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Ethnobotanical Survey of Medicinal Plants used for Diabetes Mellitus Treatment in Vallath Kunnu - Ochiyam, Kerala

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Abstract: *Diabetes mellitus is a serious metabolic disease that cause high blood sugar and slowly it spills into urine and cause many physiological disorders. It is a major life-threatening disease all over the world. An ethnobotanical survey of antidiabetic plants was conducted in Vallathkunnu. Semi-structured questionnaire method was used. The questionnaires are divided into three sections.*

First part was about the personal information such as age, sex. Second part include the common name, habit, plant part used. The third part includes plant formulations and mode of application of the plant part. A total of 48 plants belongs to 30 families having antidiabetic property are documented. The plant has been enumerated with botanical name, scientific name, local name, habit, plant part used, and ethnic practices. Distribution analysis of plants habit revealed that maximum remedies were obtained from herb (18), followed by trees (13), shrub (10), climbers (7) respectively. Different parts of medicinal plants include leaf, fruit, flower; seed, bark, whole plant, and root were used as the source of medicine by the people. Further, most of the remedies for ailments were obtained from leaves. The present survey helps to build a scientific attitude towards observing the flora around us and to enrich knowledge of medicinal plants.

Keywords: *Medicinal plants, Diabetes mellitus, Ethnobotany, Antidiabetic, natural remedies.*

I. INTRODUCTION

Medicinal plants have been utilized as a part of essentiality in all societies as wellspring of medicine. Some medicinal plants also used as pleasant condiments, to flavour, to dye, for conserving food etc. Ethnobotany is basically the study of a region's plant and their practical use through traditional knowledge and also from the local people. Eight percentage of the world's population depends wholly or partially on traditional medicinal system for their primary health care needs (Kunwar *et al.*, 2005).

Diabetes mellitus is a serious metabolic disease that cause high blood sugar and slowly it spills into urine and cause many physiological disorders. Abnormality of carbohydrate metabolism which is linked to low blood insulin level may leads to Diabetes Mellitus (Maiti *et al.*, 2004). It is a major life-threatening disease all over the world. It seems as the complex and rapidly growing problem that results in shortage or lack of insulin secretion and/or reduced sensitivity of tissue to insulin (WHO, 2006). There many lifestyle factors are known to be important to the development of diabetes. Currently in India the number of diabetic patients is around 14.9 million and it is expected to rise 69.9 by 2025 (Biswajic Sarma, 2020). According to the WHO, diabetes mellitus will be 7th leading cause of death by year 2030 (Mathers and Loncar, 2006). The effective allopathic treatment is there for diabetic treatment but it may cause potential side effects.

Low blood sugar, upset stomach, skin rash or itching, tiredness or dizziness, weight gain kidney complications, upset stomach, metal taste some drugs also cause diarrhoea. Weight gain, risk of liver disease, anaemia risk, swelling of legs or ankles are the major side effects. Now a day's people greatly depend on traditional medicinal plants and their formulations in order to avoid these kinds of side effects. These kind of documentation studies can contribute a lot increasing an averseness about the importance of such medicinal plants which is mainly used for curing the diabetic disease.

II. MATERIALS AND METHODS

A. Study area (Plate-1-2)

The ethnobotanical survey was conducted in vallath kunnu which is a hill region in Onchiyam village of Kozhikode district, Kerala. It is an important diversity zone in Onchiyam village. It is situated 7 Km north of Vatakara, adjacent to the Arabian Ocean in the west. It lies between 8°25'-8°53' N latitude and 77° 35'E longitude (Plate: I). This hill stretches 4 km and covers western region of Onchiyam village, peak height is approximately 400 meters from ground level. The vegetation is floristically rich compared to another region of this village. This region is rich with greenery having all the lushness and serenity of a rural retreat.

B. Ethnobotanical Data Collection

Semi-structured questionnaire method (Gbolade, 2009) was used along with some modifications are applied for the easy conduction of interviews. The questionnaires are divided into three sections. First part was about the personal information such as age, sex, and contact number. Second part include the common name, habit, plant part used. The third part include plant formulations and mode of application of the plant part.

The field survey was conducted between November 2020 and January 2020. Interviews are conducted with the local peoples of vallath kunnu also fifteen traditional healers from the local area were selected and interviewed. In addition, specimens are collected for herbarium preparation and also took some photographs.

C. Preservation of Specimens

The plant specimens collected from the study area dried, poisoned, mounted as per standard method (Jain and Rao 1977), and identified using the Gamble volumes (1915-1936). They were classified according to Bentham and Hooker. Herbarium was deposited in the Department of Botany, Nirmala College for women.

Plate I: Study area

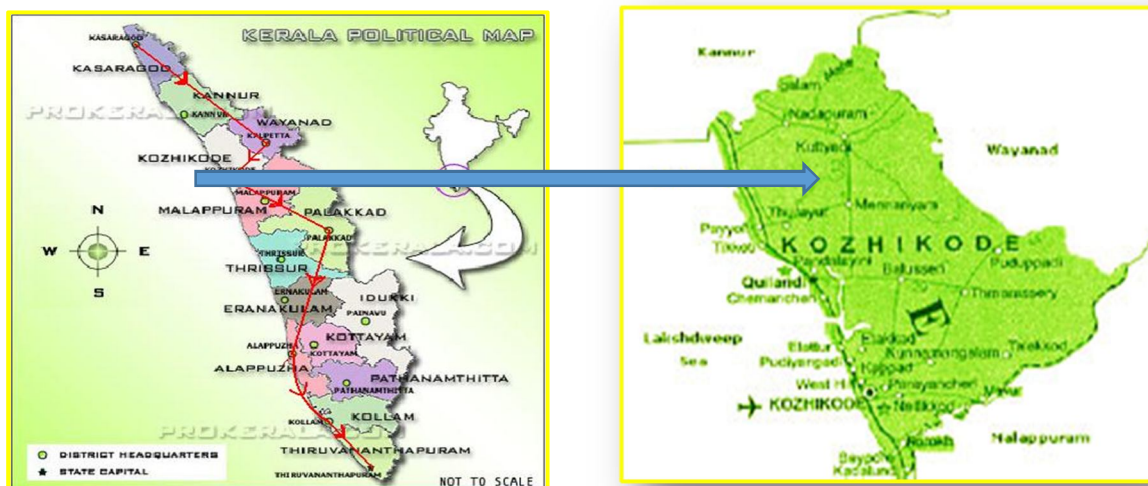
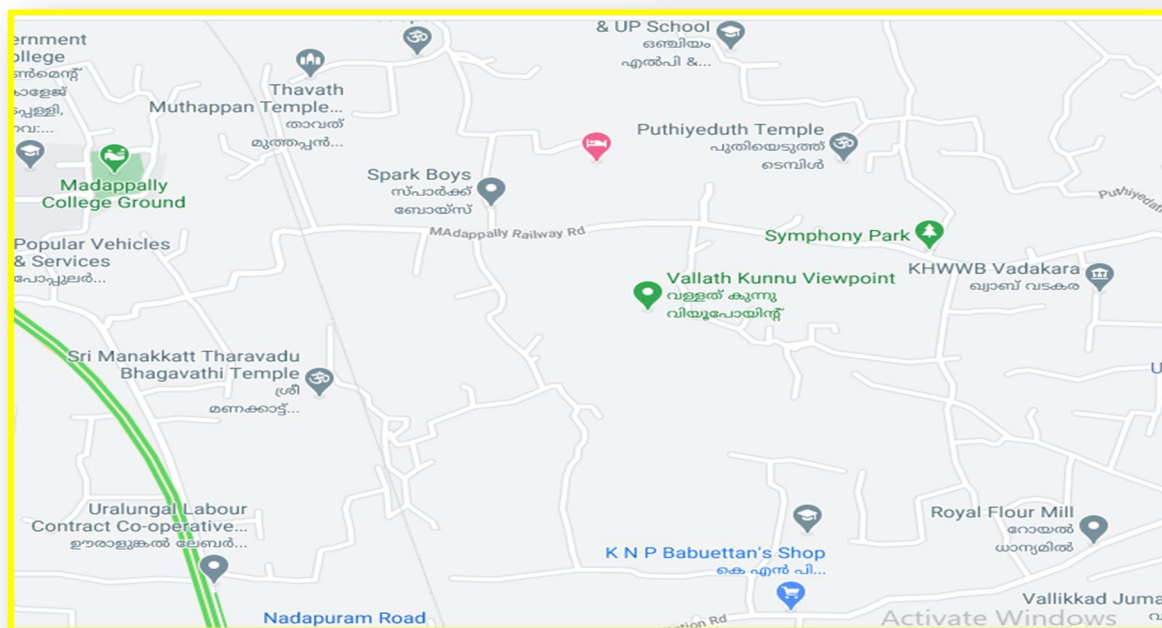


Plate II: Location map



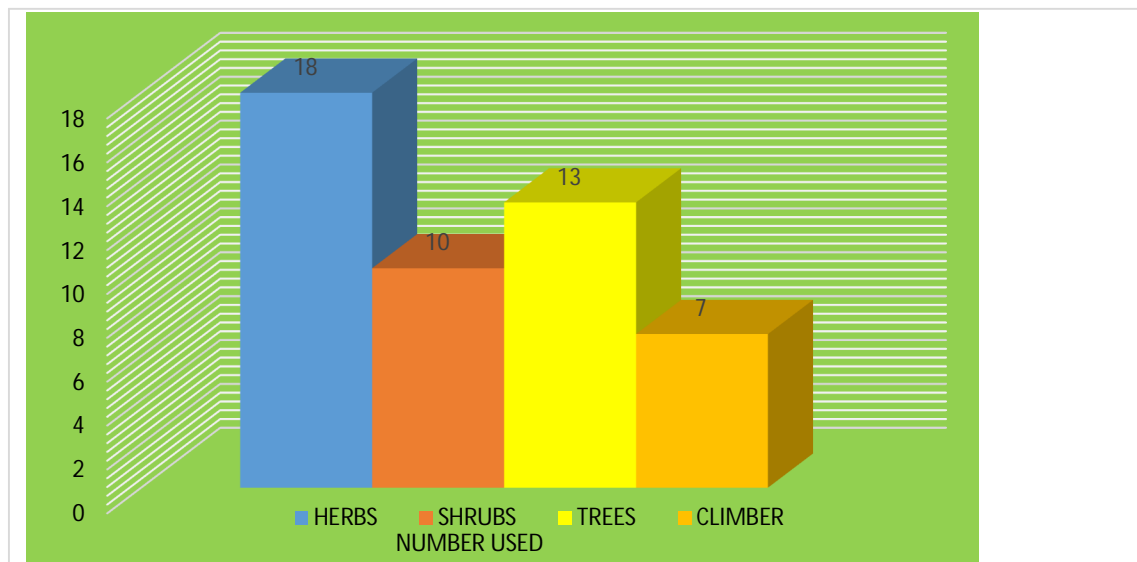
III. RESULTS AND DISCUSSION

Table I: List of medicinal plants and their ethnic practices

S.No	Binomial Name	Family	Local Name	Habit	Plant Part Used	Ethnic Practices
1	<i>Tinospora cordifolia</i> Thunb.	Menispermaceae	Amrutha valli	Climber	Leaf	Oral intake of leaf juice along with turmeric powder.
2	<i>Cleome rutidosperma</i> DC.	Cleomaceae	Neelavela	Herb	Leaf	Having decoction made with the leaf.
3	<i>Abelmoschus moschatus</i> Medik.	Malvaceae	Kattukasturi	shrub	seed	Administration of powdered seed with honey.
4	<i>Hibiscus rosa-sinensis</i> Linn.	Malvaceae	Chembarathi	Shrub	Flower	Tea made with the decoction of the flower can reduce diabetes.
5	<i>Garcinia gummi-gutta</i> Linn.	Clusiaceae	Kudam puli	Tree	Fruit	Fruit can be dried and the water boiled with this dried fruit can be used for drinking purpose.
6	<i>Biophytum sensitivum</i> Linn.	Oxalidaceae	Mukkutti	Herb	Leaf	Powered dried leaves are administered orally with honey.
7	<i>Aegle marmelos</i> Corr.	Rutaceae	Koovalam	Tree	Leaf/ bark	The decoction made with the leaf or bark can be drink in empty stomach.
8	<i>Murraya koenigii</i> (L.) Sprengel	Rutaceae	karivepp	Tree	Leaf	Inclusion of the leaf in daily diet.
9	<i>Xanthoxylum rhetsa</i> Roxb.	Rutaceae	murikk	Tree	Bark	Administration of paste made by the bark with honey or butter milk.
10	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Aryaveppu	Tree	Bark	Bark decoction is used for drinking.
11	<i>Mangifera indica</i> Linn.	Anacardiaceae	Maavu	Tree	Leaf	Administration of decoction of young leaf.
12	<i>Moringa oleifera</i> Lam.	Moringaceae	muringa	Tree	Fruit ,leaf	Including the fruit in daily diet and also administration of raw green leaf.
13	<i>Acacia Arabica</i> Wild.	Fabaceae	Karuvelam	Tree	Bark	Bark decoction mixed with milk is given before sleep.
14	<i>Mimosa pudica</i> Linn.	Fabaceae	Thottavadi	Herb	Leaf	Administration of leaf juice along with honey in little amount.
15	<i>Mucuna pruriens</i> Linn.	Fabaceae	Velvet bean	Climber	Seed	Administration of paste made by the boiled seed.
16	<i>Tamarindus indica</i> Linn.	Fabaceae	Vaalanpuli	Tree	Leaf	Drinking of water boiled with the leaf.
17	<i>Quisqualis indica</i> Linn.	Combretaceae	Yashoda poovu	Shrub	Leaf	Drinking of decoction of leaf.
18	<i>Eugenia jambolana</i> Lam.	Myrtaceae	Njaval	Tree	Seed	Administration of powdered seed along with milk.
19	<i>Psidium guajava</i> L.	Myrtaceae	Pera	Tree	Fruit	Having a peeled fruit daily can reduce sugar.
20	<i>Syzygium samarangense</i> (Blume) Merr, &L.M Perry	Myrtaceae	Chamba	Tree	Fruit	Having the fruit juice daily.
21	<i>Passiflora edulis</i> Sims.	Passifloraceae	Valli naranga	Climber	Fruit	Having fruit juice daily can reduce sugar.
22	<i>Benincasa hispida</i> Thunb.	Cucurbitaceae	Kumbalam	Climber	Fruit	Administration of fruit juice daily.
23	<i>Coccinia indica</i> W&A.	Cucurbitaceae	Koval	Climber	Leaf	Leaf juice is given morning and evening.

24	Momordica charantia Linn.	Cucurbitaceae	Kaypa	Climber	Fruit	Juice of green fruit is given in daily morning.
25	Centella asiatica Urb.	Apiaceae	Kudangal	Herb	Whole plant	Having the decoction made with the plant.
26	Ixora coccinea L.	Rubiaceae	Thechi	Shrub	Flower	Better to drink boiled water with thechi flower.
27	Eclipta prostrata L.	Asteraceae	kanjanni	Herb	Leaf	Drinking of decoction made with the leaf
28	Wedelia trilobata (L.) Pruski	Asteraceae	Amminipoovu	Herb	Flower	Consumption of paste made by flower along with honey
29	Catharanthus roseus Linn.	Apocynaceae	Shavam naari	Herb	Leaf	Leaf juice is taken daily.
30	Gymnema sylvestre R. Br.	Asclepiadaceae	Chakkarakolli	Shrub	Leaf	Mercerized leaf with water and the juice is taken daily. Leaf powder mixed with water is taken before meals.
31	Swertia chiratta Linn.	Gentianaceae	kiriyath	Herb	Leaf	Paste made with leaf and a slice of turmeric, eating it on an empty stomach in the morning and after dinner at night is very good for lowering blood sugar.
32	Evolvulus alsinoides Linn.	Convolvulaceae	vishnukrianti	Herb	Leaf	Decoction made with the leaf use for drinking purpose.
33	Capsicum frutescens Linn.	Solanaceae	mulaku	Shrub	Fruit	Preparations with the fruit is recommended.
34	Solanum torvum Sw.	Solanaceae	Chundanga	Shrub	Fruit	Inclusion of fruit in daily diet.
35	Tecoma stans Juss. Ex Kunth	Bignoniaceae	Subhramanya kireedam	Shrub	Leaf	Tea made with the decoction of the leaf.
36	Leucas aspera (Willd.)Lamk	Lamiaceae	Thumba	Herb	Root	Dried root are powdered and administrated with curd.
37	Lantana camara Linn.	Verbenaceae	Aripoovu	Shrub	Leaf	Administration of leaf juice.
38	Stachytarpheta jamaicensis Linn	Verbenaceae	kattupunnuthu	Herb	Leaf	Dried powdered leaves can be used with honey.
39	Aerva lanata Juss.	Amaranthaceae	cherula	Herb	Leaf	The decoction of leaf with decoction of curcuma longa is given twice in a day.
40	Alternanthera sessilis Linn.	Amaranthaceae	Ponnanganni	Herb	Leaf	Leaf decoction is given empty stomach.
41	Gomphrena globosa Linn.	Amaranthaceae	vadamalli	Herb	Leaf	Administration of dried powdered leaf mixed with honey.
42	Amaranthus spinosus L.	Amaranthaceae	Mullancheera	Herb	Leaf	Inclusion of leaves in daily diet.
43	Piper nigrum L.	Piperaceae	Kurumulak	Climber	Fruit	Having the tea made with the dried crushed fruit.
44	Phyllanthus emblica Linn.	Phyllanthaceae	nelli	Tree	Fruit	Juice of fruit with the turmeric can be drink at morning.
45	Phyllanthus niruri Linn.	Phyllanthaceae	Keezhar nelli	Herb	Whole plant	Drinking Decoction of whole plant in early morning.
46	Sauropus androgynous (L) Merr.	phyllanthaceae	Madura cheera	Shrub	Leaf	Inclusion of the leaf of maduracheera in diet.
47	Tragia involucrata Linn.	Euphorbiaceae	Kodithoova	Herb	Leaf	Drinking of tea made with the leaf of kodithoova.
48	Amorphophallus paeoniifolius Dennst.	Araceae	Kattuchena	Herb	Fruit	Including the fruit in diet

Figure I: Representation of plant habit



The figure- I shows the presence of maximum number of plant habit used as medicine are herb (18) than the tree (13) shrub (10) and climbers (7).

Figure -II: Representation of plant part used

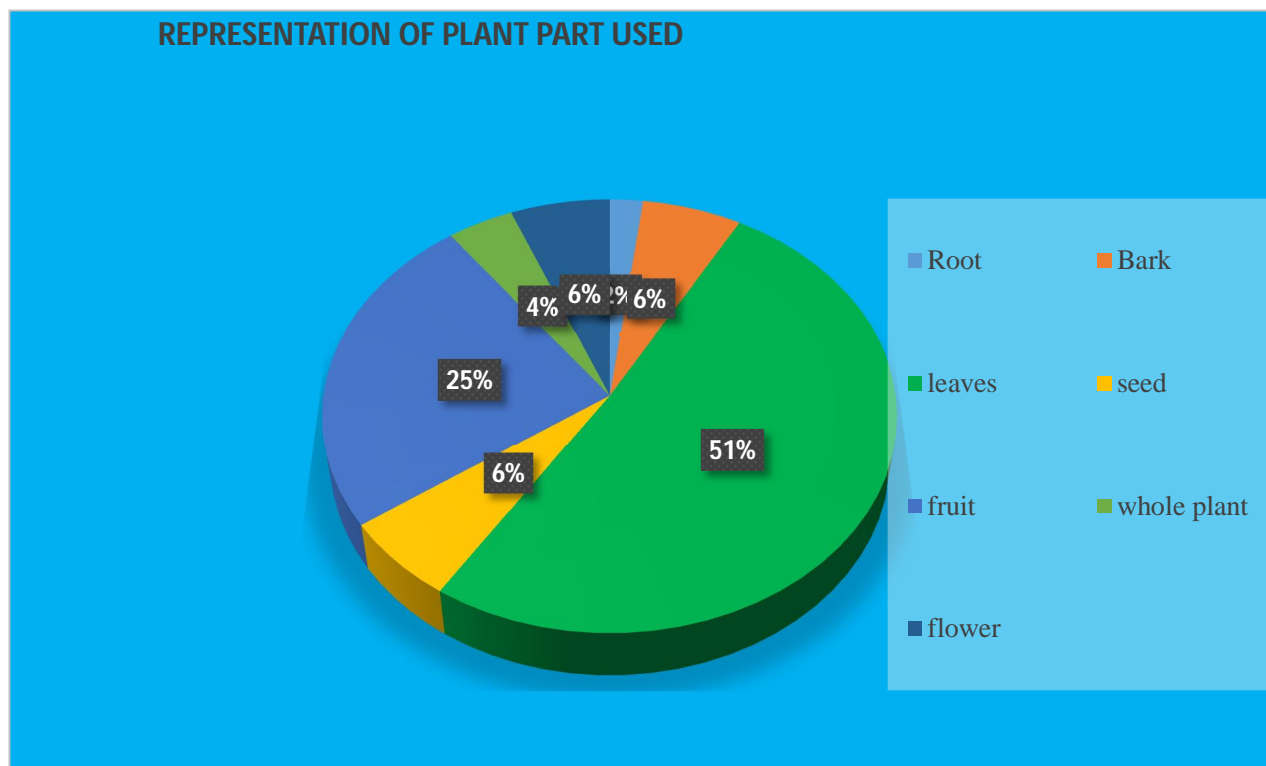
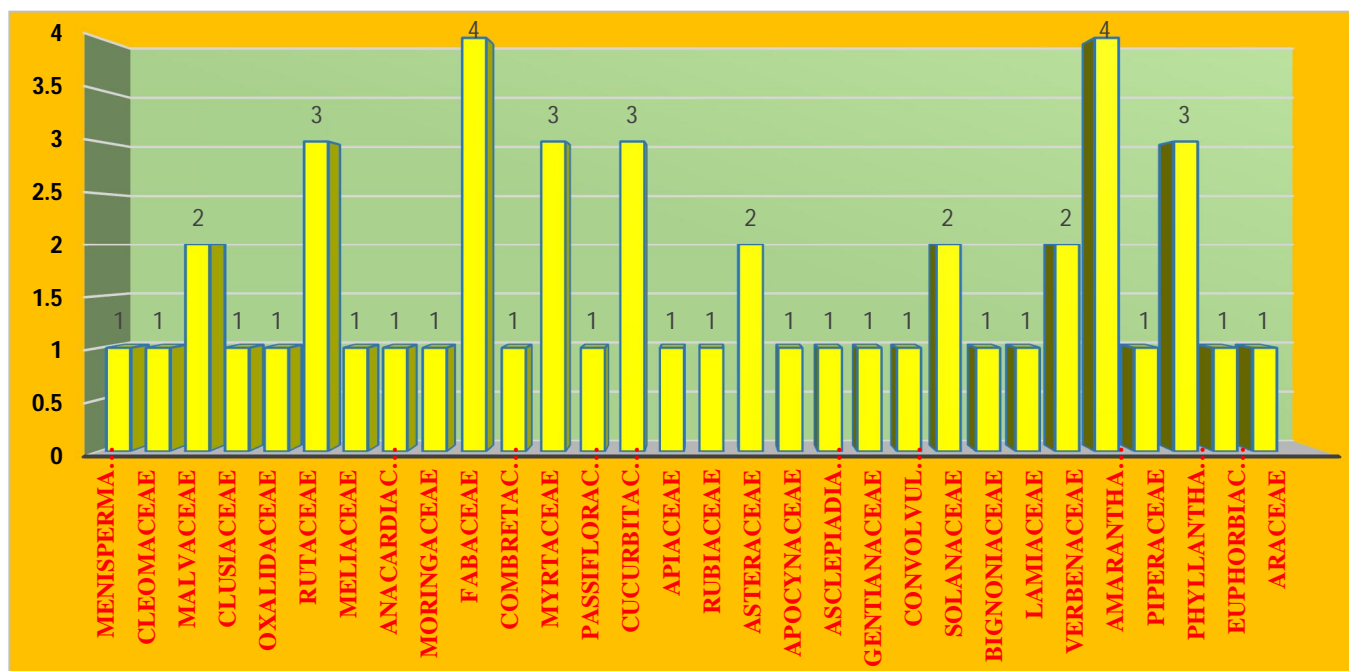


Figure: II showing the maximum percentage plant parts used for the ethnic practices are leaves (51%) than fruit (25%), flower (6%), seed (6%), bark (6%) whole plant (4%), and root (2%).

Figure- III: Representation of plant families



This ethnobotanical survey documented 48 plants are belonging to 30 families which having the antidiabetic property. The plant family include, Fabaceae (4), Amaranthaceae (4), Rutaceae (3), Myrtaceae (3), Cucurbitaceae (3), Phyllanthaceae (3) are dominant. Other families include Malvaceae (2), Asteraceae (2), Solanaceae (2), Verbenaceae (2). Families Araceae, Meliaceae, Cucurbitaceae, Oxalidaceae, Solanaceae, Apocynaceae, Apiaceae, Euphorbiaceae, Convolvulaceae, Clusiaceae, Asclepiadaceae, Rubiaceae, Lamiaceae, Anacardiaceae, Moringaceae, Passifloraceae, Combretaceae, Gentianaceae, Cleomaceae, Piperaceae having one species each. Distribution analysis of plants habit revealed that maximum remedies were obtained from herb (18), followed by trees (13), shrub (10), climbers (7) respectively (figure 1). Different parts of medicinal plants include, leaves (51%), fruit (25%), flower (6%), seed (6%), bark (6%), whole plant (4%), and root (2%) (figure. 2) where used as the source of medicine by the people. Plant habit analysis disclosed that the maximum remedies were obtained from herb (18), similar findings were found in the work of researchers (Johnson Gritto *et al.*, 2015, Himangshu Bikash Das *et al.*, 2008). Leaves are the most frequently used plant part which is followed by the fruit, flower, seed, bark, whole plant, and root. Similar type of results was also obtained by other researchers (Mahishi *et al.*, 2005, Jennymol *et al.*, 2016, Biswajit Sarma, 2020). The photosynthetic organs of plants are leaves which is responsible for the medicinal value (Balick *et al.*, 1996). Collection of leaves and its ethnic practices are easy as compared to other plant part. Herbal preparations are made in the form of decoction, infusion, powder, paste. Very common media for preparation of herbal medicine are honey, buttermilk, water and turmeric. Among the 48 plant species the plants that are commonly used by local people of the study area includes *Azadirachta indica*, *Aerva lanta*, *Centella asiatica*, *Gymnema sylvestre*, *Passiflora edulis*, *Mamordica charantia*, *phyllanthus emblica* and *Swertia chirata*. The present ethnobotanical survey is useful for further on identification of active compounds that can be used as an antidiabetic drug. The link for digital herbarium of collected medicinal plants is follows: <https://forms.gle/wV3c2Cs5JFvN6VS56>

IV. CONCLUSION

A total of 48 plants belongs to 30 families have been found in this survey which have antidiabetic property. The plant has been enumerated with botanical name, scientific name, local name, habit, plant part used, and ethnic practices. Distribution analysis of plants habit revealed that maximum remedies were obtained from herb (18), followed by trees (13), shrub (10), climbers (7) respectively. Different parts of medicinal plants include leaf, fruit, flower, seed, bark, whole plant, and root were used as the source of medicine by the people. Further most of the remedies for ailments were obtained from leaves. The survey could play an important role for acquiring knowledge on medicinal plants which is used for the treatment of diabetes mellitus. It also reveals the idea regarding the ethnic practices of plants and the plant part used. This work can also capable of creating awareness about the role of plants in human life and their contribution in sustainable development.

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