

ETHNOMEDICINAL PLANTS FOR CARDIOVASCULAR DISEASES MANAGEMENT IN MANIKGANJ DISTRICT

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Abstract

The present research deals with the identification of ethnomedicinal plants used by the local people for curing cardiovascular diseases in Manikganj district, Bangladesh. The present study aimed to record and validate the ethnomedicinal knowledge used by the local people for cardiovascular disease (CVD) management in Manikganj district, Bangladesh using recent ethnobotanical survey methods. The record of 131 ethnomedicinal plant species with diverse use patterns reflected the traditional knowledge richness in the study area. Among the ethnomedicinal plants, 10 plant species, including *Phyllanthus emblica* L., *Allium sativum* L., *Terminalia arjuna* (Roxb. Ex DC.) Wight & Arn, *Achyranthes aspera* L., *Terminalia chebula* Retz., *Allium cepa* L., *Adhatoda zeylanica* Nees, *Cinnamomum tamala* Nees & Eberm, *Cajanus cajan* (L.) Millsp, and *Ipomea aquatica* Forssk, were cited most frequently by the local people. Among the disease categories, the highest Fic (factor of informant consensus) value was obtained in cardiac complaints, followed by blood purifiers, chest pain, high blood pressure, and antioxidants. In this research, 131 plant species were recorded, and 45 plants obtained the highest FI (fidelity level) value of 100%. The members of the most common medicinal plants were from the families of Fabaceae, Amaranthaceae, Asteraceae, Cucurbitaceae, and Apocynaceae. This result provides baseline data to link the local population, including traditional health professionals and scientific communities, which could be significant in drug discovery and is very important for the sustainable development program and conservation management in Bangladesh.

Introduction

Cardiovascular disease (CVD), a group of heart and vascular diseases, is a leading cause of death and disability worldwide. In the past, there was a scarcity of modern drugs that bound people to depend on medicinal plant parts, which was so helpful for the local people at that time, especially the poor, who were not able to afford any kind of modern medicine because of its expenses. Many ancient herbs and their parts are shown to possess medicinal properties and can be used to prevent, alleviate, or cure several human diseases, especially cardiovascular diseases. It's calculable that between 70% and 80% of individuals worldwide rely on traditional, largely herbal medicine to meet their primary healthcare needs (Farnsworth and Soejarto 1991; Shengji 2001). It has been ascertained that a lot of trendy medicines are derived from the plants used by indigenous peoples (Balick and Cox, 2011; Rahmatullah, *et al.*, 2010). Worldwide, CVD plays a bigger role in being a significant explanation for morbidity and mortality (Krisela 2007). Historically, Bangladesh may have been burdened with infectious diseases like several low-income countries in

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the world. Compared to different ethnic groups, South Asians, like those from Bangladesh, Pakistan, Nepal, and other Asian nations and states, have a better prevalence of CAD and connected risks (Yusuf *et al.*, 2001). Southern Asians have a 3-5fold higher risk of myocardial infarction (Gupta *et al.*, 2006). Bangladesh has 99.6% of males and 97.9% of females exposed to one of the established risks of CVD, with CVD at a young age (males below 40 years of age) (El-Saharty *et al.*, 2013, Islam *et al.*, 2014, Enas *et al.*, 1995), and several plants are known to possess cardioprotective properties, resulting in their use by traditional healers for the treatment of chest complaints, high cholesterol, high and low blood pressure, and general heart problems. Although some plants have been used in various systems of ancient and traditional medicine to treat thrombolytic diseases or as antithrombotic agents, such plants claimed in ancient systems are still not scientifically proven (Kumar *et al.*, 2011; Manicam *et al.*, 2010). To safeguard this data, documentation of ethnic medicinal plants is already starting in Bangladesh. Several articles were revealed in this field, including Hassan and Khan (1986); Alam (1992); Alam *et al.* (1996); Uddin *et al.* (2001, 2006, 2012, 2017); Khan *et al.* (2002); Ghani (2003); Islam and Uddin *et al.* (2009); Uddin and Roy (2007); Roy *et al.* (2008); Uddin (2013); Haque *et al.* (2014); Uddin *et al.* (2015); Haque *et al.* (2017); Uddin *et al.* (2019); Uddin *et al.* (2023). This article lists several medicinal plants from specific communities, specific diseases, or specific regions in Asia. However, this study provides insufficient documentation of ethnomedicinal plant species contributing to the treatment of cardiovascular disease management in Manikganj district because, in previous years, only specific disease-related medicinal plants were documented in this specific region of Bangladesh (Eneh *et al.*, 2013). Further study is needed to identify the effectiveness of the medicinal plants in this district because the younger generation is not aware of the richness of medicinal plants in this area. Further analysis and conservation are needed for the prevention and treatment of cardiovascular diseases.

Materials and Method

The Manikganj District (Dhaka Division) spans 1383.66 square kilometers and is situated between latitudes 23°38' and 24°03' north and longitudes 89°41' and 90°08' east. The total area of Manikganj is 1,383.66 km² (534.23 sq mi) and the average annual temperature is between 36.5 °C and 12.7 °C, with 2,376 mm (93.5 in) of rainfall falling on average each year. The Padma, Kalinga, Jamuna, Dashwari and Ichamati Rivers are among the several rivers that flow through the Manikganj District. There are seven Upazilas in the District of Manikganj. This District is surrounded by the upazilas of Saturia to the north, Singair to the east, Harirampur to the south, Shivalaya and Ghior to the west, and Harirampur to the east. This district has a range of humidity levels from 56% to 83%. Silty and sandy alluvial soil, represented by the Brahmaputra Floodplain, makes up the majority of the surface soil associated with agriculture. The main river that flows through the research region is the Kaliganga River. 43.43% of the dwelling families in the research region rely on agriculture as their primary source of income, with 15.94% working in agriculture and 27.49% in cropland, livestock, forestry, and fishing (Sayed *et al.*, 2015).

The sampling sites were visited during the years 2018 and 2019 (Table 1). The visit duration for each site lasted for 4-5 days. The data on the medicinal uses of plants was recorded through semi-structured interviews with the help of herbal practitioners and also through key informant discussions (Alexiades, 1996). Field interviews, plant interviews, and group discussions with local people were also conducted for the promotion of data collection. During the field survey, information on the uses of plants to treat humans, modes of preparation, parts used, and mode of administration was documented. A total of 300 local informants, including 67% of males and 33% of females, were interviewed during the ethnobotanical survey. The local informants include housewives, herbalists, farmers, rickshaw-pullers, job-holders, craftspeople, shopkeepers, teachers

and students aged between 21–70 years old. Voucher specimens for each medicinal plant species were collected and processed using standard herbarium techniques (Hyland, 1972). Identification of plant species was confirmed using standard literature (Siddiqui *et al.*, 2007 and Ahmed *et al.*, 2008-2009). All voucher specimens were deposited at DUSH.

Table 1. Data collections sites in and around Manikganj district.

Visit no.	Name of place	GPS (Latitude, Longitude)
1.	Manikganj Sadar	23° 51' 0.00" N, 90° 00' 39.96" E
2.	Shivalaya	23° 49' 59.88" N, 89° 47' 30.12" E
3.	Singair	23° 49' 0.12" N, 90° 09' 0.00" E
4.	Daulatpur	24° 00' 5.04" N, 88° 52' 30.00" E
5.	Ghior	23° 53' 15.00" N, 89° 50' 15.00" E
6.	Harirampur	23° 43' 59.88" N, 89° 58' 0.12" E
7.	Saturia	23° 35' 33.00" N, 90° 01' 23.16" E

For estimating the diversity of medicinal plants and determining which plants are particularly valuable in the search for bioactive compounds, the factor of informant consensus (Fic) was calculated (Heinrich *et al.*, 1998). Fic is calculated in the following equation: $Fic = N_{ur} - N_{taxa} / N_{ur} - 1$, where N_{ur} is the number of use-reports in each category and N_{taxa} is the number of species in each category (Trotter and Logan, 1986; Heinrich *et al.*, 1998). A Fic-Value provides a range from 0 to 1, where a high Fic-Value (close to 1) means that there is a well-defined group of species used to cure a particular ailment-category and that information is exchanged between informants. On the other hand, a low Fic value (close to 0) indicates that informants disagree over which plants to use, due to random choice or a lack of exchange of information about the use of informants. Such analyses classified disorders into groups, such as plant species with a high Fic value, which can be considered more pharmacologically effective than plant species with a low Fic value (Ragupathy *et al.*, 2008). The credibility level was calculated for the foremost reported medicinal plant species as: $Fl (\%) = (N_p / N) \times 100$; wherever N_p = the number of informants that claim the use of a plant species to treat a specific disease. N = the number of informants that use the plants as medicine to treat any given disease (Friedman *et al.*, 1986). The Fidelity Level (Fl) varies from 0 to 100%. Medicinal plants, that are widely used by local individuals for certain ailments, have higher Fl-values, instead of those, that are less well-liked for being considered good remedies. Citation frequency (Cf) was calculated using the following method:

Frequency of citation for a particular species =

(Number of citations for that particular species/Number of all citations for all species) x 100.

Results and Discussion

The present ethnobotanical survey has recorded a total of 131 medicinal plants with 114 formularies belonging to 61 families that were acquired by conducting 300 interviews for the treatment of cardiovascular disease. For each species, the scientific name and voucher number, local name, family, habit, ailments, part(s), and treatment mode have been provided (Table 2).

Table 2. Ethnobotanical data on medicinal plants and uses in the study area.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Abelmoschus esculentus</i> (L.) Moen., TSJ- 82	Dherosh	Malvaceae	Herb	Antioxidant	Cooked fruit is taken as vegetable.
				Blood purifier	Cooked fruit is taken as vegetable.
				Cardiac complaints	Cooked fruit is taken as vegetable.
				High blood pressure	Young fruit is boiled in water, and the water is consumed regularly.
<i>Abroma augusta</i> (L.) L. f., TSJ- 76	Ulat-kambal.	Sterculiaceae.	Shrub	Heart disease	Leaf juice is taken.
<i>Acalypha indica</i> L., TSJ- 20	Muktajhuri	Euphorbiaceae	Herb	Blood purifier	Leaf juice is taken.
				Blood purifier	Root juice is taken
<i>Achyranthes aspera</i> L., TSJ-70	Apang	Amaranthaceae	Herb	Chest pain	One gm of seed powder is taken.
				Cardiac complaints	One ml of leaf juice is taken with cold water.
<i>Acorus calamus</i> L., TSJ- 109	Boch	Araceae	Herb	Antioxidant	Rhizome powder is used as spice in cooking.
				Cardiac complaints	Rhizome soaked in water overnight and the extract is taken in the morning.
<i>Aegle marmelos</i> (L.) Corr., TSJ-75	Bel	Rutaceae	Tree	Cardiac complaints	6-12 gm root powder is taken with milk.
<i>Allium cepa</i> L., TSJ-110	Piaj	Liliaceae	Herb	Blood purifier	1 ml of bulb juice is taken.
				Cardiac complaints	Young bulb is taken directly.
				High blood pressure	Leaves are taken as vegetable.
<i>Allium sativum</i> L., TSJ- 83	Rosun	Liliaceae	Herb	Cardiac Complaints	2 pieces of bulb is taken everyday.
				High blood pressure	Bulb paste is taken with boiled rice.
				Antioxidant	Leaf juice is taken.
<i>Aloe vera</i> (L.) Burm. f., TSJ-79	Ghritokumari	Aloaceae	Herb	Blood purifier	Latex paste is eaten with honey.
				Cardiac complaints	Latex is taken as vegetable.
				High blood pressure	Latex pieces is taken internally.
				High blood pressure	50 gm bark powder is taken with hot water twice in a day.
<i>Alstonia scholaris</i> R. Br., TSJ-9	Chatim	Apocynaceae	Tree	High blood pressure	50 gm bark powder is taken with hot water twice in a day.
<i>Alternanthera sessilis</i> (L.) R.Br., TSJ-84	Hainsashak, Kathapata shak	Amaranthaceae	Herb	Chest pain	Cooked whole plant is taken as vegetable.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Amaranthus tricolor</i> L., TSJ-85	Lalshak	Amaranthaceae	Herb	Antioxidant	Cooked whole plant is taken as vegetable.
				Blood purifier	Cooked whole plant is taken as vegetable.
				Cardiac complaints	Whole cooked plants are consumed as vegetables.
				High blood pressure	Cooked whole plant is taken as vegetable.
<i>Amaranthus spinosus</i> L., TSJ-86	Katanote shak	Amaranthaceae	Herb	Blood purifier	Whole cooked plants are consumed as vegetables.
<i>Amaranthus viridis</i> L., TSJ-87	Note shak	Amaranthaceae	Herb	Blood purifier	Cooked whole plant is taken as vegetable.
<i>Anacardium occidentale</i> L., TSJ-111	Kajubadam	Anacardiaceae	Tree	Cardiac complaints	Fried seed is taken.
<i>Andrographis paniculata</i> Nees., TSJ-19	Kalomegh	Acanthaceae	Herb	Antioxidant	Leaf juice is taken with honey.
				Blood purifier	Leaf juice is taken.
<i>Aquilaria malaccensis</i> Lam., TSJ-112	Agor	Thymelaeaceae	Tree	Cardiac complaints	2/3 gm bark powder is taken with milk twice a day.
<i>Arachis hypogaea</i> L., TSJ-24	China badam	Fabaceae	Herb	Antioxidant	Fried seed is taken.
				Blood purifier	5/10 seed soaked in water overnight and take the water with seed.
				Cardiac complaints	Seed juice is taken.
				High blood pressure	Seed paste is taken with boiled rice.
<i>Artabotrys hexapetalus</i> (L.f.) Bhandari., TSJ-113	Kathalichapa	Annonaceae	Shrub	Blood purifier	Flower powder is taken in empty stomach with water twice in a day.
<i>Artocarpus heterophyllus</i> Lamk., TSJ-88	Kathal	Moraceae	Tree	Antioxidant	Seed paste is taken with boiled rice.
				Blood purifier	Young fruit is taken as vegetable.
				Cardiac complaints	Ripe Fruit is taken.
				High blood pressure	Ripe Fruit is taken.
<i>Asclepias curassavica</i> (L.), TSJ-89	Bon-karpash	Asclepiadaceae	Shrub	Chest pain	Leaf juice is taken with honey twice in a day with empty stomach.
<i>Asparagus racemosus</i> Willd., TSJ-90	Satamuli	Liliaceae	Climber	Antioxidant	5/7 gram boiled leaf is taken.
				Chest pain	2/3 ml root juice is taken with half cup of raw milk and drink it in empty stomach.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Averrhoa bilimbi</i> L., TSJ-16	Bilombo	Oxalidaceae	Tree	Antioxidant	Leaf paste is taken in empty stomach.
				High blood pressure	Fruit is taken with salt.
<i>Averrhoa carambola</i> L., TSJ-52	Kamranga	Oxalidaceae	Tree	Antioxidant	Fruit is preserved as pickles.
				Cardiac complaints	Ripe Fruit is taken.
				High blood pressure	Fruit juice is taken.
<i>Azadirachta indica</i> A. Juss., TSJ-62	Neem	Meliaceae	Tree	Blood purifier	Young leaf juice is taken.
				High blood pressure	Leaf juice is taken with honey.
<i>Baccaurea ramiflora</i> Lour., TSJ-1	Lotkon	Euphorbiaceae	Tree	Cardiac complaints	Fruit juice is taken
<i>Bacopa momiera</i> (L.) Pennel., TSJ-8	Brahmishak	Scrophulariaceae	Herb	Antioxidant	Cooked leaf is taken as vegetable.
				High blood pressure	Cooked leaf is taken as vegetable.
<i>Basella alba</i> L., TSJ-100	Puisak	Basellaceae	Climber	Antioxidant	Cooked leaf is taken as vegetable.
				Cardiac complaints	Leaf juice is taken.
				High blood pressure	Boiled leaf is taken.
<i>Benincasa hispida</i> (Thub.) Cogn., TSJ-114	Chal kumra	Cucurbitaceae	Climber	Blood purifier	Cooked fruit is taken as vegetable.
<i>Blumea lacera</i> (Burn. f.) DC., TSJ-22	Kukur shunga, Shealmoti	Asteraceae	Herb	Antioxidant	Cooked leaf is taken as vegetable.
<i>Boerhaavia diffusa</i> L., TSJ-74	Punornova	Nyctaginaceae	Herb	Cardiac complaints	5-10 ml leaf juice is taken twice in a day.
<i>Bombax ceiba</i> L., TSJ-115	Shimul	Bombacaceae	Tree	Blood purifier	1/2 gm root powder is taken with goat milk twice in a day.
<i>Brassica oleracea</i> var. <i>capitata</i> L., TSJ-116	Badhakopi	Brassicaceae	Herb	Blood purifier	Leaf is taken as salad.
				Cardiac complaints	Cooked leaf is taken as vegetable.
<i>Brassica nigra</i> (L.) Koch., TSJ-54	Sorishashak	Brassicaceae	Herb	Cardiac complaints	Cooked leaf is taken as vegetable.
<i>Brassica oleracea</i> var. <i>botrytis</i> L., TSJ-117	Fulkopi	Brassicaceae	Herb	Antioxidant	1 cup boiled fruit is taken with salt.
				Blood purifier	Cooked fruit is taken as vegetable.
				Cardiac complaints	Boiled fruit paste is taken with rice.
<i>Cajanus cajan</i> (L.) Millsp., TSJ-12	Arhar	Fabaceae	Shrub	Blood purifier	Boiled leaf juice is taken.
				Cardiac complaints	Cooked seed is taken.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Camellia sinensis</i> (L.) O. Kuntze., TSJ-87	Cha pata	Theaceae	Shrub	Antioxidant	Boiled leaf juice is taken.
				Blood purifier	Boiled leaf juice is taken.
				Cardiac complaints	Boiled leaf juice is taken.
<i>Cardiospermum halicacabum</i> L., TSJ-44	Phutka, Bontepari	Sapindaceae	Climber	Antioxidant	Boiled leaf juice is taken.
				Cardiac complaints	Boiled leaf juice is taken.
<i>Carica papaya</i> L., TSJ-18	Pepe	Caricaceae	Shrub	Antioxidant	One ml of whole plant juice is taken with one spoon of water.
				Cardiac complaints	4/5 fruit is boiled with water and the juice is taken.
				Antioxidant	Leaf juice is taken.
<i>Carissa spinarum</i> L., TSJ-2	Koromcha	Apocynaceae	Shrub	Blood purifier	Young fruit is taken as salad.
				Cardiac complaints	Young fruit is taken as vegetable.
				High blood pressure	Ripe Fruit is taken.
<i>Cassia fistula</i> L., TSJ-69	Sonalu	Caesalpiniaceae	Tree	Cardiac complaints	Fruit is taken with salt.
				High blood pressure	Root juice is taken
<i>Senna occidentalis</i> (L.) Link, TSJ-119	Kolkesunda	Caesalpiniaceae	Herb	Antioxidant	Leaf juice is taken.
				High blood pressure	4/5 gm fruit is taken with half cup of milk and drink the mixture twice in a day.
<i>Catharanthus roseus</i> (L.) G. Don., TSJ-50	Nayantara	Apocynaceae	Herb	Chest pain	One gram dried flower powder is taken with milk twice in a day.
				Blood purifier	Leaf juice is taken.
<i>Centella asiatica</i> (L.) Urban., TSJ-67	Thankuni	Apiaceae	Herb	High blood pressure	Root juice is taken with empty stomach.
				Blood purifier	4 ml leaf juice is taken with one spoon honey and drink the mixture in empty stomach.
<i>Chenopodium album</i> L., TSJ-101	Bathuashak	Amaranthaceae	Herb	Blood purifier	Cooked plant is taken as vegetable.
<i>Cinnamomum tamala</i> Nees &Eberm., TSJ-81	Tejpata	Lauraceae	Tree	Antioxidant	Dried leaf powder is used as spice.
				Blood purifier	Leaf soaked in hot water overnight and then water is taken in the next day morning.
				Cardiac complaints	3 gm leaf powder mixed with 300 ml water boiled for few minutes and drink the juice.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Cinnamomum verum</i> Presl., TSJ-56	Darchini	Lauraceae	Tree	Antioxidant	Bark powder is taken as spice.
				Blood purifier	Bark powder is taken with honey.
				Cardiac complaints	Bark is soaked with water overnight and then water is taken in the next morning in empty stomach.
<i>Cissus quadrangularis</i> L., TSJ-77	Harjora	Vitaceae	Climber	High blood pressure	Leaf juice is taken.
<i>Citrullus lanatus</i> (Thumb.) Marts., TSJ-120	Tormujh	Cucurbitaceae	Creeper	Antioxidant	Outer surface of the fruit is taken as salad.
				Cardiac complaints	Ripe Fruit is taken.
<i>Citrus aurantifolia</i> (Christm. & Panzer) Swingle., TSJ-49	Kagojilebu	Rutaceae	Shrub	Antioxidant	Young Fruit is taken as vegetable. Fruit juice is taken.
				Chest pain	One ml of fruit juice is taken with half glass of water.
				High blood pressure	Outer surface of the fruit is taken as salad.
<i>Citrus maxima</i> (Burm.) Merr., TSJ-3	Jambura	Rutaceae	Tree	Antioxidant	Ripe Fruit is taken.
				Blood purifier	Outer surface of the fruit is taken as salad.
				High blood pressure	Fruit juice is taken.
<i>Citrus reticulata</i> Blanco., TSJ-45	Komolalebu	Rutaceae	Shrub	Antioxidant	Outer surface of the fruit is taken as salad. Ripe Fruit is taken.
				Cardiac complaints	Ripe Fruit is taken.
				High blood pressure	Fruit juice is taken.
<i>Cocos nucifera</i> L., TSJ-121	Narikel	Arecaceae	Tree	Antioxidant	Cooked copra is taken with sugar.
				Blood purifier	Young fruit is taken.
				Cardiac complaints	Young fruit is taken in empty stomach.
				High blood pressure	Young fruit juice is taken.
<i>Corchorus capsularis</i> L., TSJ-43	Path shak	Tiliaceae	Herb	Antioxidant	Cooked leaf is taken as vegetable.
				Blood purifier	Cooked leaf is taken as vegetable.
				Cardiac complaints	Cooked leaf is taken as vegetable.
				High blood pressure	Cooked leaf is taken as vegetable.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Coriandrum sativum</i> L., TSJ-122	Dhonia	Apiaceae	Herb	Antioxidant	Leaf juice is taken.
				Blood purifier	Seed soaked in water then the water is taken.
				High blood pressure	Leaf paste is taken with boiled rice.
<i>Croton bonpladianus</i> Baill., TSJ-102	Bon tulshi	Euphorbiaceae	Shrub	Antioxidant	Leaf juice is taken with honey in empty stomach.
				Cardiac complaints	Fresh leaf is chewed in every morning with empty stomach.
<i>Cucumis sativus</i> L., TSJ-123	Sosha	Cucurbitaceae	Climber	Cardiac complaints	Fruit is taken as salad.
<i>Cucurbita maxima</i> Duch, ex Lamk., TSJ-103	Mistikumra	Cucurbitaceae	Climber	Antioxidant	1 glass fruit juice is taken with honey 3 times in a day.
				Blood purifier	Seed paste is taken.
				High blood pressure	Cooked fruit is taken as vegetable.
<i>Curcuma longa</i> L., TSJ-104	Holud	Zingiberaceae	Herb	Antioxidant	Rhizome juice is taken with milk.
				Blood purifier	Rhizome juice is taken.
				Cardiac complaints	Rhizome powder is used in cooking.
<i>Cuscuta reflexa</i> Roxb., TSJ-105	Swarnalata	Cuscutaceae	Climber	Blood purifier	Stem juice is taken.
<i>Cynodon dactylon</i> Pers., TSJ-51	Durba ghash	Poaceae	Herb	Blood purifier	Leaf juice is taken with goat milk.
<i>Cyperus rotundus</i> L., TSJ-73	Mutha ghash	Cyperaceae	Herb	Blood purifier	One spoon of leaf juice is taken in empty stomach.
<i>Daucus carota</i> L., TSJ-124	Gajor	Apiaceae	Herb	Antioxidant	Tuber juice is taken.
				Blood purifier	Tuber is taken as salad.
				Cardiac complaints	Tuber is taken.
<i>Dillenia indica</i> L., TSJ-5	Chalta	Dilleniaceae	Tree	Antioxidant	Fruit is taken as vegetable.
				Blood purifier	Fruit juice is taken with warm water.
				Cardiac complaints	Fruit is preserved as pickles.
<i>Dioscorea alata</i> L., TSJ-39	Gach alu	Dioscoreaceae	Climber	High blood pressure	Cooked fruit is taken as vegetable.
<i>Diplazium esculentum</i> L., TSJ-33	Dheki shak	Polypodiaceae	Herb	High blood pressure	Cooked leaf is taken as vegetable.
<i>Eclipta prostrata</i> (L.) L., TSJ-47	Keshraj	Asteraceae	Herb	Blood purifier	One spoon of leaf juice is taken with one cup of water.
<i>Elaeocarpus floribundus</i> Blume, TSJ-71	Jolpai	Elaeocarpaceae	Tree	Antioxidant	Leaf juice is taken.
				Blood purifier	Fruit is preserved as pickles

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Elettaria cardamomum</i> (L.) Maton., TSJ-125	Elach	Zingiberaceae	Herb	Cardiac complaints	Fruit is taken.
				High blood pressure	Cooked fruit is taken as vegetable.
				Antioxidant	4/8 pieces seed soaked in water overnight and take it next morning in empty stomach
				Blood purifier	Seed is chewed in empty stomach.
<i>Enhydra fluctuans</i> Lour., TSJ-32	Helencha	Asteraceae	Herb	High blood pressure	Seed powder is taken as spice.
				Antioxidant	Cooked leaf is taken as vegetable.
				Blood purifier	20 ml leaf juice is taken with one spoonful of sugar.
<i>Ficus racemosa</i> L., TSJ-7	Jogdumur	Moraceae	Tree	High blood pressure	2 ml of leaf juice is taken with 2 ml of honey.
				Antioxidant	Young leaf is chewed with boiled rice 3 times in a day.
				Blood purifier	2 ml of bark juice is taken with honey.
<i>Ficus religiosa</i> L., TSJ-4	Pipal	Moraceae	Tree	High blood pressure	Cooked fruit is taken as vegetable.
				Blood purifier	2 gm of root powder is taken with one ml of water.
				Cardiac complaints	Fruit powder is taken with water.
<i>Helianthus annuus</i> L., TSJ-126	Surjomukhi	Asteraceae	Herb	Cardiac complaints	Seed oil is used in cooking.
<i>Hemidesmus indicus</i> (L.) R. Br., TSJ-56	Ananta mul	Asteraceae	Creepers	Blood purifier	1-3 gm root powder is taken after meal twice a day.
<i>Hibiscus rosa-sinensis</i> L., TSJ-80	Joba	Malvaceae	Shrub	Antioxidant	Dried flower powder is taken with boiled water.
				Blood purifier	Dried flower powder is taken with boiled water.
				High blood pressure	Dried flower powder is taken with boiled water.
<i>Hymenodictyon orixensis</i> (Roxb.) Mabb., TSJ-128	Bhuikadam	Rubiaceae	Tree	Antioxidant	Bark is soaked with water overnight and then water is taken in the next morning in empty stomach.
				High blood pressure	Bark is soaked in water overnight, and the following morning, water is consumed on an empty stomach.
<i>Hyptis suaveolens</i> (L.) Poit., TSJ-129	Tokma	Lamiaceae	Herb	Cardiac complaints	1 spoonful of seed is soaked with water overnight and then water is taken in the next morning in empty stomach.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Ipomoea aquatica</i> Forssk., TSJ-106	Kalmishak	Convolvulaceae	Creepers	Antioxidant	Cooked leaf is taken as vegetable.
<i>Ipomoea batatas</i> Lamk., TSJ-55	Misti alu	Convolvulaceae	Creepers	Antioxidant	Boiled tuber is taken.
				Blood purifier	Boiled tuber is taken with boiled rice.
				Cardiac complaints	Fried tuber is taken.
<i>Justicia adhatoda</i> L., TSJ-21	Basak	Acanthaceae	Shrub	Blood purifier	Leaf juice is taken.
<i>Kalanchoe pinnata</i> (Lamk.) Pers., TSJ-42	Pathorkuchi	Crassulaceae	Herb	High blood pressure	Leaf juice is taken.
<i>Lablab purpureus</i> (L.) Sweet., TSJ-25	Shim	Fabaceae	Climber	Antioxidant	Cooked seed is taken.
				Blood purifier	Flower is taken with salt.
				Cardiac complaints	Fruit paste is taken with boiled rice.
				High blood pressure	Cooked fruit is taken as vegetable.
<i>Lactuca sativa</i> L., TSJ-129	Lettuce pata	Asteraceae	Herb	Antioxidant	Leaf juice is taken.
				Blood purifier	Leaf is taken as salad.
				Cardiac complaints	Leaf powder is taken for flavouring food.
<i>Lagenaria siceraria</i> (Mol.) Stan., TSJ-64	Lau	Cucurbitaceae	Climber	Blood purifier	Leaf is taken as vegetable.
				Cardiac complaints	Boiled fruit paste is taken with boiled rice.
				High blood pressure	Fruit is taken as vegetable.
<i>Lawsonia inermis</i> L., TSJ-13	Mehedi	Lythraceae	Shrub	Blood purifier	Dried leaf powder is taken with boiled water.
<i>Lens culinaris</i> Medic., TSJ-131	Musur dal	Fabaceae	Herb	Blood purifier	Boiled seed is taken.
				Cardiac complaints	Boiled seed is taken.
				High blood pressure	Boiled seed paste is taken with boiled rice.
<i>Lycopersicon lycopersicum</i> (L.) Farewell., TSJ-68	Tomato	Solanaceae	Herb	Antioxidant	Young fruit is taken.
				Blood purifier	Fruit is taken as salad.
				High blood pressure	Young Fruit is taken as vegetable.
<i>Malus domestica</i> Borkh., TSJ-66	Apel	Rosaceae	Tree	Antioxidant	3 fruits are taken in empty stomach.
				Cardiac complaints	At least one fruit is taken everyday.
				High blood pressure	Fruit is taken as salad.
<i>Mangifera indica</i> L., TSJ-10	Aam	Anacardiaceae	Tree	Antioxidant	Dried leaf powder is taken twice in a day.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Mentha spicata</i> L., TSJ-60	Pudina	Lamiaceae	Herb	Blood purifier	Seed paste is taken with boiled rice.
				Cardiac complaints	Ripe Fruit is taken.
				High blood pressure	5-12 leaves are boiled with water and take water in an empty stomach.
				Antioxidant	6/7 leaves are taken with boiled with water.
<i>Momordica charantia</i> L., TSJ-107	Korola	Cucurbitaceae	Climber	Antioxidant	6/7 leaves are taken with boiled with water.
				Blood purifier	Leaf juice is taken.
				Cardiac complaints	Leaf is taken as salad.
				High blood pressure	2 leaves are chewed in every morning with empty stomach.
<i>Moringa oleifera</i> Lamk., TSJ-78	Sajna	Moringaceae	Tree	Antioxidant	2 leaves are chewed in every morning with empty stomach.
				Blood purifier	7 gm leaf powder is taken with water everyday.
				Cardiac complaints	Leaf paste is taken with boiled rice.
				High blood pressure	Leaf is taken as vegetable.
<i>Murraya koenigii</i> (L.) Spreng., TSJ-26	Curry pata, Choto kamini	Rutaceae	Shrub	Antioxidant	One cup leaf juice is taken with butter and black pepper.
				Blood purifier	4 fresh leaves are taken in empty stomach.
				Cardiac complaints	Leaf juice is taken.
<i>Musa paradisiaca</i> L., TSJ-23	Kola	Musaceae	Tree-like	Blood purifier	Leaf is taken as vegetable.
				Chest pain	Flower juice is taken at least for 15 days.
				Cardiac complaints	Young Fruit is taken as vegetable.
				High blood pressure	Ripe Fruit is taken.
<i>Nerium indicum</i> Mill., TSJ-36	Korobi	Apocynaceae	Shrub	Cardiac complaints	500 gm root powder is taken with honey.
<i>Nigella sativa</i> L., TSJ-30	Kalojira	Ranunculaceae	Herb	Blood purifier	Seed paste is taken with boiled rice.
				Cardiac complaints	One ml of seed oil is taken with one cup of milk.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Nyctanthes arbor-tristis</i> L., TSJ-57	Shiuli	Verbenaceae	Shrub	High blood pressure	One ml of seed oil is taken with one spoon of honey. Boiled leaf juice is taken.
				Antioxidant	
<i>Nymphaea nouchali</i> Burm. F., TSJ-65	Shapla	Nymphaeaceae	Herb	Blood purifier	Leaf juice is taken with honey. Flower is taken as vegetable.
				Cardiac complaints	
<i>Ocimum tenuiflorum</i> L., TSJ-11	Tulshi	Lamiaceae	Herb	Antioxidant	4/5 young leaves are chewed in empty stomach. Leaf juice is taken with honey.
				Blood purifier	
<i>Oldenlandia corymbosa</i> L., TSJ-91	Khet papra	Rubiaceae	Herb	Blood purifier	Boiled leaf juice is taken.
<i>Oryza sativa</i> L., TSJ-72	Dhan	Poaceae	Herb	Cardiac complaints	Boiled seed is taken.
<i>Phyllanthus emblica</i> L., TSJ-17	Amloki	Euphorbiaceae	Tree	Antioxidant	Fruit is taken. Fruit is preserved as pickles. Fruit juice is taken. Fruit powder is taken with milk everyday. Fruit powder is used as spice.
				Blood purifier	
				Cardiac complaints	
				High blood pressure	
<i>Piper nigrum</i> L., TSJ-28	Golmorich	Piperaceae	Climber	Antioxidant	Fruit powder is used as spice. One gm of fruit powder is boiled with two spoon of honey and then the mixture is taken.
				High blood pressure	
<i>Polyalthia longifolia</i> (Sonn.) Thw., TSJ-41	Debdaru	Annonaceae	Tree	Cardiac complaints	3-4 gram bark powder is taken with boiled water.
<i>Psidium guajava</i> L., TSJ-14	Peyara	Myrtaceae	Tree	Antioxidant	Leaf juice is taken in empty stomach. Ripe fruit is taken. Young fruit is taken as salad.
				Blood purifier	
				High blood pressure	
<i>Punica granatum</i> L., TSJ-58	Dalim	Lythraceae	Shrub	Antioxidant	Fruit juice is taken. Dried fruit surface powder is taken with water. Ripe fruit is taken. Fruit juice is taken. Fruit is taken as salad.
				Blood purifier	
				Chest pain	
				Cardiac complaints	
				High blood pressure	
<i>Raphanus sativus</i> (L.) Domin., TSJ-63	Mula	Brassicaceae	Herb	Antioxidant	Leaf juice is taken with honey. Boiled tuber is taken with salt. Cooked tuber is taken as vegetable.
				Blood purifier	
				Cardiac complaints	

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz., TSJ-34	Sarpagandha	Apocynaceae	Shrub	High blood pressure Cardiac complaints	Leaf is taken as vegetable. Root powder is taken after meal twice in a day.
<i>Rosa centifolia</i> L., TSJ-53	Golap	Rosaceae	Shrub	High blood pressure Blood purifier	Leaf juice is taken. 6 gm leaf crushed is taken with 60 ml water.
<i>Saraca asoca</i> (Roxb.) de Wild., TSJ-40	Ashok	Caesalpiniaceae	Tree	Blood purifier	Bark soaked with water overnight and then water is taken in empty stomach.
<i>Scoparia dulcis</i> L., TSJ-27	Chini-pata	Scrophulariaceae	Herb	High blood pressure	Leaf juice is taken.
<i>Solanum melongena</i> L., TSJ-92	Begun	Solanaceae	Shrub	Antioxidant Blood purifier	Fried fruit is taken. Boiled fruit is taken with salt.
<i>Spilanthes calva</i> DC., TSJ-31	Osom shak, Midi phul	Asteraceae	Herb	Cardiac complaints High blood pressure High blood pressure	Fruit is taken as vegetable. Boiled fruit paste is taken with boiled rice.
<i>Spinacia oleracea</i> L., TSJ-93	Palongshak	Chenopodiaceae	Herb	High blood pressure Antioxidant	Cooked leaf is taken as vegetable. Leaf juice is taken.
<i>Spondias pinnata</i> (L.f.) Kurz., TSJ-59	Amra	Anacardiaceae	Tree	Cardiac complaints High blood pressure Antioxidant	Boiled leaf paste is taken with boiled rice. Cooked leaf is taken as vegetable. Fruit is taken.
<i>Syzygium cumini</i> (L.) Skeels., TSJ-15	Jam	Myrtaceae	Tree	Blood purifier Cardiac complaints Antioxidant	Fruit juice is taken. Cooked fruit is taken as vegetable. Ripe Fruit is taken.
<i>Tamarindus indica</i> L., TSJ-37	Tetul	Caesalpiniaceae	Tree	Blood purifier High blood pressure Antioxidant	One gm of seed powder is taken in empty stomach. Fruit juice is taken. Fruit is preserved as pickles.
<i>Terminalia arjuna</i> (Roxb. Ex DC.) Wight & Arn., TSJ-35	Arjun.	Combretaceae	Tree	Blood purifier Cardiac complaints High blood pressure Chest pain	Leaf is taken with boiled water. Ripe Fruit is taken. Fruit juice is taken. Bark is decocted with water and then drink the water.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
				Cardiac complaints High blood pressure	Bark powder is taken in empty stomach. Bark is soaked in water overnight and then water is taken in the morning.
<i>Terminalia bellirica</i> (Gaertn.) Roxb., TSJ- 48	Bohera	Combretaceae	Tree	Cardiac complaints	Fruit is soaked in water overnight and then water is taken in the morning.
<i>Terminalia catappa</i> L., TSJ- 38	Kath badam	Combretaceae	Tree	Antioxidant Blood purifier	Boiled seed paste is taken with boiled rice. Seed is soaked in water overnight and then taken in the morning.
				Cardiac complaints High blood pressure	Seed is taken. Seed juice is taken with milk.
<i>Terminalia chebula</i> Retz., TSJ- 6	Haritaki	Combretaceae	Tree	Blood purifier	Fruit is soaked in water overnight and then water is taken in the morning.
				Cardiac complaints	Dried fruit powder mixed with Amloki and Bohera powder in water and drink the mixture in an empty stomach.
				High blood pressure	Fruit is decocted with water and then drink the water.
<i>Cascabela thevetia</i> (L.) Lippold, TSJ- 94	Kalke phul	Apocynaceae	Shrub	Cardiac complaints	One gram root powder is taken with boiled milk.
<i>Tinospora crispa</i> (L.) Hook. f. & Thoms., TSJ- 95	Guloncholota	Menispermaceae	Climber	Blood purifier	10-12 gm leaf powder is taken with one cup of water for 30 days.
<i>Trichosanthes dioica</i> Roxb., TSJ- 96	Potol	Cucurbitaceae	Climber	Antioxidant Blood purifier	Seed paste is taken with boiled rice. Boiled fruit paste is taken with boiled rice.
				Cardiac complaints	Fruit is taken as vegetable.
<i>Trigonella foenum-graecum</i> L., TSJ- 97	Methi	Fabaceae	Herb	Antioxidant	Leaf is taken as vegetable.
				Blood purifier	Seed are soaked in water overnight and then water is taken in the morning.
				Cardiac complaints	Seed paste is taken with boiled rice.
				High blood pressure	Seed powder is taken with water.
<i>Triticum aestivum</i> L., TSJ- 46	Gom	Poaceae	Herb	Blood purifier	Boiled seed is taken with milk.
				Cardiac complaints	Leaf juice is taken in empty stomach.

Scientific name & voucher no.	Local name	Family	Habit	Ailments	Parts and treatment mode
<i>Vachellia nilotica</i> (L.) P.J.H.Hurter & Mabb., TSJ- 61	Babla	Mimosaceae	Tree	High blood pressure	Bark juice is taken.
				High blood pressure	Leaf juice is taken.
<i>Vigna sesquipedalis</i> (L.) Walp., TSJ- 98	Borboti	Fabaceae	Climber	Antioxidant	Cooked fruit is taken as vegetable.
				Chest pain	Boiled fruit is taken as salad.
				Cardiac complaints	Boiled fruit paste is taken with boiled rice.
<i>Vitis vinifera</i> L., TSJ- 108	Angur	Vitaceae	Climber	High blood pressure	Boiled seed paste is taken with boiled rice.
				Antioxidant	Fruit is taken.
<i>Zea mays</i> L., TSJ-99	Vutta	Poaceae	Herb	Blood purifier	Fruit juice is taken.
				Cardiac complaints	Young fruit is preserved as pickles.
				Antioxidant	Fried fruit is taken.
				Blood purifier	Seed is take as popcorn.
<i>Zingiber officinale</i> Roscoe., TSJ- 29	Ada	Zingiberaceae	Herb	Cardiac complaints	Boiled seed is taken as vegetable.
				High blood pressure	Dried seed powder is taken with water.
				Blood purifier	Rhizome is taken with salt.
				Chest pain	2-inch rhizome is boiled with 2 cup of water and the water is taken.
				Cardiac complaints	Rhizome juice is taken with honey.

Among the 131 plant species in the review region, herbs have been addressed by 41%, trees by 33%, shrubs by 19%, and climbers by 7%. The outcome mirrored that herbs are the most prevalent life form among the medicinal plants in the review region. Leaves were the most regularly used plant part, with 35% application in traditional medicinal recipes, followed by fruit (26%), seed (12%), root (6%), bark (5%), whole plant (5%), flower (4%), rhizome (2%), tuber (1%), bulb (1%), latex (1%), and stem (1%).

For the treatment of cardiovascular disorders, 61 families of medicinal plants have been identified in the current study. The top five families, including Fabaceae, Amaranthaceae, Asteraceae, Cucurbitaceae, and Apocynaceae, were found to contain many species that are medicinal (Fig. 1). Those were the most dominant, with the maximum number of medicinal plant species in the study area.

To calculate the factor of informant consensus (Fic) values, total ailments were categorized into five groups, such as cardiac complaints, blood purifiers, chest pain, high blood pressure, and antioxidants. The average Fic value for all ailment categories obtained was 0.8492, with *Phyllanthus emblica* L., *Allium sativum* L., *Terminalia arjuna* (Roxb. ex DC.) Wight and Arn., *Achyranthes aspera* L., *Terminalia chebula* Retz, and *Allium cepa* L. as the most cited plants. Such a value indicated that the maximum number of people in the study area were well informed about the medicinal knowledge of plants. Among the five categories, the cardiac complaints group

attained the highest FIC values (0.8640), followed by blood purifier (0.8590), chest pain (0.8492), high blood pressure (0.7164), and antioxidant (0.6667).

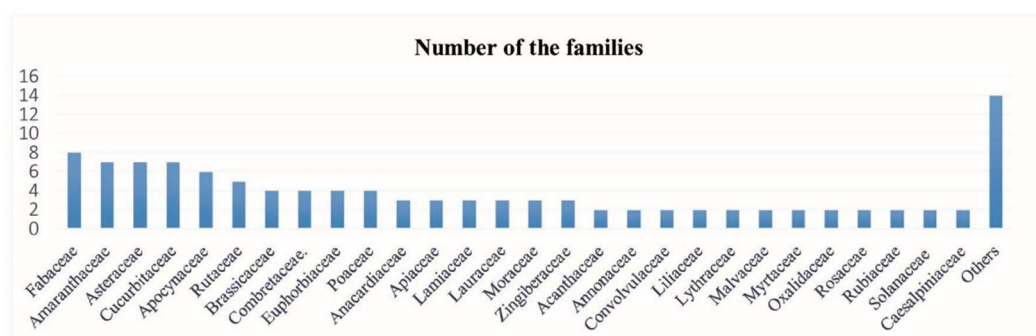


Fig. 1. Ethnomedicinal plant families according to the high number of plant species for the treatment of cardiovascular diseases in Bangladesh.

The medicinal plant species that have been extensively used by the people of the locality had an excessive fidelity level (Fl) compared to the ones that have been less vital. For figuring out medicinally vital plant species in the study area, the fidelity level (Fl) was calculated. In general, the high Fl of a species suggests the superiority of a particular disorder in a place and the usage of plant species by the population to deal with it (Bibi *et al.*, 2014; Srithi *et al.*, 2009). Among the 131 plant species, 45 scored Fl values of 100%. The fidelity level of the most cited plant species was turned into a category (Table 3).

According to the citation frequency of all medicinal plants, the most frequently used plants were *Phyllanthus emblica* L., *Allium sativum* L., *Terminalia arjuna* (Roxb. ex DC.) Wight and Arn., *Achyranthes aspera* L., and *Terminalia chebula* Retz (Table 4). The highest Cf value means that such species were very popular plant species in the study area and were used for the treatment of cardiac diseases. Among the disease categories, the highest (Fic) value was obtained in cardiac complaints, followed by blood purifiers, chest pain, high blood pressure, and antioxidants. The cardiac complaints were managed by a total of 80 medicinal plant species. Among the medicinal plants, the most cited were *Phyllanthus emblica* L., *Allium sativum* L., and *Terminalia arjuna* (Roxb. ex DC.) Wight and Arn., *Achyranthes aspera* L., *Terminalia chebula* Retz, and *Allium cepa* L. In the blood purifier category, 76 species were used, and *Phyllanthus emblica* L., *Terminalia chebula* Retz, and *Allium cepa* L. were most cited. In the chest pain category, 20 species were used,

Table 3. Fidelity level (Fl) values of the frequently reported plants and their major uses.

Ailments	Scientific name	Np	N	Fl %
Blood purifier	<i>Adhatoda zeylanica</i> Medikus.	160	160	100
Cardiac complaints	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	108	108	100
Chest pain	<i>Alternanthera sessilis</i> (L.) R.Br.	77	77	100
Cardiac complaints	<i>Baccaurea ramiflora</i> Lour.	76	76	100
	<i>Helianthus annuus</i> L.	58	58	100
	<i>Hyptis suaveolens</i> (L.) Poit.	58	58	100
Blood purifier	<i>Hemidesmus indicus</i> (L.) R. Br.	56	56	100
Cardiac complaints	<i>Nymphaea nouchali</i> Burm. F.	47	47	100

Table 4. Citation frequency of most cited medicinal plants.

Scientific name	Local name	Parts use	Ailments	Citation	CF value
<i>Phyllanthus emblica</i> L.	Amloki	Fruit	Antioxidant	197	65.67
			Blood purifier	197	65.67
			Cardiac complaints	197	65.67
			High blood pressure	197	65.67
<i>Allium sativum</i> L.	Rosun	Bulb	Cardiac complaints	182	60.67
			High blood pressure	182	60.67
<i>Terminalia arjuna</i> (Roxb. Ex DC.) Wight & Arn.	Arjun.	Bark	Chest pain	174	58
			Cardiac complaints	174	58
			High blood pressure	174	58
<i>Achyranthes aspera</i> L.	Apang	Leaves	Cardiac complaints	172	57.33
		Seed	Chest pain	172	57.33
<i>Terminalia chebula</i> Retz.	Horitoki	Fruit	Blood purifier	166	55.33
			Cardiac complaints	166	55.33

and the most cited were *Terminalia arjuna* (Roxb. Ex DC). Wight and Arn. and *Achyranthes aspera* L. In the high blood pressure category, 39 species were used, and the most cited were *Phyllanthus emblica* L., *Allium sativum* L., and *Terminalia arjuna* (Roxb. ex DC). Wight and Arn., *Terminalia chebula* Retz., *Allium cepa* L. In the antioxidant category, 36 species were used, and *Phyllanthus emblica* L. was the most cited plant. Among the 131 plant species, 45 species scored a 100% fidelity level as culturally important plant species. The record of 131 ethnomedicinal plant species with diverse use patterns reflected the traditional knowledge richness in the study area. Among the ethnomedicinal plants, 10 plant species, including *Phyllanthus emblica* L., *Allium sativum* L., *Terminalia arjuna* (Roxb. ex DC.) Wight and Arn, *Achyranthes aspera* L., *Terminalia chebula* Retz., *Allium cepa* L., *Adhatoda zeylanica* Nees, *Cinnamomum tamala* Nees and Eberm, *Cajanus cajan* (L.) Millsp, and *Ipomoea aquatic* Forssk, were cited the most times by the local people. The study resulted in the recording a total of 131 ethnomedicinal plant species under 61 families with 114 formularies documented by the local people around the study area of Manikganj district for the treatment of cardiovascular diseases. Although modern health services are available, the local people still rely on traditional medicine, highlighting the importance of traditional herbal treatment methods.

Since the dawn of society, humans have relied on plants to create new fields for the discovery of drugs derived from plants. These medicines are effective in curing several ailments and have changed the focus on herbal medicines in new ways. It is estimated that about 30% of pharmaceutical products are made from plant derivatives (Leta *et al.*, 2002; Gillman *et al.*, 1995). Several studies have been conducted to find plants, natural food sources, and their supplements that have antithrombotic effects such as anticoagulants and antiplatelets. There are indications that consumption of these foods leads to the prevention of coronary disease and stroke (Ratnasooriya *et al.*, 2008; Liu *et al.*, 2000; Joshipura *et al.*, 1999; Bazzano *et al.*, 2002). Although there are several thrombolytic drugs derived from those obtained with recombinant DNA technology, the side effects associated with some of these drugs have been reported to cause further difficulties (Baruah *et al.*, 2006; Gallus *et al.*, 1998; Capstick *et al.*, 2005). The Ethnomedicinal plants were also used for the treatment of Covid-19 pandemic in and around Dhaka City (Uddin *et al.*, 2023). However, herbal preparations with the right dosage can be an alternative and a better choice for curing various diseases.

Based on observations and local people's perceptions, the most cited species, named *Achyranthes aspera* L., *Cajanus cajan* (L.) Millsp., *Andrographis paniculata* Nees., *Aquilaria malaccensis* Lam., *Dioscorea alata* L., and *Rauwolfia serpentina* (L.) Benth. ex Kurz., were found to be very rare in the habitat and were also in danger because of anthropogenic pressure, deforestation, lack of knowledge about plants, and mismanagement of plantations in the study area. This survey has significant value for conservation managers and policymakers for the sustainable management of medicinal plant species that are threatened in nature. This species should be conserved before being eliminated from nature. There is an urgent need to document this knowledge before it becomes extinct. These herbal remedies can be further tested against various diseases to discover their unexplored capacity and may be a potential source of biologically important drug components.

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