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Ethnomedicinal plants used for gastro intestinal disorders by the local people of Brahmanbaria, Bangladesh

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The present research documented the ethnomedicinal plants used by the local people of Brahmanbaria, Bangladesh to treat gastro intestinal disorders in their daily life. Ethnomedicinal data were collected in between June 2018 to June 2019 from 265 local people using mainly key informant's interview. Citation frequency and Fidelity level values were calculated for claimed their ethnomedicinal knowledge to estimate their healing potentials. A total of 61 ethnomedicinal plants were used against gastro intestinal disease category from 40 families. Mimosaceae was the most predominant family. The most cited plant species were*Litseaglutinosa,Centellaasiatica, Holarrhenaantidysenterica, Clerodendrumviscosum, Portulacaoleracea, Mangiferaindica, Paederiafoetida*and*Phyllanthusreticulatus.* Among the most cited plants, all were presented 100% Fidelity level except *Centellaasiatica* and *Pithocellobiumdulce.* This study contributes to record a database of ethnomedicinal plants used in gastro intestinal disease in Brahmanbaria. Plant species with related uses can be subjected to further ethno-pharmacology studies to find active compounds for the new drug candidates.

ABSTRACT

1. Introduction

Gastrointestinal disorders are cited more frequently in developing country where poor sanitation practices are more common. According to estimates of World Health Organization (WHO), gastrointestinal disorders caused nearly 1 million adult deaths worldwide during 2019 where diarrhea alone was responsible for 370,000 deaths in children under the age of 5 years. The most common gastrointestinal disorders are diarrhea, dysentery, constipation, abdominal inflammation etc. It is reported that digestive system disorders particularly diarrhea, was the fifth leading cause of global mortality, as approximately 100 million people died worldwide in 2012 from these types of disorders (WHO, 2014). Asia and lower-middle-income countries had notably higher case numbers than other regions (Zhao *et al*., 2025). Bangladesh has a high risk of diarrheal mortality and morbidity in the South Asian region. The prevalence of diarrhea in Bangladesh declined from 7.05% in 2006 to 3.91% in 2012–13, but then increased to 8.78% in 2019. Most of the people of native region are depends on plant based medicine for their primary healthcare treatment. There are more than 5000 angiosperm species (Khan and Huq 1975) in Bangladesh. Only 750 plant species have been documented as medicinal values (Ahmed *et al*., 2008 & Yusuf *et al*., 2009). Many medicinal Plants has been widely used by many people without documentation for preservation and scientific study. The present study is designed to document the ethnomedicinal uses of plants of Brahmanbaria district to find out the culturally important medicinal plants for cure of illnesses related to gastrointestinal disease.

2. Methodology

Ethnomedicinalplants documentation

Brahmanbaria is a district in east-central Bangladesh lies between 23°57′10″ and 23.9528° N latitude and between 91.07′00″ and 91.1167° E longitudes. It is a part of the Chottogram Division. Fig. 1 is showing study area of Brahmanbaria district. Ethnobotanical study was carried out from June 2018 to June 2019 following the standard guidelines for ethnobotanical survey (Alexiades, 1996 and Chambers, 1994). Scientific name, local name, family name, habitat, parts used, use formularies of each plants have been recorded following standard methods (Martin, 2004). Voucher specimens for each medicinal plant have been collected and processed using standard herbarium techniques (Hyland, 1972&Alexiades, 1996) and have been deposited at Dhaka University Salar Khan Herbarium, Department of Botany, University of Dhaka.

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Citation frequency

Calculation of citation frequency (CF%) is a way to determine the most useful plants. CF values are useful to determine most common medicinal plants in study area. CF values of medicinal plants were estimated using the formula: (number of people interviewed citing species/ total number of people interviewed) × 100 (Rahmatullah*et al.*, 2011).

Fidelity level

The fidelity level (FL) value is useful for identifying the informants most preferred species in use for treating certain ailments (Firedman*et al*., 1986). The fidelity level (FL), the percentage of informants claiming the use of a certain plant species for the same major purpose was calculated for the most frequently reported diseases or ailments as: FL (%) = (Np / N) × 100; Where, Np = number of informants that claim a use of a plant species to treat a particular disease; N = number of informants that use the plants as a medicine to treat any given disease.

3. Results

In the present study, Brahmanbaria district, Bangladesh is chosen for data collection. Fig. 1 showing the study area of Brahmanbaria district. A total of 61 plant species from 40 families used by the local people have been recorded with their medicinal use formularies. Scientific name, local name, family name, habitat, ailments, parts used, treatment mood and Citation frequency (CF%) of each plants have been shown in Table 1.Table 2 is showing the Fidelity level (FL) of most cited ethnomedicinal plants.

Recorded ethnomedicinal plant species in the Brahmanbaria district is the indication of huge diversity of medicinal plants and their uses. Among the 40 families, Mimosaceae was best represented in terms of the number of species, followed by Fabaceae, Cucurbitaceae and Verbenaceae (Fig. 2). In case of Habitat distribution 35% has been represented by trees, 32% by herbs, 18% by shrubs and 15% by climbers (Fig. 3). Most of the ethnomedicinal plants were collected from wild habitat. Among the plant parts used, leaf was the most frequently used plant parts (44%) followed by Fruit (18%), Bark (11%), Seed (6%), Whole plant (3%) Tuber (3%) and others (5%) including flower, stem, rhizome (Fig. 4).

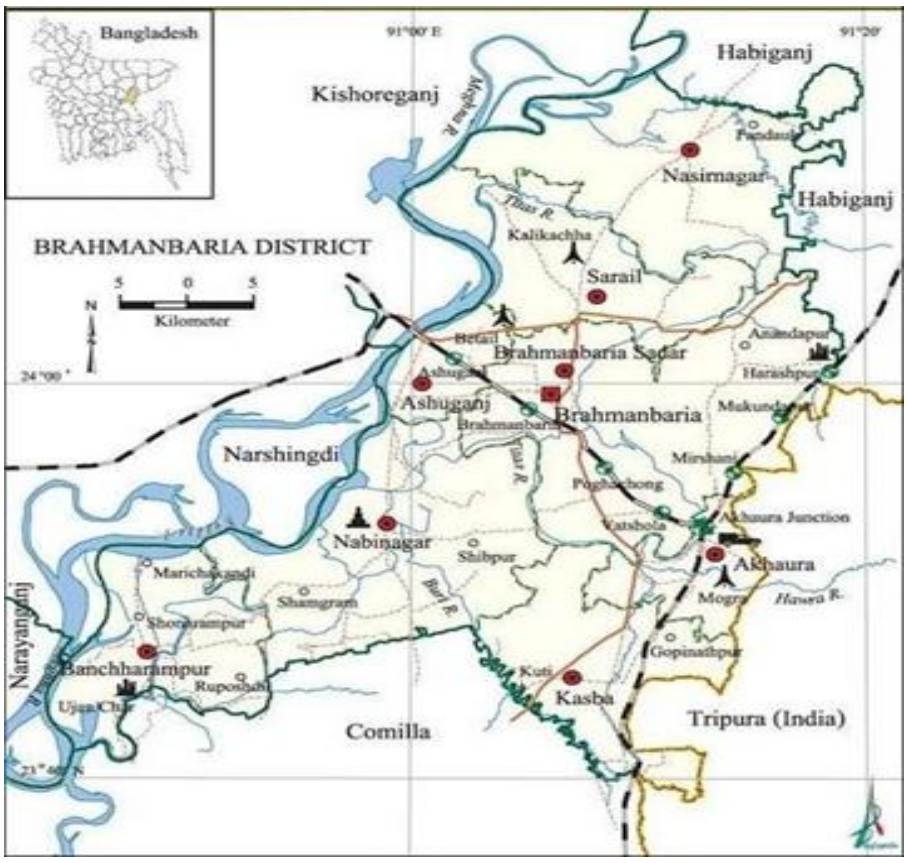

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Fig. 1: Study area of Brahmanbaria district.

Table-1: Ethnomedicinal data of medicinal plants and their uses. (T-Tree, S-Shrub, H-Herb, C-Climber,Wp-Whole plant).

Scuientific name	**Local name**	**Family**	**Habitat**	**Ailments**	**Parts use**	**Treatment mood**	**Citation frequency (CF%)**
Acacia niloticaTH-248	Babla	Mimosaceae	T	Diarrhea	Bark	Decoction taken internally twice daily	2.64
Albizzialebbeck(L.) Benth TH-249	Sirishkoroi	Mimosaceae	T	Inflammation	Bark	One or two table spoon powder mixed with one glass of water which taken internally	1.13
Allium sativum(L.) TH-117	Rosun	Liliaceae	H	Abdominal pain	Bulb	Paste taken internally with boiled rice	1.13
Amorphophalluspaeoniifolius (Dennst.) Nicolson TH-275	Olkochu	Araceae	H	Diarrhea	Tuber	Decoction taken internally	1.13
Antigononleptopus Hook. et Arn.TH-247	Anantamul	Polygonaceae	C	Diarrhea	Root	Decoction taken internally	0.37
Bacopamonnieri(L.) TH-261	Brammi	Scrophulariaceae	H	Stomachache	Leaf	Juice taken internally	1.13
Barringtoniaacutangula (L.) Gartn. TH -305	Eijolgach	Lecythidaceae	T	Gastric	Leaf	Juice taken internally	0.75
Basella alba (L.) TH-114	Puilata	Basellaceae	C	Constipation	Twig	Cooked with oil & salt which taken internally	1.13
Boerhaaviadiffusa(L.) TH-14	Punarnabba	Nyctaginaceae	S	Digestion	Leaf	boiled leaf taken internally	0.75
Celosia cristata (L.) TH-278	Morogful	Amaranthaceae	H	Diarrhea	Leaf	Juice is prepared by mixing salt and sugar and taken internally every day until disease is cured	0.75
Centellaasiatica(L.) Urban TH-02	Tunimankoni	Apiaceae	H	Dysentery	Wp	Juice or paste taken	24.5

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						internally until cure	
Centellaasiatica (L.) Urban, TH-02	Tiamoni	Apiaceae	H	Stomach ache	Leaf	Paste taken with Boiled rice	5.28
Chromolaenaodorata (L.) R.M.King&H.Rob. TH-276	Assamlata	Asteraceae	C	Dysentery	Leaf	Juice is taken internally	0.37
Citrus aurantifolia(Cristm. & Panzer) Swingle	Kangogilebu	Rutaceae	S	Laxative	Fruit	Juice mixed with boiled water & taken internally	3.01
Clerodendrumviscosum Vent, TH-153	Vetvedi	Verbenaceae	S	Diarrhea	Leaf	Extract internally taken by children	16.2
Coccineacordifolia(L.) Cogn. TH-03	Telakucha	Cucurbitaceae	C	Appetizer	Leaf	Paste taken with Boiled rice	1.88
Crataeva magna (Lour.) DC. TH-32	Barunpata	Capparaceae	T	Diarrhea	Leaf	Juice taken internally	0.37
*Crotalaria pallida*Ait. TH-246	Jhunjune	Fabaceae	S	Digestion	Root	Extract taken Internally	0.75
Cucumissativus(L.) TH-268	Sasha	Cucurbitaceae	H	Gastric	Fruit	Taken internally	0.75
*Cucurbita maxima*Duch TH-303	Mistikumra	Cucurbitaceae	C	Laxative	Fruit	Boiled with salt & taken internally	0.75
Cuminumcyminum TH-302	Zira	Apiaceae	H	Gastric	Seed	Powder mix with water & taken internally	0.37
*Dalbergiasissoo*Miq TH-104	Sissoo	Fabaceae	T	Dysentery	Leaf	One spoon of juice taken internally two times daily for seven days	9.06
Echinopsisperuviana(Britton & Rose) TH-134	Hizgach	Cactaceae	H	Constipation	Aerial part	Decoction taken internally every morning for several days	0.37
Eryngiumfoetidum(L.) TH-63	Rashnapata/BoroDhania	Apiaceae	H	Appetizer	Wp	Juice Taken internally	0.75
Ficusbenghalensis(L.) TH-166	Botgach	Moraceae	T	Dysentery	Root	Juice taken internally	0.37
Gloriosasuperba (L.) TH-287	Ulatchandal	Liliaceae	C	Stomachache	Tuber	One spoon of extract taken	0.37

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						internally	
Hibiscus rosasinensis(L.)TH-163	Roktojaba	Malvaceae	S	Dysentery	Leaf	Mashed & taken with rice	1.88
Hibiscus sabdariffa (L.) TH-58	Mestapata	Malvaceae	H	Appetizer	Fruit	Boiled with water & salt than taken internally	0.37
Holarrhenaantidysenterica(L.) Wall. ex Decne. TH-148	Kuruz	Apocyanaceae	T	Dysentery	Leaf	Juice of fresh leaf taken internally at morning	21.5
Hyptissuaveolens(L.) Poit. TH-38	Tokmai	Lamiaceae	H	Constipation	Seed	Juice taken internally	0.75
Ipomoea batatas(L.) Lamk. TH-107	Mistialu	Convulvulaceae	C	Stomach ache	Leaf	Paste taken with boiled rice	2.26
JusticiagendarussaBurm. f. TH-176	Jogmardon	Acanthaceae	S	Stomach ache	Leaf	Juice taken internally	0.37
Lanneacoromandelica(Houtt.) Mers. TH-132	Zigargach	Anacardiaceae	T	Dysentery	Bark	Extract taken internally for three days	0.37
Lantana camara(L.) TH-168	Chutrapata	Verbenaceae	S	Abdominal pain	Leaf	Decoction taken internally	0.75
Lippia alba (Mill.) Briton *et* Wilson TH-138	Motka	Verbenaceae	H	Diarrhea	Leaf	Juice taken 2/3 times everyday until disease is cured	10.9
Litseaglutinosa (Lour.) Robinson, TH- 08	Menda	Louraceae	T	Dysentery	Leaf	Mashed with water than one glass taken internally in morning & evening until cure	34.7
LudwigiaascendensTH-252	Mulsi	Onagraceae	H	Dysentery	Leaf	Extract taken Internally	0.75
Ludwigiaprostrata(Roxb.) TH-187	Nakful	Onagraceae	H	Diarrhea	Leaf	Cooked & taken internally	0.37
Lycopersiconlycopersicum (L.) Britton & Brown TH-128	Tometo	Solanaceae	h	Appetizer	Fruit	Ripe fruit taken as salad	0.75
Mangiferaindica(L.)sw, TH-133	Aam	Anacardiaceae	T	Diarrhea	Leaf	Chewed young leaves	13.2
Melastomamalabathric	jonglitezpata	Melasomatac	S	Diarrhea	Leaf	decoction	1.13

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um(L.) TH-185		eae				taken internally	
Mesuaferra (L.) TH-295	Nageshor	Clusiaceae	S	Dysentery	Leaf/ Flower	Decoction taken internally in empty stomach until disease is cured	1.50
Mimosa pudica (L.) TH-35	Lajonti	Mimosoideae	H	Diarrhea	Root	Juice taken internally	4.52
Moringaoleifera lamk, TH-26	Sajna	Moringaceae	T	Diarrhea	Leaf	Fried leaf eaten with rice twice a day for 3 days	0.37
Murrayapaniculata(L.) Jack TH-22	Kaminiful	Rutaceae	T	Stomachache	Leaf	Juice taken internally	1.13
Musa paradisiaca(L.) TH-67	Attya kola	Musaceae	T	Dysentery	Fruit	Crusted raw fruit taken orally with rice until cure	6.41
Paederiafoetida(L.) TH-30	Padrapata	Rubiaceae	C	Diarrhea	Leaf	Paste taken internally with rice	11.6
Pasplumscrobiculatum(L.) TH-123	Dhandurba	Poaceae	H	Diarrhea	Wp	Tied around west until cure	3.39
Phyllanthusembelica(L.) TH-05	Amloki	Euphorbiaceae	T	Appetizer	Fruit	Crusted dry fruit taken internally	13.2
Phyllanthusreticulatus(Poir.) TH-61	Sitki	Euphorbiaceae	S	Diarrhea	Stem & Leaf	One spoon of extract taken internally for child	4.90
Pithecellobiumdulce (R oxb.) Benth, TH-231	Moccasarifgach	Mimosaceae	T	Stomachache	Bark	Decoction is taken internally twice daily	8.67
Pithecellobiumdulce (R oxb.) Benth, TH-231	Moccasarifgach	Mimosaceae	T	Diarrhea	Bark	Boiled in water which is taken two times daily	3.01
Polygonumhydropiper(L.),TH-88	Bishkatali	Polygonaceae	H	Dysentery	Leaf	Juice taken internally	1.13
Portulacaoleracea (L.) TH-289	Nontashakh	Portulaceae	H	Dysentery	Wp	Decoction is given to children	13.5
Psidiumguajava(L.), TH-109	Peara	Myrtaceae	T	Diarrhea	Leaf	Juice of young leaves taken internally	9.43

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Rosa damascena Mill. TH-129	Golap	Rosaceae	S	Digestion	Flower	Juice taken internally	0.75
Santalum album (L.) TH-272	Chandongach	Santalaceae	T	Gastric	Bark	Grinded to form powder which is taken internally	0.75
Syzygiumjambos(L.) Alston TH-161	Golapjam	Myrtaceae	T	Appetizer	Fruit	Taken internally as necessary	3.77
Tectonagrandis (L.) TH-277	Kathgach	Verbenaceae	T	Stomachache	Bark	Decoction of young stem bark is mixed with leaf paste of *Centellaasiatica* which is taken internally	1.50
Terminalia arjuna(Roxb. ex DC.) Wight & Arn.TH-01	Aurjun	Combretaceae	T	Gastric	Fruit	Powder of bark mix with water & taken internally	1.13
Trigonellafoenum-graecum(L.) TH-101	Methi	Fabaceae	H	Gastric	Seed	Fried & taken internally	0.37
Vignaunguiculata (L.) Walp. TH-253	Barbati	Fabaceae	C	Laxative	Fruit	Paste taken internally	0.75

Table 2. Fidelity level (FL) of most cited ethnomedicinal plants.

Scientificname	**Np**	**N**	**FL(%)**
Litseaglutinosa (Lour.) Robinson, TH- 08	92	92	100
Centellaasiatica(L.) Urban TH-02	65	74	87.84
Holarrhenaantidysenterica(L.) Wall.*Decne.* TH-148	57	57	100
Clerodendrumviscosum Vent, TH-153	43	43	100
Portulacaoleracea (L.) TH-289	36	36	100
Mangiferaindica(L.) TH-133	35	35	100
Phyllanthusembelica(L.) TH-05	35	35	100
Paederiafoetida(L.) TH-30	31	31	100
Lippia alba (Mill.) Briton *et* Wilson TH-138	29	29	100
Psidiumguajava(L.) TH-109	25	25	100
Pithecellobiumdulce (Roxb.) Benth, TH-231	23	31	74.19
Musa paradisiaca(L.) TH-67	17	17	100

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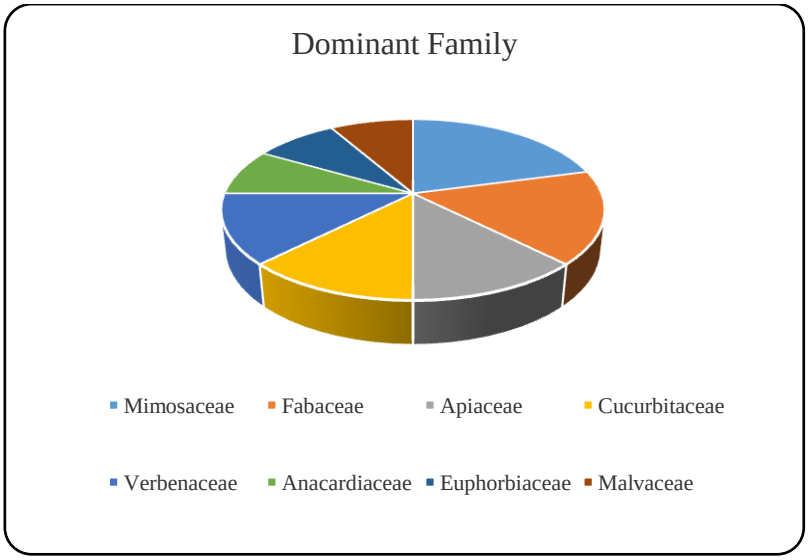

Fig. 2. Number of useful ethnomedicinal plant species per family from the study area.

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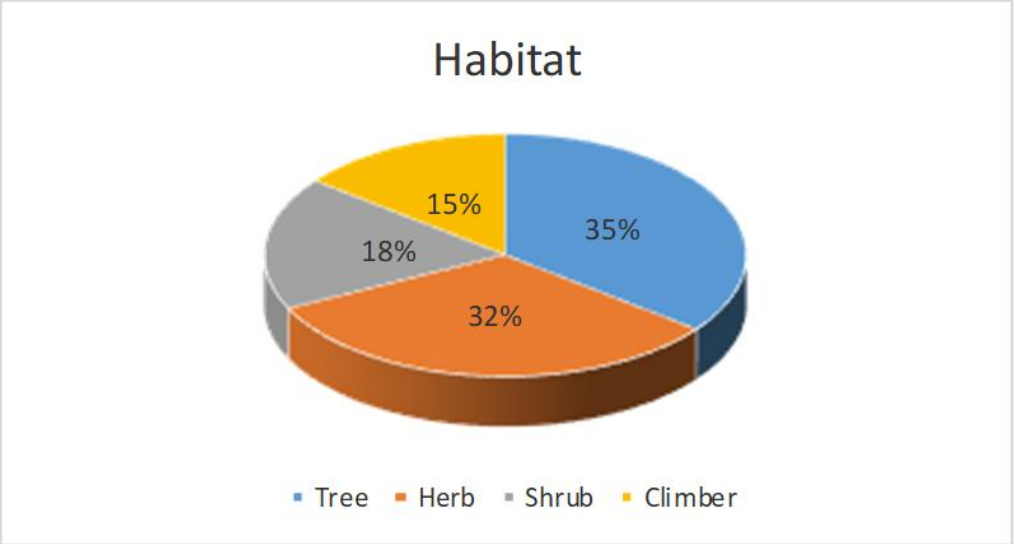

Fig. 3. Diversity of habits of medicinal plants.

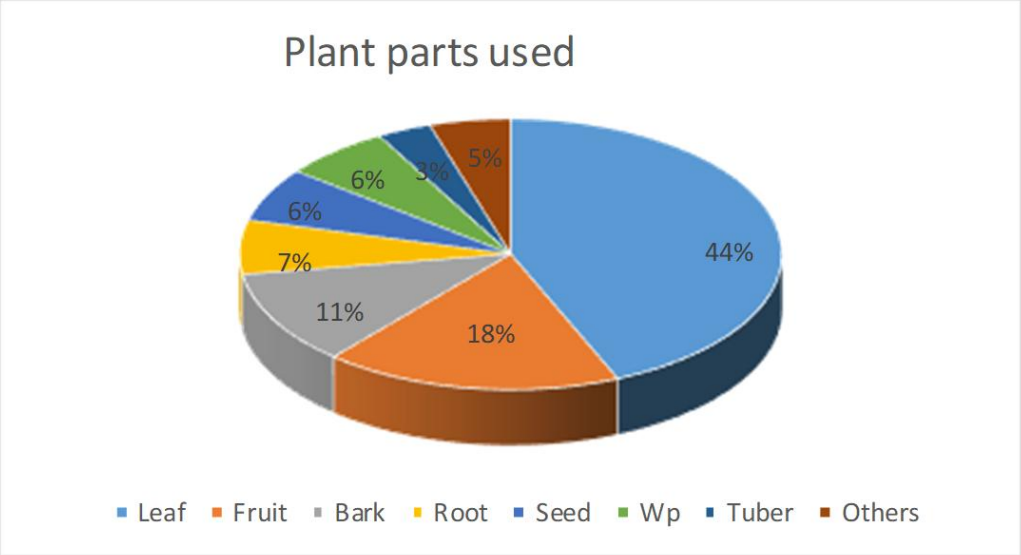

Fig. 4. Consensus in the plant parts used in the study area.

A total 63 actual use records were registered by piloting the 265 interviewed with key informants and local residents. The ailment for which there was the most frequently reported was diarrhea and dysentery whereas abdominal pain, appetizer, constipation, laxative, digestion, diuretic and gastric were also common. According to citation frequency most cited plant species in the gastrointestinal diseases were*Litseaglutinosa*(34.7%), *Centellaasiatica*(24.5%),*Holarrhenaantidysenterica*(21.5%), *Clerodendrumviscosum*(16.2%),*Portulacaoleracea*(13.5%), *Mangiferaindica*(13.3%),*Phyllanthusreticulatus*(13.2%) and *Paederiafoetida*(11.6%). Most of the ethnomedicinal plants showed 100% fidelity level. *Centellaasiatica* showed 87.8% fidelity level and *Pithocellobiumdulce*had 74% fidelity level (Table-2).

4. Discussion

In the present study 61 ethnomedicinal plant species from 40 families with 63 uses were mentioned by conducting 265 interviews at nine upazila of Brahmanbaria district from the local people of Brahmanbaria, Bangladesh. The results exposed the ethnomedicinal plants including family, habitat, use parts and use formularies focuses on gastrointestinal disease category. Among the 40 families, Mimosaceae was most represented in terms of the number of species, followed by Fabaceae, Cucurbitaceae and Verbenaceae. The family Fabaceae reportedly has the

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highest numberof species more than any other plant family in the world (Chandra, 2005&Haque*et al*., 2014). A similar trend was also observed that trees and herbs were the most used growth form of ethnomedicinal plants in the study area which also found in other investigation (Haque*et al*., 2017). Leaves are the most commonly used plant parts for the preparation of the medicine (Fig. 3). The reason why leaves were used mostly is that they are collected very easily than underground parts, flowers and fruits. On the other hand, leaves are active in photosynthesis and produce metabolites (Ghorbani, 2005&Tangjitman*et al.*, 2015).

The most common ailment was diarrhea and dysentery in the study area possibly showed that this ailment is common in the study area due to poor sanitation in the region. The local people of Brahmanbaria also used the plant species against ailments such as abdominal pain, appetizer, constipation, laxative, digestion, diuretic and gastric. Therefore, this indicates that the gastrointestinal diseases are common in the study area and local people prefer to use plants to get remedy. Usually rural people collect medicinal plants from their backyards and surroundings as well as use them to treat these diseases. Most of the treatment formularies inherited by elder person of the family and from local medicine men (kabiraj) or personal experience.

Ethnomedicinal plant having highest CF value and FL value (highest citation frequency) of the present survey which is discussed here comparing with the other related literature. The species accountable for the high CF and FL value for gastrointestinal diseases were *Litseaglutinosa,Centellaasiatica, Holarrhenaantidysenterica, Clerodendrumviscosum, Portulacaoleracea, Mangiferaindica, Paederiafoetida*and*Phyllanthusreticulatus.* Among them *Litseaglutinosa* (CF= 34.7% and FL=100%) was the best used medicinal plant in the study area for the cure of diarrhea and dysentery. The ethanol and aqueous extracts of leaves showed antibacterial activity (Haque*et al*. 2022). The bark has effective antibacterial activities against *Pseudomonusaeroginosa, Staphylococcus aureus* and *E.coli*. The bark showed also antifungal activities against *Aspergillus fumigates*&*Candida albicans* (Hosamath, 2011). Uddin (2014) suggest that *Litseaglutinosa* might be used for the development of new, cheap, effective, and eco-friendly herbal formulations for health-care management but the illegal and unsustainable collection of bark from this tree by the local crude drug traders considered as major causes of its depletion from nature. The second highest scored plant was*Centellaasiatica* (CF=24.5% and FL= 87.8%) used for the treatment of dirrhoea and stomachache. This plant is also used for treatment of various diseases like dysentery by the Bauri tribe (Das *et al*., 2013).*Dalbergiasissoo* used for dirrhoea in present study, also reported in Feni districts with a high citation (Uddin *et al*., 2015). These result might confirm that notable ethno medicinal plants have a potential effect on treating gastrointestinal disorders. So these Plants should be further investigated for updated their validation scientifically.

5. Conclusion

Gastrointestinal disorders are one of the most common types of ailments affecting humans. Several ethnomedicinal studies revealed that the use of medicinal plants by traditional people against digestive system disorders is a common practice throughout the world. The present study is the first time effort to documented gastrointestinal disease activity of ethnomedicinal plants of Brahmanbaria district. The results indicated that the study area is rich in ethnomedicinal plants and diversity of knowledge of medicinal uses in the primary health care. The ethnomedicinal plants secured high CF and FL values such as: *Litseaglutinosa,Centellaasiatica, Holarrhenaantidysenterica, Clerodendrumviscosum, Portulacaoleracea, Mangiferaindica, Paederiafoetida*and*Phyllanthusreticulatus*should be scientifically investigated. Ethnomedicinal plants have been used in Brahmanbaria but most of them have not been studied and documented. Therefore, the present study successfully recorded and documented the uses of ethnomedicinal plants focusing on gastrointestinal disease category. The present information on these ethnomedicinal plants, which have high CF and FL values, may serve as the baseline data to initiate further research for the discovery of new compounds to the remedy of gastrointestinal diseases.

6. Acknowledgement

Greatly acknowledged for the financial support of the Prime Minister's Office of the Government of the People's Republic of Bangladesh and also thankful to the local people of Brahmanbaria district who provided information during data collection.

7. Conflict of interest

The authors declared there is no conflict of interest.

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