

The use of Plants in Traditional Health Care Practice: An Ethnomedicinal Survey at Mymensingh Sadar and Shambhuganj Area in Mymensingh District of Bangladesh

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Abstract:- The present ethnomedicinal survey was conducted to comprehend the traditional knowledge of medicinal plants being used by the *Kavirajes* of Sadar and Shambhuganj area, Mymensingh, Bangladesh. Informed consent was obtained and interviews were conducted with the help of a structured questionnaire. This study provided a preliminary evaluation of sixty-seven plant species used by *Kavirajes* for treatment of various diseases. These medicinal plants belong to forty-four families. The Fabaceae family provided the largest number of species followed by the Apiaceae, Combreteaceae, Lamiaceae, Solanaceae and Zingiberaceae. The various plant parts used for treatment comprised of whole plants, leaves, stems, roots, barks, flowers, fruits and rhizomes. The findings revealed that the use of above-ground plant parts particularly leaves was higher (77.61%) compared to the under-ground plant parts (13.43%). Whole plants were also used (8.96%) in some cases.

Keywords:- Medicinal plants, Kavirajes, Folk medicine, Mymensingh Sadar, Shambhuganj Area, Bangladesh.

I. INTRODUCTION

The biological dependency among plants, animals and human beings has been developed from the very beginning of human civilization for existence of each other. Men always get their natural friends, the plants, in their side for treating ailments and satisfying hunger¹. In recent days, due to cost-effectiveness and higher availability than modern medicines, about 64% of the total world population use traditional medicine for primary healthcare². Even modern drug discoveries have been greatly based on medicinal plants used by indigenous people³. It is now well established that the plants naturally can accumulate some secondary metabolites, like alkaloids, glycosides and tannins, which possess healing properties⁴. Ethnomedicine, a sub-discipline

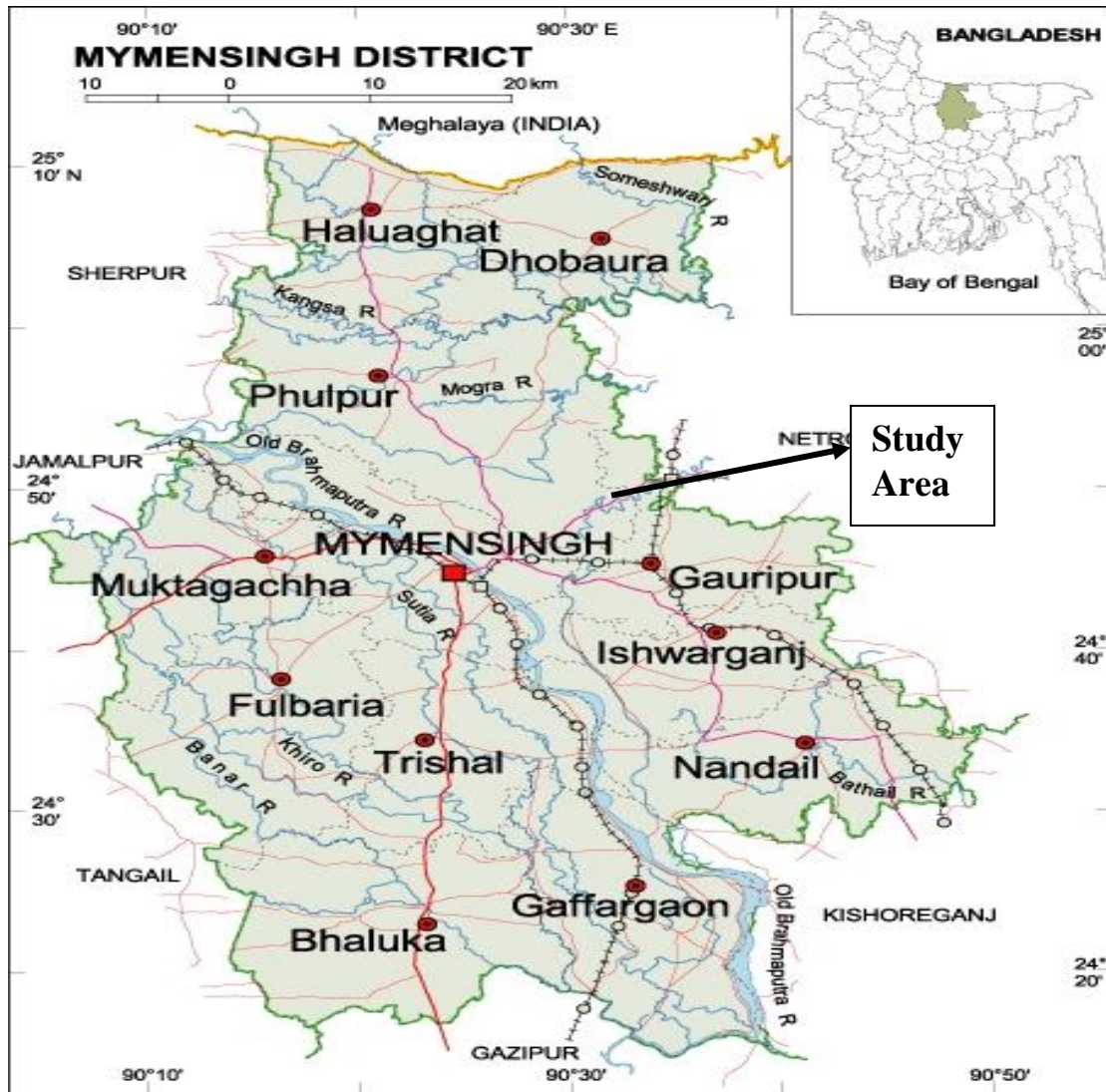
of ethnobotany, comprises the study of traditional medicines. Ethnomedicinal survey is the most interactive method for identifying new medicinal plants or the bioactive constituents of the plants which were reported earlier⁵.

A rich history of Ayurvedic, Unani and Folk medicinal systems, which use different types of medicinal plants, has been always touted in Bangladesh. Folk medicinal practitioners (*Kavirajes*) prepare their various formulations by using medicinal plant in simplified preparation procedures^{6,7}. They obtained this rich knowledge about medicinal plants from their forerunner and by their own experience and passed the knowledge to their descendent generations which may reveal some important clues for scientist to search new bio-potential ingredients for existing uncontrollable disorders. The main objective of this study was documenting the use of plants in traditional health care practice at Mymensingh sadar and Shambhuganj area in Mymensingh district of Bangladesh, which was not focused yet in any ethnomedicinal survey.

II. METHOD

A. Survey Site

The study was conducted at Mymensingh Sadar upzilla (sub-district) and Shambhuganj area that is near the old Brahmaputra River under Mymensingh district (formerly Nasirabad), Bangladesh. Mymensingh is one of the old districts of Dhaka division, Bangladesh. The district is bordered on the north by the Meghalaya state of India and Garo Hills, on the south by Gazipur district, on the east by Netrokona and Kishoreganj districts, and on the west by Sherpur, Jamalpur and Tangail districts. This district falls roughly within 24°15' & 25°12' north latitudes and 90°04' & 90°49' east longitudes. As of the 2001 Bangladesh Population Census, Mymensingh has an area of 4363.48 km² with a total population of 4489726; population density of 1029/km² and average literacy rate is 39.1%⁸.



Map 1: Location map of Mymensingh district showing the study area

III. PROCEDURE OF DATA COLLECTION

Data for this study were collected from April 2011 to March 2012. A questionnaire was carefully prepared to collect the required data on various aspects of the study. The questions were arranged systematically and presented clearly to get those easily understood by the respondents. Data on age, sex, level of education, religion, human diseases treated, local names of the plants used, plant parts used, condition of the plant part used (fresh/ dried), methods of remedy preparations, routes of remedy administration, noticeable adverse effects of remedies, use of antidotes for adverse effects, indigenous knowledge transfer and other uses of the ethnomedicinal plant species were gathered during the interviews.

The survey was conducted in Bangla language, which was spoken by both the *Kavirajes* and the surveyors, and it is the national language of Bangladesh. Excellent cooperation was received from all the respondents during total procedure of data collection. A total of 20 *Kavirajes*, who are randomly considered, from the five vicinities of Mymensingh Sadar and two vicinities of Shambhuganj area were interviewed in the present study. Prior to the study,

informed consents were obtained from the *Kavirajes* that the information may be disseminated both nationally and internationally. The *Kavirajes* took the surveyors to medicinal plants collection sites. Plants were shown and detailed information was given on the local name and ailments treated with the plants. All information was cross-checked later with the *Kavirajes*. Plant specimens as pointed out by the *Kavirajes* were collected, pressed and dried on site. Some collected specimens were later brought to the Bangladesh National Herbarium for complete identification. The scientific names were obtained by consulting the literature⁹⁻¹².

IV. DATA ANALYSIS

Responses of the completed questionnaires were numerically coded and analyzed. Microsoft Office Excel 2003 program was used to process all the collected information. Descriptive statistics such as frequency and percentage distribution were used to analyze the data. In addition, graphs and tables were used to interpret the findings.

V. RESULTS

A. Distribution of Plants into Families

In this study, ethnomedicinal data on 67 plant species including herb, shrub, tree and climber distributed across 44 floral families were collected that are used by the *Kavirajes* of Mymensingh Sadar and Shambhuganj area in Mymensingh, Bangladesh for treating different ailments (Table-1 & Table-2). Among the families, the Fabaceae family appeared as the most dominant family (5 species), followed by the Apiaceae, Combretaceae, Lamiaceae, Solanaceae and Zingiberaceae (3 species of each) and Acanthaceae, Apocynaceae, Asteraceae, Cucurbitaceae, Lauraceae, Liliaceae, Myrtaceae, Rubiaceae and Rutaceae (2

species of each). Rests were the families that contained one species of each. These were Annonaceae, Aracaceae, Aristolochiaceae, Asclepiadaceae, Berberidae, Bombacaceae, Bromeliaceae, Caesalpinaceae, Caricaceae, Clusiaceae, Convolvulaceae, Euphorbiaceae, Linaceae, Malvaceae, Meliaceae, Moraceae, Moringaceae, Murraya, Myristicaceae, Oxalidaceae, Piperaceae, Plantaginaceae, Poaceae, Ranunculaceae, Santalaceae, Scrophulariaceae and Vitaceae. Schippmann *et al* reported a wide therapeutic use of the two families, Apocynaceae and Asclepiadaceae, throughout the world¹³ and these two families were also used by the practitioners of this study area.

Scientific Name	Local Name	Family	Part Used	Condition of the Part Used
<i>Adhatoda vasica</i> Nees	Basok	Acanthaceae	Leaves	Fresh
<i>Aegle marmelos</i> L.	Bel	Rutaceae	Fruit	Fresh or Dried
<i>Aloe vera</i> L.	Grithakumari	Liliaceae	Leaves	Fresh
<i>Andrographis paniculata</i> Burm.f.	Kalomegh	Acanthaceae	Whole plant	Fresh or Dried
<i>Ananas comosus</i> L.	Anaras	Bromeliaceae	Fruit	Fresh
<i>Annona squamosa</i> L.	Ataphol	Annonaceae	Leaves	Fresh
<i>Aristolochia indica</i> L.	Ishwarmul	Aristolochiaceae	Root	Dried
<i>Asparagus racemosus</i> Willd.	Satamuli	Liliaceae	Root	Dried
<i>Averrhoa carambola</i> L.	Kamranga	Oxalidaceae	Leaves, Fruit	Fresh
<i>Azadirachta indica</i> L.	Neem	Meliaceae	Leaves, Stem	Fresh
<i>Bacopa monnieri</i> L.	Brabmbhi	Scrophulariaceae	Whole plant	Fresh
<i>Berberis aristata</i> DC.	Daruharidra	Berberidae	Wood	Dried
<i>Bombax ceiba</i> L.	Shimul	Bombacaceae	Root	Dried
<i>Cajanus cajan</i> L.	Arhar	Fabaceae	Leaves, Seed	Fresh or Dried
<i>Carica papaya</i> L.	Papaya	Caricaceae	Fruit	Fresh
<i>Catharanthus roseus</i> L.	Nayantara	Apocynaceae	Leaves	Fresh
<i>Centella asiatica</i> L.	Thankuni	Apiaceae	Whole plant	Fresh
<i>Cinnamomum tamala</i> Buch.-Ham.	Tejpata	Lauraceae	Leaves	Dried
<i>Cinnamomum verum</i> J.Presl	Daruchini	Lauraceae	Bark	Dried
<i>Cissus quadrangularis</i> L.	Harjora	Vitaceae	Leaves, Stem	Fresh
<i>Citrus aurantifolia</i> Christm.	Lebu	Rutaceae	Fruit	Fresh
<i>Clitoria ternatea</i> L.	Aparajita	Fabaceae	Root	Dried

<i>Coccinia grandis</i> L.	Telakucha	Cucurbitaceae	Leaves	Fresh
<i>Cocos nucifera</i> L.	Narikel	Aracaceae	Water of tender Fruit, Seed coat	Fresh
<i>Coriandrum sativum</i> L.	Dhania	Apiaceae	Seed	Dried
<i>Curcuma longa</i> L.	Holud	Zingiberaceae	Rhizome	Fresh or Dried
<i>Cynodon dactylon</i> L.	Durba Ghas	Poaceae	Leaf (tender)	Fresh
<i>Datura metel</i> L.	Dhutura	Solanaceae	Seed	Dried
<i>Eclipta alba</i> L.	Bhringoraj	Asteraceae	Whole plant	Fresh
<i>Elettaria cardamomum</i> L.	Alach	Zingiberaceae	Fruit, Seed	Dried
<i>Ficus racemosa</i> L.	Dumur	Moraceae	Fruit	Fresh
<i>Foeniculum vulgare</i> Mill.	Mauri	Apiaceae	Seed	Dried
<i>Glycyrrhiza glabra</i> L.	Jastimadhu	Fabaceae	Whole plant	Dried
<i>Hemidesmus indicus</i> L.	Anantha-mul	Asclepiadaceae	Root	Dried
<i>Hibiscus rosa-sinensis</i> L.	Joba	Malvaceae	Flower	Fresh
<i>Hyptis suaveolens</i> L.	Tokma	Lamiaceae	Seed	Fresh or Dried
<i>Ipomoea mauritiana</i> Jacq.	Bhui-kumra	Convolvulaceae	Fruit	Dried
<i>Lawsonia inermis</i> L.	Mehedi	Lythraceae	Leaves	Fresh
<i>Linum usitatissimum</i> L.	Tisi	Linaceae	Seed	Dried
<i>Mentha piperita</i> L.	Pudina	Lamiaceae	Leaves	Fresh
<i>Mesua ferrea</i> L.	Nageshwar	Clusiaceae	Flower	Fresh
<i>Myristica fragrans</i> Houtt.	Jayphal	Myristicaceae	Fruit	Dried
<i>Momordica charantia</i> Descourt.	Korolla	Cucurbitaceae	Leaves, Fruit	Fresh
<i>Moringa oleifera</i> Lam.	Sojne	Moringaceae	Leaves	Fresh
<i>Mucuna pruriens</i> L.	Alkushi	Fabaceae	Seed	Dried
<i>Murraya paniculata</i> L.	Kamini	Murraya	Leaves	Fresh
<i>Nigella sativa</i> L.	Kalijira	Ranunculaceae	Seed, Seed oil	Dried
<i>Ocimum sanctum</i> L.	Tulshi	Lamiaceae	Leaves	Fresh
<i>Paederia foetida</i> L.	Gandhabaduli	Rubiaceae	Leaves	Fresh
<i>Phyllanthus emblica</i> L.	Amloki	Euphorbiaceae	Fruit	Fresh or Dried
<i>Piper longum</i> L.	Pipul	Piperaceae	Fruit	Dried
<i>Plantago ovata</i> Forssk.	Isabgul	Plantaginaceae	Seed coat	Dried
<i>Punica granatum</i> L.	Dalim	Lythraceae	Fruit	Fresh
<i>Rauwolfia</i>	Sarpagandha	Apocynaceae	Root	Dried

<i>serpentine</i> L.				
<i>Rubia cordifolia</i> L.	Manjishta	Rubiaceae	Stem	Dried
<i>Santalum album</i> L.	Chandan	Santalaceae	Wood	Dried
<i>Solanum xanthocarpum</i> Schrad. & Wendl.	Kontikari	Solanaceae	Whole plant	Fresh or Dried
<i>Syzygium aromaticum</i> L.	Lavanga	Myrtaceae	Flower (bud and oil)	Dried
<i>Syzygium cumini</i> L.	Jam	Myrtaceae	Seed	Dried
<i>Tagetes erecta</i> L.	Gada	Asteraceae	Leaves	Fresh
<i>Tamarindus indica</i> L.	Tetul	Caesalpinaceae	Fruit	Fresh or Dried
<i>Terminalia arjuna</i> Roxb.	Arjun	Combretaceae	Bark	Dried
<i>Terminalia belerica</i> Gaertn.	Bohera	Combretaceae	Fruit	Dried
<i>Terminalia chebula</i> Retz.	Horitaki	Combretaceae	Fruit	Dried
<i>Trigonella foenum-graecum</i> L.	Methi	Fabaceae	Seed	Dried
<i>Withania somnifera</i> L.	Ashwagandha	Solanaceae	Root	Dried
<i>Zingiber officinale</i> Roscoe	Ada	Zingiberaceae	Rhizome	Fresh or Dried

Table 1: Species Used in Traditional Practices in Mymensingh Sadar and Shambhuganj Area of Mymensingh District of Bangladesh

Scientific Name	Preparation	Routes Of Admin.	Methods Of Application	Uses
<i>Adhatoda vasica</i> Nees	Crushed, mixed with water	Oral	Drinking	Asthma, Whooping cough
<i>Aegle marmelos</i> L.	Pounded, mixed with water	Oral	Drinking	Dysentery, Constipation, Helminthiasis
<i>Aloe vera</i> L.	Squeezed, mixed with water	Oral	Drinking	Keep head cool, Constipation, General debility
<i>Andrographis paniculata</i> Burm.f.	Soaked with water, decanted extract	Oral	Drinking	Diabetes, Fever, Stimulate liver
<i>Ananas comosus</i> L.	Inner flesh eaten raw	Oral	Swallowing	Jaundice, Menstrual problem, Fever, Helminthiasis
<i>Annona squamosa</i> L.	Powdered, extracted with cold water	Oral	Drinking	Appetite stimulation
<i>Aristolochia indica</i> L.	Crushed, used alone	Topical	Topical application	Snake bite
<i>Asparagus racemosus</i> Willd.	Pounded, pasted, mixed with sugar	Oral	Swallowing	Diabetes, Constipation, Impotency in man
<i>Averrhoa carambola</i> L.	Extracted juice, used alone	Oral	Drinking	Fever, Skin diseases
<i>Azadirachta indica</i> L.	Pasted, cooked	1.Oral, 2.Topical	1.Eaten with rice 2. Topical application	Fever, Diabetes, Allergy, Skin diseases
<i>Bacopa monnieri</i> L.	Decanted extract, used alone	Oral	Drinking	High blood pressure, Epilepsy, Dementia
<i>Berberis aristata</i> DC.	Crushed, powdered, used alone	Topical	Topical application	Inflammation, Jaundice, Skin disease

<i>Bombax ceiba</i> L.	Powdered, mixed with water	Oral	Drinking	Infrequent urination, Increase sperm count
<i>Cajanus cajan</i> L.	Cooked	Oral	Eaten with rice	Jaundice, Piles
<i>Carica papaya</i> L.	Sliced, Cooked	Oral	Eaten with rice	Constipation, Indigestion, Colic pain
<i>Catharanthus roseus</i> L.	Squeezed, mixed with water	Oral	Drinking	Diabetes, Helminthiasis, Toothache
<i>Centella asiatica</i> L.	Pounded, mixed with water	Oral	Drinking	Dysentery, Fever, Dementia
<i>Cinnamomum tamala</i> Buch.-Ham.	Boiled with water	Oral	Drink with water or tea	Small itching pustules, Excessive sweating
<i>Cinnamomum verum</i> J.Presl	Boiled with water	Oral	Drink with water or tea	Nausea, Vomiting, Flatulence, Cough
<i>Cissus quadrangularis</i> L.	Pasted, used alone	Topical	Topical application	Bone fracture
<i>Citrus aurantifolia</i> Christm.	Squeezed, mixed with meal	Oral	Drinking	Nausea, Flatulence, Dyspepsia
<i>Clitoria ternatea</i> L.	Crushed, mixed with water	Oral	Drinking	Tuberculosis, Piles, Skin diseases
<i>Coccinia grandis</i> L.	Cooked as vegetables	Oral	Eaten with rice	Diabetes, Blood dysentery, Scabies
<i>Cocos nucifera</i> L.	Squeezed, used alone	Oral	Dinking	Dyspepsia, Dehydration, General debility
<i>Coriandrum sativum</i> L.	Cooked as aromatic spice	Oral	Eaten with rice	Diuretic, Carminative, Digestive aid
<i>Curcuma longa</i> L.	Powdered, cooked as aromatic spice	Oral	Eaten with rice	Dyspepsia, Antiseptic agent
<i>Cynodon dactylon</i> L.	Smashed, used alone	Topical	Topical application	Topical bleeding
<i>Datura metel</i> L.	Powdered, used alone	Nasal	Sniffing	Pain, Hallucinogen
<i>Eclipta alba</i> L.	Extracted juice, mixed with water	Oral	Gargling	Oral mucosa and Gum inflammation, Tooth problem
<i>Elettaria cardamomum</i> L.	Boiled with water	Oral	Drinking	Teeth and Gums infection, Throat troubles, Digestive disorders
<i>Ficus racemosa</i> L.	Cooked as vegetables	Oral	Eaten with meals	Diabetes, Jaundice, Fever
<i>Foeniculum vulgare</i> Mill.	Boiled with water	Oral	Drinking	Flatulence, Colic, Indigestion, Cardiac diseases
<i>Glycyrrhiza glabra</i> L.	Crushed, pasted, used alone	Oral	Swallowing	Cough, Throat pain, Liver disorders
<i>Hemidesmus indicus</i> L.	Pounded, mixed with water	Oral	Drinking	Dysentery, Hemorrhoids, Leucorrhoea, Arthritis
<i>Hibiscus rosa-sinensis</i> L.	Crushed, mixed with water	Oral	Drinking	Menstrual disorders, Burning sensation
<i>Hyptis suaveolens</i> L.	Soaked with water	Topical	Topical application	Boils, Carbuncle
<i>Ipomoea mauritiana</i> Jacq.	Pounded, mixed with water	Oral	Drinking	Increase strength and lactation
<i>Lawsonia inermis</i> L.	Pasted with water	Topical	Topical application	Burning sensations, Dandruff, Hair loss and graying
<i>Linum</i>	Pasted, cooked	Oral	Eaten with meals	Lower cholesterol level,

<i>usitatissimum</i> L.				Laxative
<i>Mentha piperita</i> L.	Extracted juice, used alone	Oral	Drinking	Flatulence, Indigestion, Burning sensations
<i>Mesua ferrea</i> L.	Grinded, extracted	Topical	Topical application	Itch, Skin diseases
<i>Myristica fragrans</i> Houtt.	Pounded, mixed with water	Oral	Drinking	Diarrhea, Colic, Premature ejaculation of semen
<i>Momordica charantia</i> Descourt.	Extracted juice, used alone	Oral	Drinking	Diabetes, Worm infestation
<i>Moringa oleifera</i> Lam.	Cooked as vegetables	Oral	Eaten with meals	Fever, Dyspepsia
<i>Mucuna pruriens</i> L.	Crushed, mixed with water	Oral	Drinking	Sexually transmitted disease, Increase libido
<i>Murraya paniculata</i> L.	Extracted juice, mixed with water	Oral	Gargling	Stomatitis
<i>Nigella sativa</i> L.	Pounded, mixed with water	Oral	Drinking	Asthma, Cough, Bronchitis
<i>Ocimum sanctum</i> L.	Crushed, mixed with honey and zinger	Oral	Drinking	Asthma, Rhinitis, Fever
<i>Paederia foetida</i> L.	Extracted juice, mixed with water	Oral	Drinking	Dyspepsia, Constipation
<i>Phyllanthus emblica</i> L.	Crushed, mixed with water	Oral	Drinking	Jaundice, Fever, General weakness
<i>Piper longum</i> L.	Pounded, mixed with water	Oral	Drinking	Burning sensations
<i>Plantago ovata</i> Forssk.	Soaked in water	Oral	Drinking	Constipation
<i>Punica granatum</i> L.	Extracted juice, used alone	Oral	Drinking	Debility, Intestinal parasites, Menorrhagia
<i>Rauwolfia serpentina</i> L.	Crushed, mixed with water	Oral	Drinking	Hypertension, Snake bite
<i>Rubia cordifolia</i> L.	Crushed, powdered, mixed with water	1. Oral 2. Topical	1. Drinking 2. Topical application	1. Blood purifier 2. Skin disease, Bleeding disorders
<i>Santalum album</i> L.	Pounded, mixed with water	Topical	Topical application	Burning sensations, Hyper perspiration, Skin disease
<i>Solanum xanthocarpum</i> Schrad. & Wendl.	Smashed, used alone	Topical	Topical application	Skin disease, Trauma, Piles
<i>Syzygium aromaticum</i> L.	Crushed, mixed with water	Oral	Drinking	Pain, Helminthiasis
<i>Syzygium cumini</i> L.	Powdered, mixed with some salt	Oral	Licking	Diabetes
<i>Tagetes erecta</i> L.	Extracted juice, used alone	Topical	Topical application	Bleeding
<i>Tamarindus indica</i> L.	Pasted, mixed with water	Oral	Drinking	Fever, Digestive disorder, Syphilis
<i>Terminalia arjuna</i> Roxb.	Soaked in water, decanted extract	Oral	Drinking	Cardiovascular diseases
<i>Terminalia belerica</i> Gaertn.	Powdered, mixed with water	Oral	Drinking	Fever, Anorexia, Erectile dysfunction
<i>Terminalia chebula</i> Retz.	Powdered, mixed with water	Oral	Drinking	Fever, Asthma, Anorexia
<i>Trigonella foenum-graecum</i> L.	Crushed, mixed with water	Oral	Drinking	Cardiovascular diseases, Diabetes, Flatulence
<i>Withania somnifera</i> L.	Pounded, mixed with water	Oral	Drinking	Nerve weakness, Oligospermia, Stimulate sex
<i>Zingiber officinale</i> Roscoe	Sliced, chewed with slight salt or boiled with tea	Oral	Drinking	Appetizer, Cough, Throat pain

Table: 2 Scientific Name, Preparation, Routes of Administration, Methods of Application and Uses

B. Used Plant Parts

Above-ground and under-ground plant parts were used in folk medication in the study area. Though the number of above-ground plant parts is greater than under-ground plant parts, whole plants were also used in some cases. Among

the above-ground plant parts, leaves were the most frequently used part followed by fruits, seeds, flowers, bark and stem. On the other hand, roots and rhizomes were used as under-ground plant parts.

Serial No.	Plant Parts	No. of Species	Percentages (%)
1.	Leaf only	14	20.90
2.	Fruit	13	19.40
3.	Seed	12	17.91
4.	Root	7	10.45
5.	Whole plant	6	8.96
6.	Leaf with other parts	5	7.46
7.	Flower	3	4.48
8.	Bark	2	2.99
9.	Wood	2	2.99
10.	Rhizome	2	2.99
11.	Stem	1	1.49

Table 3: Frequency of Using Parts of the Plants and Percentages

C. Plant Uses

About 62 different ailments were treated by the *Kavirajes* of the survey site by using described plant parts. The dose and dosage for children and adults were usually

different and generally depended on the degree and duration of the ailment. These different ailments can be classified under 15 board categories for documentation purpose (Table 4).

Serial No.	Broad Categories of Ailments	Percentage (%) of Plant Used
1.	Gastrointestinal disorders	29.33
2.	Cold and Flu related ailments	10.63
3.	Pain, Inflammation and Burning sensation	7.33
4.	Sexual problems	7.33
5.	Skin diseases	7.33
6.	Respiratory tract disorders	4.67
7.	Cardiovascular diseases	4.67
8.	Nerve disorders	4.67
9.	Oral and larynx health diseases	4.67
10.	Hepatic problems	4.00
11.	Antiseptic purposes	2.67
12.	Wound and Blood disorders	2.67
13.	Bone related ailments	1.33
14.	Renal diseases	1.33
15.	Miscellaneous diseases	11.33

Table 4: Broad Categories of the Ailments and Percentage of the Plants Used in Each Category

D. Respiratory Disorders

There were five respiratory diseases treated by folk practitioners in the survey site - asthma, bronchitis, rhinitis,

whooping cough and tuberculosis. List of the used medicinal plants for respiratory disorders are given in Table 5.

Name of the Respiratory Diseases	Species Used	Name of the Species
Asthma	4	<i>Adhatoda vasica</i> Nees <i>Nigella sativa</i> L. <i>Ocimum sanctum</i> L. <i>Terminalia chebula</i> Retz.
Bronchitis	1	<i>Nigella sativa</i> L.
Rhinitis	1	<i>Ocimum sanctum</i> L.
Whooping cough	1	<i>Adhatoda vasica</i> Nees
Tuberculosis	1	<i>Clitoria ternatea</i> L.

Table 5: List of the Medicinal Plants Used in Respiratory Disorders

E. Hepatic Disorders

Three hepatic disorders were commonly treated in the study area were jaundice and other liver disorders like liver

stone and partial liver failure. List of the medicinal plants used in hepatic disorders are given in Table 6.

Name of the Hepatic Diseases	Species used	Name of the Species
Jaundice	4	<i>Berberis aristata</i> DC. <i>Cajanus cajan</i> L. <i>Ficus racemosa</i> L. <i>Phyllanthus emblica</i> L.
Stimulates liver	1	<i>Andrographis paniculata</i> Burm.f.
Other liver disorders	1	<i>Glycyrrhiza glabra</i> L.

Table 6: List of the Medicinal Plants Used in Hepatic Disorders

F. Gastrointestinal Diseases

Most prevailed treatment practiced by the *Kavirajes* of the study area for gastrointestinal diseases, was a common case observed in several ethnomedicinal surveys in other parts of Bangladesh, because peoples are unaware of hygienic lifestyle and environment. Treated diseases under

this category were indigestion, flatulence, constipation, helminthiasis, dysentery, anorexia, colic, diarrhea and other digestive disorder like abdominal cramp. List of the medicinal plants used in gastrointestinal diseases are presented in Table 7.

Name of the Gastrointestinal Diseases	Species Used	Name of the Species
Indigestion	9	<i>Carica papaya</i> L. <i>Citrus aurantifolia</i> Christm. <i>Cocos nucifera</i> L. <i>Coriandrum sativum</i> L. <i>Curcuma longa</i> L. <i>Foeniculum vulgare</i> Mill. <i>Mentha piperita</i> L. <i>Paederia foetida</i> L. <i>Terminalia chebula</i> Retz.
Flatulence	8	<i>Cinnamomum verum</i> J.Presl <i>Citrus aurantifolia</i> Christm. <i>Coriandrum sativum</i> L. <i>Foeniculum vulgare</i> Mill. <i>Mentha piperita</i> L. <i>Trigonella foenum-graecum</i> L. <i>Syzygium aromaticum</i> L. <i>Zingiber officinale</i> Roscoe
Constipation	7	<i>Aegle marmelos</i> L. <i>Aloe vera</i> L. <i>Asparagus racemosus</i> Willd. <i>Carica papaya</i> L. <i>Linum usitatissimum</i> L. <i>Paederia foetida</i> L. <i>Plantago ovata</i> Forssk.
Helminthiasis	5	<i>Aegle marmelos</i> L. <i>Catharanthus roseus</i> L. <i>Momordica charantia</i> Descourt. <i>Punica granatum</i> L. <i>Syzygium aromaticum</i> L.
Dysentery	4	<i>Aegle marmelos</i> L. <i>Centella asiatica</i> L. <i>Coccinia grandis</i> L. <i>Hemidesmus indicus</i> L.
Appetite stimulant	4	<i>Annona squamosa</i> L. <i>Moringa oleifera</i> Lam. <i>Terminalia belerica</i> Gaertn. <i>Zingiber officinale</i> Roscoe
Colic	3	<i>Carica papaya</i> L. <i>Foeniculum vulgare</i> Mill. <i>Myristica fragrans</i> Houtt.

Diarrhea	2	<i>Cocos nucifera</i> L. <i>Myristica fragrans</i> Houtt.
Other digestive disorder	2	<i>Elettaria cardamomum</i> L. <i>Tamarindus indica</i> L.

Table 7: List of the Medicinal Plants Used in Gastrointestinal Diseases

G. Skin Diseases

Skin diseases were also treated by the *Kavirajes* in the study area. They were allergy, scabies, itching and vitilgo.

List of the medicinal plants used in skin diseases are given in Table 8.

Name of the Skin Diseases	Species Used	Name of the Species
Allergy	1	<i>Azadirachta indica</i> L.
Scabies	1	<i>Coccinia grandis</i> L.
Itching	1	<i>Mesua ferrea</i> L.
Other skin diseases	8	<i>Averrhoa carambola</i> <i>Azadirachta indica</i> L. <i>Berberis aristata</i> DC. <i>Clitoria ternatea</i> L. <i>Mesua ferrea</i> L. <i>Rubia cordifolia</i> L. <i>Santalum album</i> L. <i>Solanum xanthocarpum</i> Schrad. & Wendl.

Table 8: List of the Medicinal Plants Used in Skin Diseases

H. Renal Diseases

In case of renal diseases, difficulties and burning sensation in urination and infrequent urination were treated

by *Kavirajes* of the survey region. List of the medicinal plants used in renal diseases are given in Table 9.

Name of the Renal Diseases	Species Used	Name of the Species
Difficulties and burning sensation in urination	1	<i>Piper longum</i> L.
Infrequent urination	1	<i>Bombax ceiba</i> L.

Table 9: List of the Medicinal Plants Used in Renal Diseases

I. Sexual Problems

Total five diseases that are classified under sexual problems were being treated in this area, namely menstrual disorder, oligospermia, erectile dysfunction, depression of

libido and sexually transmitted disease like syphilis. List of the medicinal plants used in sexual problems are presented in Table 10.

Name of the Sexual Problems	Species Used	Name of the Species
Menstrual disorder	3	<i>Hemidesmus indicus</i> L. <i>Hibiscus rosa-sinensis</i> L. <i>Punica granatum</i> L.
Erectile dysfunction	2	<i>Myristica fragrans</i> Houtt. <i>Terminalia bellerica</i> Gaertn.
Oligospermia	3	<i>Asparagus racemosus</i> Willd. <i>Bombax ceiba</i> L. <i>Withania somnifera</i>
Sexually transmitted disease	2	<i>Mucuna pruriens</i> L. <i>Tamarindus indica</i> L.
Depression of libido	2	<i>Mucuna pruriens</i> L. <i>Withania somnifera</i> L.

Table 10: List of the Medicinal Plants Used in Sexual Problems

J. Oral and Larynx Diseases

It is interesting that four problems related to oral health were also treated by *Kavirajes* in the survey site; e.g., teeth

and gum diseases, oral mucosa inflammation, throat pain and toothache. List of the medicinal plants used in oral and larynx diseases are given in Table 11.

Name of the Oral health and larynx diseases	Species used	Name of the species
Teeth and gum disease	2	<i>Elettaria cardamomum</i> L. <i>Glycyrrhiza glabra</i> L.
Oral mucosa inflammation	2	<i>Elettaria cardamomum</i> L. <i>Eclipta alba</i> L.
Throat pain	2	<i>Murraya paniculata</i> L. <i>Eclipta alba</i> L.
Toothache	1	<i>Catharanthus roseus</i> L.

Table 11: List of the Medicinal Plants Used in Oral and Larynx Diseases

K. Cold and Flu related ailments

In this study, it has been observed that *Kavirajes* of the study area used the highest number of plant species (11) to

treat fever. Cold ailment and cough treatment can also be categorized under this class. List of the medicinal plants used in cold and flu related ailments are given in Table 12.

Name of the Cold and Flu related Ailments	Species Used	Name of the Species
Fever	11	<i>Andrographis paniculata</i> Burm.f. <i>Averrhoa carambola</i> L. <i>Azadirachta indica</i> L. <i>Centella asiatica</i> L. <i>Ficus racemosa</i> L. <i>Moringa oleifera</i> Lam. <i>Ocimum sanctum</i> L. <i>Phyllanthus emblica</i> L. <i>Tamarindus indica</i> L. <i>Terminalia belerica</i> Gaertn. <i>Terminalia chebula</i> Retz.
Cold	1	<i>Ocimum sanctum</i> L.
Cough	4	<i>Cinnamomum verum</i> J.Presl <i>Glycyrrhiza glabra</i> L. <i>Nigella sativa</i> L. <i>Zingiber officinale</i> Roscoe

Table 12: List of the Medicinal Plants used in Cold and Flu related Ailments

L. Wound and Blood Disorders

In this study, it has been found that two plant species were used for hemorrhoid treatment, one species for

purifying blood and one to stop bleeding. List of the medicinal plants used in wound and blood disorders are given in Table 13.

Name of the Wound and Blood Disorders	Species Used	Name of the Species
Bleeding (minor injury)	1	<i>Cynodon dactylon</i> L.
Hemorrhoid (major injury)	2	<i>Hemidesmus indicus</i> L. <i>Tagetes erecta</i> L.
Blood purifier	1	<i>Rubia cordifolia</i> L.

Table 13: List of the Medicinal Plants Used in Wound and Blood Disorders

M. Antiseptic Purposes

For antiseptic purposes, two species were used for snake bite and two for boils and carbuncle. List of the medicinal plants used for antiseptic purposes are given in Table 14.

Name of the Antiseptic Purpose	Species used	Name of the Species
Snake bite	2	<i>Curcuma longa</i> L. <i>Hyptis suaveolens</i> L.
Boils & carbuncle	2	<i>Aristolochia indica</i> L. <i>Rauwolfia serpentina</i> L.

Table 14: List of the Medicinal Plants Used for Antiseptic Purposes

N. Cardiovascular Diseases

Different cardiovascular diseases were also treated with medicinal plants in the survey area where three plant species were used for cardiac diseases, two for hypertension and one

for lowering cholesterol level and one as diuretic. List of the medicinal plants used in cardiovascular diseases are given in Table 15.

Name of the Cardiovascular Diseases	Species Used	Name of the Species
Cardiac disease	3	<i>Foeniculum vulgare</i> Mill. <i>Terminalia arjuna</i> Roxb. <i>Trigonella foenum-graecum</i> L.
High cholesterol level	1	<i>Linum usitatissimum</i> L.
Hypertension	2	<i>Bacopa monnieri</i> L. <i>Rauwolfia serpentina</i> L.
Diuretic	1	<i>Coriandrum sativum</i> L.

Table 15: List of the Medicinal Plants Used in Cardiovascular Diseases

O. Nerve Disorders

Treatment of the diseases related with nervous system using medicinal plants was also practiced in the survey site. Five types of diseases are classified under this category -

nausea and vomiting, dementia, epilepsy, nerve weakness and over excitability. List of the medicinal plants used in nerve disorders are given in Table 16.

Name of the Nerve Disorders	Species Used	Name of the Species
Epilepsy	1	<i>Bacopa monnieri</i> L.
Nerve weakness	1	<i>Withania somnifera</i>
Dementia	2	<i>Bacopa monnieri</i> L. <i>Centella asiatica</i> L.
Nausea and Vomiting	2	<i>Cinnamomum verum</i> J.Presl <i>Citrus aurantifolia</i> Christm.
Over excitability	1	<i>Datura metel</i> L.

Table 16: List of the Medicinal Plants used in Nerve Disorders

P. Bone related Ailments

For bone related diseases, two species of medicinal plants were used, one for arthritis and the other for

management of bone fracture. List of plant species used for bone related diseases are arranged in Table 17.

Name of the Bone related Ailments	Species Used	Name of the Species
Arthritis	1	<i>Hemidesmus indicus</i> L.
Bone fracture	1	<i>Cissus quadrangularis</i> L.

Table 17: List of the Plant Species Used for Bone related Ailments

Q. Pain, Inflammation And Burning Sensation

Four plant species were used for treating burning sensation of the body, three species were used in piles and

as analgesic, and one species was used to treat inflammation. Table 18 lists the plant species used in pain, inflammation and burning sensation.

Name of the Disorders	Species Used	Name of the Species
Pain	3	<i>Datura metel</i> L. <i>Solanum xanthocarpum</i> Schrad. & Wendl. <i>Syzygium aromaticum</i> L.
Inflammation	1	<i>Berberis aristata</i> DC.
Burning sensation	4	<i>Hibiscus rosa-sinensis</i> L. <i>Mentha piperita</i> L. <i>Lawsonia inermis</i> L. <i>Santalum album</i> L.
Piles	3	<i>Cajanus cajan</i> L. <i>Clitoria ternatea</i> L. <i>Solanum xanthocarpum</i> Schrad. & Wendl.

Table 18: List of the Plant species Used in Pain, Inflammation and Burning Sensation

R. Miscellaneous Diseases

Besides the ailments mentioned earlier, there were also some other diseases which were treated by *Kavirajes* of the study area. These can not be easily classified among specific disease groups, so the rests of the diseases are described under miscellaneous diseases here. The names of the

diseases of this category are diabetes, general debility, small pustules on the body due to excessive heat or sweats, controlling dandruff, warm head, hair falling and graying of hair, and inadequate lactation. These are summarized in Table 19.

Name of the Diseases	Species Used	Name of the Species
Warm head	1	<i>Aloe vera</i> L.
General debility	3	<i>Cocos nucifera</i> L. <i>Phyllanthus emblica</i> L. <i>Punica granatum</i> L.
Excessive sweating	2	<i>Cinnamomum tamala</i> Buch.-Ham. <i>Santalum album</i> L.
Inadequate lactation	1	<i>Ipomoea mauritiana</i> Jacq.
Dandruff, Hair fall and Graying of hair	1	<i>Lawsonia inermis</i> L.
Diabetes	9	<i>Andrographis paniculata</i> Burm.f. <i>Asparagus racemosus</i> Willd. <i>Azadirachta indica</i> L. <i>Catharanthus roseus</i> L. <i>Coccinia grandis</i> L. <i>Ficus racemosa</i> L. <i>Momordica charantia</i> Descourt. <i>Syzygium cumini</i> L. <i>Trigonella foenum-graecum</i> L.

Table 19: List of the Medicinal Plants in Miscellaneous Diseases

VI. DISCUSSION AND CONCLUSION

It is interesting to note that a number of plants used by the *Kavirajes* of survey area are also to be used in the traditional medicinal systems in other parts of the world as well as Bangladesh and some of the uses have also been validated through modern scientific research, although the ailments treated may be different.

Both *Andrographis paniculata* Burm.f. and *Aristolochia indica* L. are used by indigenous groups of southern parts of Tamilnadu, India for the treatment of snake bite¹⁴. *Andrographis paniculata* Burm.f. was used by the *Kavirajes* of Mymensingh to treat diabetes, fever and liver diseases and *Aristolochia indica* L. was used to treat snake bite. A study conducted in the United States of America documented that *Andrographis paniculata* Burm.f. can help in prevention and treatment of colds¹⁵.

The *Kavirajes* of Mymensingh used *Aloe vera* L. to treat constipation, general debility and to keep head cool. Traditional Chinese medicine uses this plant in the treatment of inflammatory bowel disease and to treat hypertension in the ethnomedicine of Trinidad and Tobago^{16,17}.

Adhatoda vasica Nees was used by *Kavirajes* of the study area for whooping cough and asthma, from where the isolation of a bronchodilator alkaloid vasicinone has been reported previously by Amin *et al*¹⁸.

Centella asiatica L. is widely used in the ayurvedic system of India for various ailments including abdominal diseases and wound healing¹⁹. In the survey area, *Kavirajes* used this plant for treating dysentery, fever and dementia. The gastric ulcer healing effect of this plant has been claimed for its phytochemical constituent, asiaticoside that can work by interfering in nitric oxide synthesis had been reported previously²⁰.

Catharanthus roseus L. used by the *Kavirajes* of Mymensingh to treat diabetes, toothache and helminthiasis, is considered as anti-diabetic plant in the ethnomedicine of Trinidad and Tobago¹⁷ and juice of the fresh leaves of this

plant demonstrated significant anti-diabetic activity in alloxan-induced diabetic rabbits²¹. It is also known as an anti-cancer drug yielding plant²².

Momordica charantia Descourt. used to treat diabetes and worm infestation in the survey area, also documented to show anti-diabetic potential as well as the hypoglycemic properties. The fruit extract has been reported to lower blood sugar levels including enhanced insulin secretion by the islets of Langerhans, reduced glycogenesis in liver tissue, enhanced peripheral glucose utilization and increase serum protein level²³. Momorcharins, proteins of *Momordica charantia* Descourt., selectively inactivated the ribosomes of tumor and HIV-infected cells, without damaging the healthy cells²⁴.

To treat skin diseases, fever, diabetes and allergy, *Azadirachta indica* L. was used by *Kavirajes* of this area. This species is also considered as a medicinal plant in India, and was reported to have anti-bacterial activity against different gram-positive and gram-negative bacterial strains²⁵. For treating fever and bacterial infections, *Azadirachta indica* L. was also reported to be used in Oyo state of southwestern Nigeria²⁶.

For treating syphilis, fever and digestive disorder *Tamarindus indica* L. was used in this area which is considered to possess considerable medicinal values in the traditional medicinal system of many countries. Various extracts of this plant possess anti-microbial activity and was reported to be used to treat trypanosomiasis in Nigeria^{27,28}. In North African countries, this plant was found to be used to treat inflammation for its anti-inflammatory properties which have also been validated through scientific studies²⁹.

Since thousands of years back *Curcuma longa* L. is in the traditional medicine in India and China to treat inflammatory diseases which was used to treat dyspepsia and as antiseptic agent in the survey area. Curcumin, a compound isolated from *Curcuma longa* L., has been shown to have potential activities to treat arthritis, diabetes, cardiovascular diseases, osteoporosis, Alzheimer's disease

and cancer³⁰. This species was also used in the study area to treat dyspepsia and as antiseptic agent.

Since the advent of modern or allopathic medicine, researcher started to overlook the medicinal plants used in traditional medicine. However, the emergence of drug resistant microorganisms, huge drug induced side effects and the high price of modern medicines in present days drive the practitioners back to traditional medicines derived from natural plant sources. Ethnomedicinal surveys could help in creating awareness regarding the need to preserve such plants and also promote indigenous knowledge of different regions. The collected 67 plant species as used by *Kavirajes* of the survey area in Mymensingh district have the potential for novel drug discoveries, which can serve as excellent remedies for a diverse number of ailments. At the same time, scientific validation of the various medicinal plants' uses by the *Kavirajes* can go a long way towards conservation and cultivation of these plant species, some of which are already in the risk of extinction because of rapidly expanding human habitat.

REFERENCES

- [1.] Mishra, D. Broker A.2009.An ethnomedicinal study among the Gond of Chhattisgarh: India. *Antrocom*. 5(1):61-65.
- [2.] WHO, 2012.WHO traditional medicine strategy 2002-2005. Available at: http://whqlibdoc.who.int/hq/2002/who_edm_trm_2002.1.pdf.
- [3.] Balick, J.M., Cox, P.A. 1996. *Plants, People and Culture: the science of Ethnobotany*. Scientific American Library, New York.pp: 228.
- [4.] Dixon, R., Paivan, L. 1995. Stress-induced phenylpropanoid metabolism. *Plant Cell*. 7:1085.
- [5.] Falemara, B.C., Joshua, V.I., Ogunkanmi, T.I. & Mbeng, W.O., 2021, 'Ethnomedicinal survey of indigenous medicinal plants in Jos Metropolis, Nigeria'. *Journal of Medicinal Plants for Economic Development* 5(1), a128.
- [6.] Rahamatullah, M., Das, A.K., Mollik, A.H., Jahan, R., Khan, M., Rahman. M.T.U., Chowdhury, M.H.2009. An ethnomedicinal survey of Dhamrai Sub-district in Dhaka District, Bangladesh. *Am.-Eurasian J. Sustain. Agric*. 3(4):881-888.
- [7.] Rahamatullah, M., Ferdousi, D., Mollik, A.H., Azam, M.N.K., Rahman, M.T.U., Jahan, R.2009. Ethnomedicinal survey of Bheramara area in Kushtia District, Bangladesh. *Am.-Eurasian J. Sustain. Agric*. 3(4):534-541.
- [8.] https://en.banglapedia.org/index.php/Mymensingh_District
- [9.] Salar, M.K. 1992. *Flora of Bangladesh*. BARC, Dhaka, Bangladesh; 1972-1992.
- [10.] Chopra, R.N., Nayar, S.L.1992.Chopra IC: *Glossary of Indian medicinal plants*. CSIR, New Delhi.
- [11.] Chevallier, A.1996. *The encyclopedia of medicinal plants* (First edition). DK Publishing Inc., New York.
- [12.] Das, K.D., Alam, M.K. 2001.*Trees of Bangladesh*. Bangladesh Forest Research Institute, Chittagong.
- [13.] Schippmann, U., Leaman, D.J., Cunningham, A.B. 2002. Impact of cultivation and gathering of medicinal plants on biodiversity: global trends and issues. In *Proceedings on the Ninth Regular Session of the Commission on Genetic Resources for Food and Agriculture: 12-13 October 2002; Rome*.2002.
- [14.] Samy, R.P., Thwin, M.M., Gopalakrishnakone, P., Ignacimuthu, S.2008. Ethnobotanical survey of folk plants for the treatment of snakebites in Southern part of Tamilnadu, India. *Journal of Ethnopharmacology* 115: 302-312.
- [15.] Roxas, M., Jurenka, J. 2007.Colds and Influenza: a review of diagnosis and conventional, botanical and nutritional considerations. *Alternative Medicine Review* 12:25-48.
- [16.] Langmead, L., Rampton, D.S.2006. Review article: Complementary and Alternative therapies for inflammatory bowel disease. *Alimentary Pharmacology and Therapeutics*. 23: 341-349.
- [17.] Lans, C.A. 2006. Ethnomedicines used in Trinidad and Tobago for urinary problems and diabetes mellitus. *Journal of Ethnobiology and Ethnomedicine* 2:45.
- [18.] Amin,A.H., Mehta ,D.R. 1959.A bronchodilator alkaloid (vasicinone) from *Adhatoda vasica* Nees. *Nature* 184 (Suppl 17): 1317.
- [19.] Ghani, A. 2003.*Medicinal plants of Bangladesh with chemical constituents and uses* .Second edition, Asiatic Society of Bangladesh, Ramna, Dhaka, Bangladesh.
- [20.] Guo, J.S., Cheng, C.L., Koo, M.W.2004. Inhibitory effects of *Centella asiatica* water extract and asiaticoside on inducible nitric oxide synthase during gastric ulcer healing in rats. *Planta Medica* 70: 1150-1154.
- [21.] Nammi, S, Boini, M.K., Lodagala, S.D., Bchara, R.B.2003. The juice of fresh leaves of *Catharanthus roseus* Linn. Reduces blood glucose in normal and alloxan diabetic rabbits. *BMC Complementary and Alternative Medicine* 3:4.
- [22.] Haridasan, K., Shukla, G, P., Beniwal, B.S. 2002. Medicinal plants of Arunachal Pradesh. *SFRI Information Bulletin* (Volume: V), Arunachal Government Press.
- [23.] Fernades N.P., Lagishetty C.V., Panda, V.S., Naik, S.R. 2007.An experimental evaluation of the antidiabetic and antilipidemic properties of a standardized *Momordica charantia* fruit extract. *BMC Complementary and Alternative Medicine* 2007, 7:29.
- [24.] Dean, K. 1997. Plant patents. *Herbal Grams* 41:23.
- [25.] Nair, R., Kalariya, T., Chanda, S. 2007. Antibacterial activity of some plant extracts used in folk medicine. *Journal of Herbal Pharmacotherapy* 7:191-201.
- [26.] Ajaiyeoba, E.O., Oladepo, O., Fawole, O.L., Bolaji, O.M., Akinboye, D.O., Ogundahunsi, O.A., Falade, C.O., Gbotosho, G.O., Itiola, O.A., Happi, T.C., Ebong, O.O., Ononiwu, I.M., Osowole, O.S., Oduola, O.O., Ashidi, J.S., Oduola ,A.M. 2003. Cultural categorization of febrile illness in correlation with herbal remedies used for treatment in Southwestern Nigeria. *Journal of Ethnopharmacology* 85: 179-185.

- [27.] Al-Fatemi, M., Wurster, M., Schroder, G., Lindequist, U. 2007. Antioxidant, antimicrobial and cytotoxic activities of selected medicinal plants from Yemen. *Journal of Ethnopharmacology* .111: 657-666.
- [28.] Atawodi, S.E., Ameh, D.A., Ibrahim, S., Andrew, J.N., Nzelibe, H.C., Onyike, E.O., Anigo, K.M., James, E.A., Njoku, G.C., Sallau, A.B. 2002. Indigenous knowledge system for treatment of trypanosomiasis in Kaduna state of Nigeria. *Journal of Ethnopharmacology* 79: 279-282.
- [29.] Riambau, V., Cerdan, C., Vila, R., Iglesias, J.1999. Anti-inflammatory activity of some extracts from plants used in traditional medicine of North-African countries (II), *Phytotherapy Research* 13: 128-132.
- [30.] Shishodia S., Sethi, G., Aggarwal, B.B. 2005. Curcumin: getting back to the roots. *Annals of the New York Academy of Sciences* 1056: 206-217.