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Original Article

A FEW TRADITIONAL MEDICINAL PLANTS USED AS ANTIFERTILITY AGENTS BY ETHNIC PEOPLE OF TRIPURA, INDIA

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ABSTRACT

Objective: Ethnobotanical survey was conducted in the remote hills, forests and rural areas of Tripura, a diversified ethnic people rich state of North-Eastern India, for gathering information about traditional method of birth control.

Methods: Semi-structured questionnaire was used during the interview with the informants having traditional botanical knowledge. Use of medicinal plants were documented using an interview datasheet mentioning detailed information of the informants and vernacular names, parts used, method of preparation and administration modes of botanicals. Finally, collected samples of botanicals, prepared herbarium, identified and scientific names were confirmed by consulting reference herbarium specimen available in Assam University, Silchar.

Results: A total of 55 ethnomedicinal plants belonging to 42 families and 49 genera have been documented having antifertility property. Apocynaceae, Caesalpiniaceae, Combretaceae, Fabaceae were found to be the dominant families of medicinal plants used for fertility regulation. This paper represents detailed profile of each plant including scientific name, family, common name, parts used, activities, mode of preparation and dosage. While comparing the established literature it is interestingly recorded that antifertility activity of 10 plants have been reported for the first time.

Conclusion: Conservation of the traditional informations should be given utmost importance in this region to prevent the rapid loss of ethnobotanical wealth.

Keywords: Ethnomedicine, Antifertility, Birth control, Contraceptive, Abortifacient, Herbal Formulation.

INTRODUCTION

Over growing population is one of the major threats in the developing countries, facing new challenges, with its inevitable consequences on all aspects of development [1]. Therefore, there is an urgent need to control population explosion, and to ensure better health for one and all. Efforts have been taken to tackle this serious problem by developing antifertility agents called contraceptive; those chemical substances that inhibit either the sperm production or sperm motility in males or prevent the formation of ovum and produce some changes in the endometrium, making it unsusceptible to a fertile ovum in females [2].

Synthetic hormonal contraceptives cannot be used continuously because of their health related effects, like increase in blood transminase and cholesterol levels, dyspepsia, headache, depression, tiredness, weight gain, hyper menorrhea and intermenorrheal hemorrhage and also disturb the metabolism of lipid, protein, carbohydrate, enzymes and vitamins [3].

Therefore, scientists are on the hunt for newer alternatives, with lesser side effects, self-administrable, less expensive and with complete reversiblity. Much of these properties are observed in drugs of natural plant origin. Many plants are reported to have fertility regulatory activity.

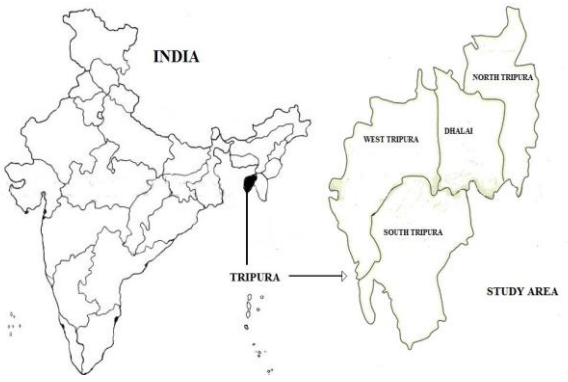
Plants having such properties may have role in rapid discharge of the fertilized ova from the fallopian tube, inhibition of implantation due to a interruption in oestrogen- progesterone balance, foetal abortion due to lack supply of nutrients to the uterus and the embryo, and also on the male by affecting sperm count, motility, and viability. In recent years, many workers have reported a lot of traditional plants used for antifertility purpose [4-6]. Most of the tribal economies have been engaged in subsistence agriculture, Jhum, piggery, fishery and hunting. With the passage of time, tribal communities have been developed a great deal of knowledge on the use of plants and plant products in curing various diseases, ailments [7]. In the present study, an attempt has been taken to investigate and document the herbal practices for antifertility purpose by the ethnic peoples of Tripura state.

MATERIALS AND METHODS

Study area

Tripura is a small hilly state of North-Eastern India, surrounded by Bangladesh on three sides with rich biodiversity hot spot with huge variety of flora and fauna (Figure1). The total area of the state is 10,497,697 Sq Km and located in the Bio-geographic zone of 9B-North East Hills between 22^{0}-56' to 24^{0}-32' North latitude and between 90^{0}-09' to 92^{0}-20' East longitudes.

Fig. 1: Location of study area (Tripura state)



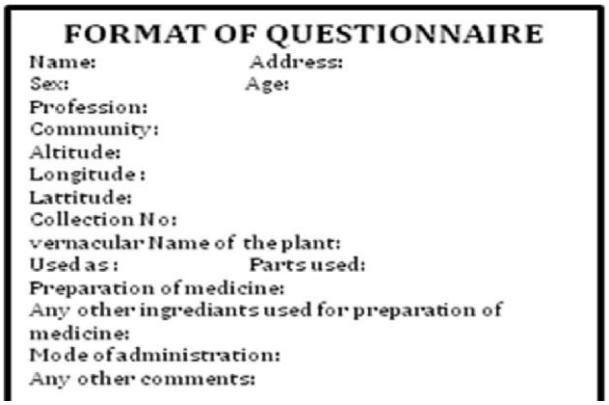
Total forest covers an area of about 6292.689Sq. Km, with the annual rainfall of about 247.9 cm and temperature ranging in between 10^{0} C-35^{0} C. The suitable tropical climate supports luxuriant growth of various types of medicinal plants and other forest resources scattered all over the state from hilly tract to plain. The use of medicinal plants in the traditional system of folk medicine forms as integral part of the culture of the people. The state has five districts viz. West, South, North Tripura, and Dhalai.

Different tribal and non tribal group of the state live together in harmony with nature and maintain a close link between them.

Interviews and botanical collections

Interviews were conducted with local people and traditional healers of Bangalee, Tripuri, Halam, Reang, Darlong, Chakma and Mog community for the study and documentation of the plants used in contraception and abortion. Extensive field survey of different parts of the district (map showing the study area) was done to document information. A total of 31 traditional healers were interviewed using structured questionnaire (Figure 2).

Fig. 2: Interview questionnaire


FORMAT OF QUESTIONNAIRE

Name: Address:
Sex: Age:
Profession:
Community:
Altitude:
Longitude:
Lattitude:
Collection No:
vernacular Name of the plant:
Used as: Parts used:
Preparation of medicine:
Any other ingrediants used for preparation of medicine:
Mode of administration:
Any other comments:

Plants were collected after interaction with traditional healers and local people during July 2010-July2011 during their different flowering periods. Information about the local name of the plants, parts used, preparation of drug, doses and mode of uses in controlling population growth were collected from the traditional healers. Plants were collected, pressed and drenched in alcohol for herbarium vouchers were identified with the help of standard floras [8-10]. The data collected in the field were formatted and preserved carefully. Voucher specimens were deposited in the herbarium, Department of Life Science and Bioinformatics, Assam University, Silchar.

RESULTS

A total of 55 ethnomedicinal plants used in different drug formulations belonging to 49 genera and 42 families have been documented along with their formulations from Tripura are listed in the present article. The 55 plant having antifertility property are mentioned here along with the name of tribal and non tribal community from whom the information were collected (Table No. I). Plant species are arranged with their scientific name, family, common name, parts used, activities, mode of preparation and dosage. Local names of plants are given as available in Bangalee (B), Tripuri (T), Reang (R), Halam (H), Darlong (D), Chakma (C), Mog (M) languages, respectively. Maximum numbers of ethnomedicinal plants were recorded from Combretaceae, Caesalpiniaceae, Fabaceae, Apocynaceae (each family having three plant species) followed by Alliaceae, Euphorbiaceae, Lamiaceae, Malvaceae, Moraceae, Plumbaginaceae, Solanaceae (each family having two plant species). Many families represented by single ethnomedicinal plant. In the present investigation, 52.72% plants have been reported with abortifacient property and 49.09% plants with contraceptive activity and 9.9% plants having both contraceptive and abortifacient efficacy.

Enumeration

The medicinal plant species with their formulations are enumerated alphabetically in Table 1, with their botanical name, family, common name, followed by part used, activities and used as.

Abbreviations: B- Bangalee, Tripuri- T, Chakma- C, Halam- H, Darlong- D, Reang- R, Mog- M.

Table 1: List of plants used as contraceptive and abortifacient by the ethnic people of tripura State.

S. No.	Plant name	Family	Common name	Part used	Activities	Mode of Preparation and Dosage
1	*Abrus precatorius* L.	Fabaceae	Besko (R)	Seed	Contraceptive	½ tea spoon paste in tablet form twice a day in empty stomach for 3days just after completion of menstrual period.
2	*Achyranthes aspera* L.	Amranthaceae	Uthlengra (B)	Whole plant	Contraceptive	1 tea spoon paste as tablet twice a day for 7 days in empty stomach.
3	*Adiantum philippense* L.	Adiantaceae	Khokochor (H)	Fresh leaves	Abortifacient	Fresh leaf pastes are prepared in combination of *Cuscuta reflexa* Roxb. Fresh leaf paste in equal volume, 1-2 tea spoon amount in a tablet form, twice a day in empty stomach for 7 days.
4	*Allium cepa* L.	Alliaceae	Resunchao (R)	Bulb	Contraceptive	Bulb paste is prepared in combination with *Terminalia arjuna* (Roxb. Ex Dc.) Wight &Arn. fruit bark and *Allium sativum* L. bulb in tablet form. 2tablets twice a day for 5 days.
5.	*Allium sativum* L.	Alliaceae	Resun (R)	Bulb	Contraceptive	Same as *Allium cepa* L.
6	*Aloe barbadensis* Mill.	Aloaceae	Ghretokumari, Mussobbar (B)	Whole plant	Contraceptive	Dried juice is mixed with fresh *Hibiscus rosa-sinensis* L. flower, latex of *Ferula assa-foetida*L. and dried powder of *Zingiber officinale* Roscoe rhizome are mixed in equal ratio (5 gm each) along with ½ tea spoon honey. 1 tea spoon of this mixture twice a day in empty stomach for 8 days.
				Fresh leaves	Abortifacient	Fresh leaves are dried for 1-2 days. It is then powdered and mixed with water, 2 tea spoons, twice daily in

						empty stomach for 3 days.
7	*Ananas comosus* (L.) Merr	Bromeliaceae	Birtung (D)	Fresh leaves	Abortifacient	1 tea spoon paste as tablet twice a day for 3 days in empty stomach.
8	*Annona reticulata* L.	Annonaceae	Ata (R)	Unripe fruit	Abortifacient	½ tea spoon paste is taken with a cup of warm water, twice a day for 2 days.
9	*Azadirachta indica* A. Juss.	Meliaceae	Neem (R), (T)	Stem bark Seed	Abortifacient	Tablets from stem bark pastes are prepared; one tablet contains ½ tea spoon paste. 1 tablet every dayin empty stomach for 10 days. Tablets fro, fresh seed pastes are prepared; one tablet contain ¼ tea spoon of the paste. 2 tablets daily in empty stomach for 5 days.
10	*Bombax ceiba* L.	Bombacaceae	Gochu (R)	Fresh seeds	Abortifacient	Tablets are prepared from ½ tea spoon paste and taken twice a day for 5 days.
11	*Butea monosperma* (Lam.) Taub.	Fabaceae	Polash (B)	Dried Seed	Abortifacient	Dried seed paste of *Solanum xanthocarpum* Schrad, fresh *Coccinia grandis* (L.) Voigt stem, dried seed of *Vitex negundo* L., *Caesalpinia pulcherrima* (L.) Sw., *Holarrhena antidysenterica* (L.) Wall., *Rubia cordifolia* L., fresh seed of *Ricinus communis* L., fresh seed of *Saraca asoca* (Roxb.) W. J. De Wilde dried fruit of *Sapindus mukorossi* Gaertn. are prepared separately and mixed in equal ratio. Tablets are then prepared from this mixture, one tablet contain ½ spoon of the mixture. 1 tab daily after dinner for 7 days.
12	*Caesalpinia pulcherrima* (L.) Sw.	Caesalpiniaceae	Radhachura (B)	Seed	Abortifacient	Same as *Butea monosperma* (Lam.) Taub.
13	*Calotropis procera* (Aiton) W.T.Aiton	Asclepiadaceae	Akanda (B), Angrapata (R)	Root	Contraceptive	Fresh root paste is prepared and then mixed with root paste of *Mimosa pudica* L. in equal ratio. Tablets are prepared from the paste mixture. One tablet contains ½ tea spoon paste. 1 tablet daily at empty stomach after completion of menstrual cycle.
14	*Carica papaya* L.	Caricaceae	Hogeyegulo (C)	Seed	Contraceptive	Fresh or dried seeds paste is prepared. 2 tea spoon paste decoction taken every day after menstrual period till commencement of next menstrual period.
15	*Cassia alata* L.	Caesalpiniaceae	Thechou (H)	Leaves	Abortifacient	Tablets are prepared from leaf paste. One tablet contains 1 spoon of that paste. 2 tabs, twice daily for 3 days.
				Roots	Contraceptive	10 gm fresh root is mixed with 10 gm *Cynodon dactylon* (L.) Pers., 5 fresh *Piper betle* L. leaves, and 10gm fresh *Ricinus communis* L. root. Paste decoction is prepared.5ml of this daily in empty stomach for 7 days after completion of menstruation cycle.
16	*Costus speciosus* Sm.	Costaceae	Khetoki (C)	Seed	Abortifacient	Seed (mature seeds) pastes are used to prepare tablet containing ½ tea spoon paste. 2 tablet twice a day before meal for 3 days.
17	*Cuscuta reflexa* Roxb.	Convolvulaceae	Chinailat (H)	Whole plant	Contraceptive	Fresh plant paste is prepared separately and mixed with leaves paste of *Stephania japonica* (Thunb.) Miersin equal volume and Tablets are prepared from it, one tablet contain 1/2 spoon paste. 2 tabs twice a day in empty stomach

						for 7 days.
					Abortifacient	Same as *Adiantum philippense* L.
18	*Cynodon dactylon* (L.) Pers.	Poaceae	Durpa (T)	Whole plant	Contraceptive	Same as *Cassia alata* L.
19	*Datura metel* L.	Solanaceae	Dutra (B)	Fresh root	Abortifacient	Fresh root paste decoction of is prepared and2 teaspoon decoction is taken once a day for 5 days in empty stomach.
20	*Dioscorea bulbifera* L.	Dioscoreaceae	Khudupan (M)	Whole plant	Contraceptive	Whole plant paste is prepared and mixed equally with *Ficus religiosa* L. leaves paste. Tablets are then prepared from this mixture and one tablet contain 1-2 tea spoon mixture and is taken twice a day till commencement of next menstrual cycle.
					Abortifacient	When the above mentioned dose is taken by 3-4 months pregnant woman for 4-5 days, it act as abortifacient.
21	*Drynaria quercifolia* (L.) J. Smith	Polypodiaceae	Banartola (T)	Rhizome	Abortifacient	Tablets are prepared from 10 gm paste of fresh rhizome in combination with 5gm paste of *Rauvolfia serpentina* Bail. 3 tablets, 3 times daily in empty stomach for 3 days.
22	*Ferula assa-foetida* L.	Apiaceae	Hing (B)	Latex	Contraceptive	Same as *Aloe barbadensis* Mill.
23	*Ficus religosa* L.	Moraceae	Neao (M)	Leaves	Contraceptive	Same as *Dioscorea bulbifera* L.
24	*Gossypium herbacium* L.	Malvaceae	Khol (T)	Fresh root	Contraceptive	Decoction of fresh root is prepared and 1 tea spoon decoction is taken daily for 5 days.
25	*Hibiscus rosa-sinensis* L.	Malvaceae	Nipui par (D), Joba (B)	Flower	Abortifacient	Paste of 5 flowers is prepared and mixed with one tea spoon honey. 2 tea spoonful of this paste is taken every day in empty stomach for 3 days.
				Stem bark	Abortifacient	Decoction of stem bark is prepared. 5 ml decoction everyday once for 5 days.
26	*Holarrhena antidysenterica (*L.) Wall.	Apocynaceae	Kuruchi (B)	Seed	Abortifacient	Same as *Butea monosperma* (Lam.) Taub.
27	*Lawsonia inermis* L.	Lythraceae	Mehendi (D)	Leaves	Contraceptive	Paste of fresh leaves is prepared and mixed with little amount of esabgul powder. Tablets arethen prepared from ½ tea spoon mixture, taken twice daily for 21 days from last menstrual period.
28	*Leucas aspera* Spreng.	Lamiaceae	Donkalas (B)	Fresh stem and root	Abortifacient	15-20 cm long stem root is used for intravaginal insertionfor 20 min.
29	*Lygodium flexuosum* (L.) Sw.	Schizaeaceae	Sakbangma (R), Suilen (D)	Leaves	Contraceptive	Leaves paste is prepared and mixed with paste of fresh *Moringa oleifera* Lam. root and in equal ratio. ½ tea spoon mixture is used to prepare 1 tablet and is taken daily in empty stomach after completion of menstrual cycle.
					Abortifacient	The above mentioned formulation is act as abortifacient during its use in pregnancy.
30	*Mimosa pudica* L.	Mimosaceae	Rajuriher (R)	Whole plant	Abortifacient	Same as *Calotropis procera* (Aiton) W.T.Aiton
31	*Momordica charantia* L.	Cucurbitaceae	Kangla (R)	Seed	Contraceptive	Fresh seed paste is prepared and mixed with paste of *Stephania japonica* (Thunb.) stem Miers in equal volume. Tablets are then prepared from containing 1-2 tea spoon paste taken twice a day after completion of menstrual cycle to commencement of next menstrual cycle.

					Abortifacient	Fresh seed paste decoction is prepared and 2 tea spoon fresh decoctions is taken once a day for 3 days in empty stomach. It can cause abortion of 4 months pregnancy.
32	*Moringa oleifera* Lam.	Moringaceae	Sajna (R)	Root	Contraceptive	Leaves paste is prepared and mixed with paste of fresh *Moringa oleifera* Lam. root and in equal ratio. ½ tea spoon mixture is used to prepare 1 tablet and is taken daily in empty stomach after completion of menstrual cycle.
33	*Musa balbisiana* Colla	Musaceae	Mot munei (D)	Seed	Contraceptive	Tablets are prepared from fresh or dried seeds paste containing 5g paste and taken twice a day in empty stomach for 7 days.
34	*Oroxylum indicum* Vent.	Bignoniaceae	Bakilong (D)	Bark	Contraceptive	Paste of fresh stem bark is prepared and mixed with *Coccinia grandis* (L.) Voigt stem, fresh *Tacca laevis*Roxb. root, fresh *Lygodium flexuosum* (L.) Sw. leaves paste equal ratio. Tablets are then prepared containing 1 tea spoon mixture and taken once a day in empty stomach for 7 days (just 2 days after menstrual period)
35	*Phlogacanthus thyrsiformis* (Roxb. Ex Hardw.) Mabb.	Acanthaceae	Ravanbasak (H)	Leaves	Contraceptive	1 tea spoon leaves paste as tablet twice a day for 3-4 days in empty stomach.
36	*Phyllanthus emblica* L.	Euphorbiaceae	Amlaki (B)	Fruit	Contraceptive	A mixed paste of fruit along with *Terminalia chebula* Retz., *Phyllanthus emblica* L., *Terminalia bellerica* Roxb., are prepared. Rasanjan is added to this mixture. Tablets are prepared from this and one tablet contains 6 ratimixtures.1 tab daily once for one month.
37	*Piper betle* L.	Piperaceae	Khasiapathoi(T), Pangua (D)	Stem	Abortifacient	Stem paste decoction of *Piper betle* L. is prepared and 1 teaspoon decoction is taken daily once in empty stomach for 7 days.
38	*Plumbago indica* L.	Plumbaginaceae	Swetochita (R)	Fresh root	Abortifacient	5-6 pieces of Fresh root are dipped in 20-30 ml of cold water for 10 mins and 2 tea spoon decoction is taken twice a day for a single day.
39	*Plumbago zeylanica* L.	Plumbaginaceae	Chichirimiri (T)	Fresh root	Abortifacient	3-4 inch long root is used as intravaginal insertion device for 15 mins.
40	*Rauvolfia serpentine* Bail.	Apocynaceae	Chandoma (T)	Root	Abortifacient	Same as *Drynaria quercifolia* (L.) J. Smith
41	*Ricinus communis* L.	Euphorbiaceae	Letao (T)	Seed	Abortifacient	20g fresh seeds paste is prepared. 2 tea spoon seed paste decoction, twice daily for 3 days.
42	*Rubia cordifolia* L.	Rubiaceae	Manjistha (B)	Seed	Abortifacient	Same as *Butea monosperma* (Lam.) Taub.
43	*Solanum xanthocarpum* Schrad.	Solanaceae	Kantikari (B)	Seed	Abortifacient	Same as *Butea monosperma* (Lam.) Taub.
44	*Sapindus mukorossi* Gaertn.	Sapindaceae	Ritha (B)	Seed	Abortifacient	Same as *Butea monosperma* (Lam.) Taub.
45	*Saraca asoca* (Roxb.) W. J. De Wilde	Fabaceae	Asok (B)	Seed	Abortifacient	Same as *Butea monosperma* (Lam.) Taub.
46	*Stephania japonica* (Thunb.) Miers	Menispermaceae	Samsota (H)	Leaves	Contraceptive	Same as *Momordica charantia* L.
47	*Streblus asper* Lour.	Moraceae	Sheora (T)	Fresh Stem	Abortifacient	4 inch long fresh stem used for intravaginal insertion for 20 mins.
48	*Tacca laevis* Roxb.	Taccaceae	Tealkha (D)	Rhizome	Contraceptive	Same as *Oroxylum indicum* Vent.
49	*Tamarindus indica* L.	Caesapiniaceae	Tingtoi (R), Thenthoi (T)	Fruit	Abortifacient	One cup hot water extract of fruit is taken for a single day.

50	*Terminalia arjuna* (Roxb.) Wight &Arn	Combretaceae	Arjun (T), (H)	Fruit	Abortifacient	Tablets are prepared from fresh fruit paste. One tablet contains 5g mixture. Tablets are the dried for 1 day. 2 tabs twice a day in empty stomach for 7 days.
51	*Terminalia bellerica* Roxb.	Combretaceae	Boyra (B)	Fruit	Contraeptive	Same as *Phyllanthus emblica* L.
52	*Terminalia Chebula* Retz.	Combretaceae	Bakala(R)	Fruit bark	Contraceptive	Same as *Phyllanthus emblica* L.
53	*Thevetia peruviana* K. Schum.	Apocynaceae	Khumbarangcha (R)	Seed	Abortifacient	Seed paste decoction is prepared 1/4th tea spoon seed paste decoction with one tea spoon honey, daily at morning for 2-3 days.
54	*Vitex negundo* L.	Lamiaceae	Nisinda (B)	Seed	Abortifacient	Same as *Butea monosperma* (Lam.) Taub.
55	*Zingiber officinale* Roscoe	Zingiberaceae	Ada (B)	Rhizome	Contraceptive	Same as *Aloe barbadensis* Mill.

DISCUSSION

Our Earth is under the pressure of population explosion. In this regard, W.H.O. and other health organizations have put great notice on the search for a safe form of contraception which will be cheap and socially acceptable. Great attention is being given to plants with anti-fertility properties. The people of North Tripura district have rich traditional knowledge in the field of ethnomedicine which are forming a strong base for primary health care system. In the present study, 55 medicinal plants from 42 families and 49 genera along with 42 formulations are recorded and documented which are used for family planning in Tripura. Maximum numbers of ethnomedicinal plants are recorded from Apocynaceae, Combretaceae, Caesalpiniaceae, Fabaceae family (each family with three plant species). 70.27% plants formulations have been reported which are used to induce abortion, 37.43% have been reported as contraceptive and 2.7% herbal formulations used for both contraception and abortion.

The use of some of the above mentioned plants as fertility antidote have been worked upon by many workers from time to time in different parts of India [4,9,11-14]. Lyophilized *Aloe barbadensis* Mill. with zinc acetate is used as vaginal contraceptive [15]. Ripened and unripe fruits and fresh leaves of *Ananas comosus* (L.) Merr. as fertility antidote has been reported by various field survey from West Bengal, Andhra Pradesh and Kerala [16-18]. On the other hand, *in vivo* study with unripe fruit juice of *Ananas comosus* (L.) Merr. in pregnant wistar rats also reported the same conclusion as above [19]. The use of *Azadirachta indica* A. Juss. (flower extract, neem seed oil) as potential antifertility drug have been reported by many authors [20-26].

Ricinus communis L. is also reported to have potent spermicidal activity [27, 28]. Tribal people of West Bengal use *Plumbago indica* L. and *Plumbago zeylanica* L. [9]. Though many reports have been published describing the potentiality of plants as antifertility agents, commercial availability of plant based contraceptive agent is not very common. This indicates that ethnobotanical or pharmacological investigations on above plants do not end up with the ultimate target. As such there always remains scope for further work on the issue. Of all the 56 plants recorded in this investigation, *Adiantum philippense* L. (family-Adiantaceae), *Coccinia grandis* (L.) J. Voigt (family-Cucurbitaceae), Datura metel L. (family- Solanaceae), Holarrhena antidysenterica (L.) Wall. (family-Apocynaceae), Lucas aspera Spreng (family-Lamiaceae), Musa balbisiana Colla (family-Musaceae), Streblus asper Lour (family- Moraceae), Phlogacanthus thyrsiformis (Roxb. ex Hardw.) Mabb. (family-Acanthaceae), Tacca laevis Roxb. (family-Taccaceae) and Tamarindus indica L. (family-Caesalpiniaceae) are reported for first time as antifertility agent. We are for the first time reporting fertility regulatory activity of these plants from this area. Interestingly Tripura tribes use Streblus asper Lour stem, Leucas aspera Spreng stem-root and Plumbago zeylanica L. root as an external source for abortion. The study of modern phytotherapy on contraception and abortion is rapidly evolving all through the world. The therapeutic parts of a plant are not simply its wood, stem or leaves but the chemical compounds it produces. The highly interesting findings for birth control measures by using herbal drugs require further research for their pharmacological validation, which may lead to the identification and development of biologically active compounds for scientific utility.

CONCLUSION

As the work has reported 10 new plants as human antifertility agents along with other 45 known plants, it may be of significant importance to explore further for isolation and characterization of novel active contraceptive agents.

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