use a dead spider for treating severe eye irritation not only borders on the esoteric but may be of no medical value whatsoever.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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References

1. Manoharachary C, Nagaraju D (2016) Medicinal plants for human health and welfare. *Ann Phytomed* 5: 24-34.
2. Jacobs EC (2018) Potential therapeutic effects of phytochemicals and medicinal herbs for cancer prevention and treatment. *Arch Gen Intern Med* 2: 44-48.
3. Yuan H, Ma Q, Ye L, Piao G (2016) The traditional medicine and modern medicine from natural products. *Molecules* 21: E559.
4. Mustafa G, Arif R, Atta A, Sharif S, Jamil A (2017) Bioactive compounds from medicinal plants and their importance in drug discovery in Pakistan. *Mat Sc Pharm* 1: 17-26.
5. Rahmatullah M, Ferdausi D, Mollik MAH, Jahan R, Chowdhury MH, et al. (2010) A Survey of Medicinal Plants used by Kavirajes of Chalna area, Khulna District, Bangladesh. *Afr J Tradit Complement Alternat Med* 7: 91-97.
6. Rahmatullah M, Khatun MA, Morshed N, Neogi PK, Khan SUA, et al. (2010) A randomized survey of medicinal plants used by folk medicinal healers of Sylhet Division, Bangladesh. *Adv Nat Appl Sci* 4: 52-62.
7. Rahmatullah M, Kabir AABT, Rahman MM, Hossain MS, Khatun Z, et al. (2010) Ethnomedicinal practices among a minority group of Christians residing in Mirzapur village of Dinajpur District, Bangladesh. *Adv Nat Appl Sci* 4: 45-51.
8. Rahmatullah M, Momen MA, Rahman MM, Nasrin D, Hossain MS, et al. (2010) A randomized survey of medicinal plants used by folk medicinal practitioners in Daudkandi sub-district of Comilla district, Bangladesh. *Adv Nat Appl Sci* 4: 99-104.
9. Rahmatullah M, Mollik MAH, Ahmed MN, Bhuiyan MZA, Hossain MM, et al. (2010) A survey of medicinal plants used by folk medicinal practitioners in two villages of Tangail district, Bangladesh. *Am-Eur J Sustain Agric* 4: 357-362.
10. Rahmatullah M, Mollik MAH, Islam MK, Islam MR, Jahan FI, et al. (2010) A survey of medicinal and functional food plants used by the folk medicinal practitioners of three villages in Sreepur Upazilla, Magura district, Bangladesh. *Am-Eur J Sustain Agric* 4: 363-373.
11. Rahmatullah M, Jahan R, Khatun MA, Jahan FI, Azad AK, et al. (2010) A pharmacological evaluation of medicinal plants used by folk medicinal practitioners of Station Purbo Para Village of Jamalpur Sadar Upazila in Jamalpur district, Bangladesh. *Am-Eur J Sustain Agric* 4: 170-195.
12. Rahmatullah M, Ishika T, Rahman M, Swarna A, Khan T, et al. (2011) Plants prescribed for both preventive and therapeutic purposes by the traditional healers of the Bede community residing by the Turag River, Dhaka district. *Am-Eur J Sustain Agric* 5: 325-331.
13. Rahmatullah M, Azam MNK, Rahman MM, Seraj S, Mahal MJ, et al. (2011) A survey of medicinal plants used by Garo and non-Garo traditional medicinal practitioners in two villages of Tangail district, Bangladesh. *Am-Eur J Sustain Agric* 5: 350-357.
14. Rahmatullah M, Biswas KR (2012) Traditional medicinal practices of a Sardar healer of the Sardar (Dhangor) community of Bangladesh. *J Altern Complement Med* 18: 10-19.
15. Rahmatullah M, Hasan A, Parvin W, Moniruzzaman M, Khatun Z, et al. (2012) Medicinal plants and formulations used by the Soren clan of the Santal tribe in Rajshahi district, Bangladesh for treatment of various ailments. *Afr J Tradit Complement Alternat Med* 9: 350-359.
16. Rahmatullah M, Khatun Z, Hasan A, Parvin W, Moniruzzaman M, et al. (2012) Survey and scientific evaluation of medicinal plants used by the Pahan and Teli tribal communities of Natore district, Bangladesh. *Afr J Tradit Complement Alternat Med* 9: 366-373.
17. Rahmatullah M, Azam MNK, Khatun Z, Seraj S, Islam F, et al. (2012) Medicinal plants used for treatment of diabetes by the Marakh sect of the Garo tribe living in Mymensingh district, Bangladesh. *Afr J Tradit Complement Alternat Med* 9: 380-385.
18. Rahmatullah M, Khatun Z, Barua D, Alam MU, Jahan S, et al. (2013) Medicinal plants used by traditional practitioners of the Kole and Rai tribes of Bangladesh. *J Altern Complement Med* 19: 483-491.
19. Rahmatullah M, Pk SR, Al-Imran M, Jahan R (2013) The Khasia tribe of Sylhet district, Bangladesh, and their fast-disappearing knowledge of medicinal plants. *J Altern Complement Med* 19: 599-606.
20. Akter S, Nipu AH, Chyiti HN, Das PR, Islam MT, et al. (2014) Ethno medicinal plants of the Shing tribe of Moulvibazar district, Bangladesh. *World J Pharm Pharm Sci* 3: 1529-1537.
21. Azad AK, Mahmud MR, Parvin A, Chakraborty A, Akter F, et al. (2014) Medicinal plants of a Santal tribal healer in Dinajpur district, Bangladesh. *World J Pharm Pharm Sci* 3: 1597-1606.
22. Azad AK, Mahmud MR, Parvin A, Chakraborty A, Akter F, et al. (2014) Ethno medicinal surveys in two Mouzas of Kurigram district, Bangladesh. *World J Pharm Pharm Sci* 3: 1607-1620.
23. Kamal Z, Bairage JJ, Moniruzzaman, Das PR, Islam MT, et al. (2014) Ethno medicinal practices of a folk medicinal practitioner in Pabna district, Bangladesh. *World J Pharm Pharm Sci* 3: 73-85.
24. Anzumi H, Rahman S, Islam MA, Rahmatullah M (2014) Uncommon medicinal plant formulations used by a folk medicinal practitioner in Naogaon district, Bangladesh. *World J Pharm Pharm Sci* 3: 176-188.

25. Amin R, Hasan MM, Rahman MA, Nargis T, Akter MH, et al. (2015) Home remedies of a rural housewife in Jamalpur district, Bangladesh. *World J Pharm Pharm Sci* 4: 329-335.
26. Rahman F, Rahmatullah M (2015) Medicinal plant formulations of the Musohor tribe of Birganj in Dinajpur district, Bangladesh. *World J Pharm Pharm Sci* 4: 177-185.
27. Alam MS, Alamin M, Bari AN, Adhikary AC, Khatun MM, et al. (2015) Medicinal uses of plants by a female folk medicinal practitioner of Narayanganj district, Bangladesh. *World J Pharm Pharm Sci* 4: 361-368.
28. Zaman T, Keya KF, Akter S, Sagar MH, Khan MS, et al. (2015) Plants as medicines: documentation of medicinal plants used by a Khasia tribal practitioner in Habiganj district, Bangladesh. *World J Pharm Pharm Sci* 4: 55-63.
29. Kundu MK, Alam MM, Arefin Z, Yasmin S, Yeasmin S, et al. (2016) Phytotherapeutic practices of a folk medicinal practitioner of Jhenaidah district, Bangladesh. *World J Pharm Pharm Sci* 5: 127-136.
30. Mukti M, Rahman MA, Bashar ABMA, Hossain S, Rahmatullah M (2013) Medicinal plants of the Khatriya and Kasya clans of the Bagdi people in Rajbari district in Bangladesh. *Am.-Eur J Sustain Agric* 7: 170-177.
31. Kabir MH, Hasan N, Rahman MM, Rahman MA, Khan JA, et al. (2014) A survey of medicinal plants used by the Deb barma clan of the Tripura tribe of Moulvibazar district, Bangladesh. *J Ethnobiol Ethnomed* 10: 19.
32. Amin R, Hasan MM, Rahman MA, Nargis T, Akter MH, et al. (2015) Home remedies of a rural housewife in Jamalpur District, Bangladesh. *World J Pharm Pharm Sci* 4: 329-335.
33. Chowdhury ASMHK, Shahriar MH, Rahman MS, Uddin MP, Al-Amin M, et al. (2015) Home remedies of rural folks: a study in Kadipur village of Chuadanga District, Bangladesh. *World J Pharm Pharm Sci* 4: 171-182.
34. Mahmud MR, Parvin A, Anny IP, Akter F, Tarannom SR, et al. (2015) Home remedies of village people in six villages of Dinajpur and Rangpur Districts, Bangladesh. *World J Pharm Pharm Sci* 4: 63-73.
35. Rahman S, Rahmatullah M (2015) Medicinal plant home remedies in several villages of Patuakhali district, Bangladesh. *J Chem Pharm Res* 7: 147-151.
36. Nahar S, Rahmatullah M (2016) Plants, animals, birds, insects, minerals - all are medicines to a folk medicinal practitioner in Nilphamari district, Bangladesh. *World J Pharm Pharm Sci* 5: 2422-2439.
37. Akhter J, Khatun R, Akter S, Akter S, Munni TT, et al. (2016) Ethnomedicinal practices in Natore district, Bangladesh. *World J Pharm Pharm Sci* 5: 212-222.
38. Martin GJ (1995) *Ethnobotany: a 'People and Plants' Conservation Manual*, Chapman and Hall, London. pp285.
39. Maundu P (1995) Methodology for collecting and sharing indigenous knowledge: a case study. *Indigenous Knowledge and Development Monitor* 3: 3-5.
40. Dev C, Nidhi SRRS (2016) Basketful benefit of citrus lemon. *Int Res J Pharm* 7: 1-4.
41. Kaur AP, Manoharan S, Mohamed NEN (2013) Antimicrobial activity of steamed lime and honey remedy against *Streptococcus pneumoniae*. *Global Res Anal* 2: 193-194.
42. Kumar V, Roy S, Sahoo AK, Behera BK, Sharma AP (2015) Horse-shoe crab and its medicinal values. *Int J Curr Microbiol App Sci* 4: 956-964.
43. Nasrin F, Hakim ML (2015) *In vivo* antidiarrheal study of ethanolic extracts of *Mikania cordata* and *Litsea monopetala* leaves. *Bangladesh J Pharmacol* 10: 562-565.
44. Maiti R, Misra DS, Ghosh D (2014) Hypoglycemic and hypolipidemic effect of seed hydromethanolic extract of *Tamarindus indica* L. on streptozotocin-induced diabetes mellitus in rat. *Am J Phytomed Clin Ther* 2: 1416-1429.
45. Patil SB, Rambhimaiah S, Patil P (2016) Evaluation of analgesic activity of aqueous extract of leaves of *Hibiscus sabdariffa* in albino rats. *Int J Basic & Clin Pharmacol* 5: 910-913.
46. Tasleem F, Azhar I, Ali SN, Perveen S, Maqhmood ZA (2014) Analgesic and anti-inflammatory activities of *Piper nigrum* L. *Asian Pac J Trop Med* 7: 461-468.
47. Kumar R, Anjum N, Tripathi YC (2015) Phytochemistry and pharmacology of *Santalum album* L.: A review. *World J Pharm Res* 4: 1842-1876.
48. Karim MS, Rahman MM, Shahid SB, Malek I, Rahman MA, et al. (2011) Medicinal plants used by the folk medicinal practitioners of Bangladesh: a randomized survey in a village of Narayanganj district. *Am.-Eur J Sustain Agric* 5: 405-414.
49. Khatun MA, Harun-Or-Rashid M, Rahmatullah M (2011) Scientific validation of eight medicinal plants used in traditional medicinal systems of Malaysia: A review. *Am.-Eur J Sustain Agric* 5: 67-75.