



## ANALYTICAL SCREENING OF MEHAGHNA AND PRAMEHAGHNA PLANTS OF BHAVAPRAKASH WITH SPECIAL REFERENCE TO ANTIDIABETIC STUDIES

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### ABSTRACT

Diabetes mellitus has become a challenge for human civilisation due to want of definite safer medicine. Though modern science has stepped up to maximum with the help of technological advancement but still the alternative approach stands as option. Ayurveda has described the complete treatment package for the traditional nomenclature disease Madhumeha. Different interdisciplinary aetiopathogenesis are met with suitable scientific evaluations for the disease and treatment. The herbal drugs are now-a day's playing vital role in drug research in word scenario. Several classical books are famous for their description of medicinal plants with various pharmacological values. A search was made in the paper to find out specific plants described as *pramehaghna/mehaghna* in comparison with experimental/clinical antidiabetic effect in *Bhava prakasa* the noted work on herbal drugs of Ayurveda.

### INTRODUCTION

Diabetes mellitus is a major public health problem known to affect more than 20 million people in the world. It poses a great risk as far as the morbidity and mortality through early atherosclerosis, obesity and hypertension are concerned. In many, it may remain undiagnosed. It contributes significantly to prolonged ill health and premature death. The disease is rapidly developing into a major health hazard in our country with the changed life styles and high paced civilization. The disease is affecting the average Indian at a quite younger age. Diabetes mellitus is one of the oldest diseases known to mankind and yet with the tremendous scientific advances witnessed in this century, including its management. The disease was well known to the ancient Indian medical experts. All the

renowned classic text of Ayurveda works refers to this disease under the term *Madhumeha* (sugar in the urine).

The causes of diabetes are many known factors. Methods of prevention and treatment are all relevant in the context of diabetes. Furthermore, diabetes is a major cause of disability through its complications of retinopathy, nephropathy and diseases of the larger blood vessels, which may lead to blindness, kidney failure, coronary thrombosis, gangrene of the lower extremities and amputation sometimes. Apart from detailed description its etiopathogenesis a definite familial prediction to the disease are referred in Ayurveda, besides the importance given to dietary regulations, physical exercises and the use of number of plant drugs in the management of disease.

Bhava Prakash a treatise in Ayurveda is the legacy of Bhava Mishra of 16<sup>th</sup> C. AD and is a noted work in medicinal plants. His contribution to Ayurveda cannot be measured in words but his work has strengthened the identity of Ayurveda no doubt. Usually he is known for contribution of defined medicinal plants in Ayurveda. Though hundreds of medicinal plants have been described

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in Charak, Susruta and Vagbhatta (Vrihatrayee) like important earlier texts of Ayurveda, Vrihatrayee has also shown the light on several *pramehaghna* /*mehaghna* /*madhumehaghna* plants [1] out of which many plants have been proved experimentally and clinically having anti-diabetic effect. A lot of information related to herbal drugs with their specifications like flower group, leafy vegetable group etc. apart from different types of meats, rice preparations, water varieties, milk, curd, ghee, etc are found to have been described vividly in various places of Bhavaprakasa and are congregated in one place in a very simplified way. A total no of 22 chapters (Vargas) are seen authentically prepared in his work with pharmacognostical value. Especially Pt P.V Sharma has clearly defined all the medicinal plants in his work [2]. In most animal studies, water extracts or alcoholic extracts of the plants have been screened. In few studies, the active principles of plants have been investigated for hypoglycaemic activity.

Out of the total Vargas, an attempt has been taken to sort out the medicinal plants described as Pramehaghna/Mehaghna may have efficacy in diabetes from research point of view. A number of reviews have been published in the last three decades on plants screened for hypoglycaemic activity in India and elsewhere [3]. On observation it was found that 47 such drugs of Bhavaprakasa were having *Pramehaghna* or *mehaghna* properties [4].

During nineteenth century a lot of physicians have come out with specified documented works of sensitive medicinal plants [5]. Several organisations like ICMR etc. have also brought out publications compiled with analytical study of various herbal plants [6]. Looking to the interest for an alternative substitute of diabetic management a step was taken to verify *Pramehaghna*/*Mehaghna* plants of Bhava prakasa whether having any anti diabetic effect.

## MATERIALS AND METHODS

The following herbal/plant drugs have been sorted out from Bhava-Prakasa and were compared with latest available references having ant diabetic effect

The following table shows the references of Pramehaghna/Mehaghna plants described in Bhavaprakasa/Vriyatrayee with botanical names, family etc. Attempt was taken to provide the information compiled and references collected from the text and other materials.

## OBSERVATION AND DISCUSSION

It was observed from the total plants identified from Bhavaprakasa, that there are 47 plants have been described having pramehaghna/ mehaghna effect which are not specific as madhumehaghna or anti-diabetic. Out of the above 47 items, 42 plants have been experimentally found having anti-diabetic effect mostly on animal model.

Among the major chemical constituents of plants credited with hypoglycaemic actions are glycosides, alkaloids, glycans, triterpenes, mucilages, polysaccharides, oils, vitamins, saponins, glycoprotein's, peptides, amino acids and proteins etc. Pharmacological screening for hypoglycaemic activities has been done using various animal models like normal, fasting rats and rabbits; alloxan-treated rabbits and hyperglycaemia. In most animal studies water extracts or alcoholic extracts of the plants have been screened. In few studies the active principles of plants have been investigated for hypoglycaemic activity induced in rats by andrenaline, corticoropin, corosolin, somatotropin as also by streptozotocin and by pancreatectomy. It was also searched from various sources and screening processes strengthening the concept.

Those plants listed from *Bhava prakasha* were also compared to the *pramehaghna* herbs found in *charaka*, *susruta* and *Vagbhatta* also and it was found that few drugs are not found in *Vrihatrayee* as described in *Bhava prakasha* (Star marked). It can be apprehended that, the later *pramehaghna* dravyas of *Bhava prakasha* are properly based on later research or evidence which have been duly recognised in the text.

## Enumeration of Drugs with their Experimental/Clinical Study References

Amlaki is most important drug used in various ways as medicine, cosmetics etc. The well known chyavanprash is famous for *Amla* and it is an important source of Vitamin C. It is known as a preventive for diabetes when used raw amla fruit and have been confirmed through several studies. As per a study methalonic seeds extract of *Embllica officanalis* possess significant anti-diabetic activity in streptozotonic-induced type-2 diabetes mellitus rats [7].

*Magnifera indica* (Amra) or mango is very important plant known for its fruits all over the world but so many studies have been done on different parts of the plant. However, the kernel of the seed is a noted anti-diabetic agent used by traditional physicians. A study shows 100 gm of mango leaves powder on a daily basic effectively reduced weight, elevated blood glucose level and relief in symptoms of type II diabetes mellitus patient [8].

The use of *Holostemma annularis* (Arkapuspi/payasaya) is usually limited to the practitioners. Use of the plant in the treatment of diabetes mellitus is a potential source for isolation of new active agents for diabetes mellitus. The principal antioxidant compounds of *Holostemma annularis* root may also be responsible for hypoglycaemic effects shown in a study [9].

*Portulaca oleracea* (Brihanloni) is traditionally described as a drug in very limited formulation but a study suggests that *Portulaca oleracea* has the hypoglycaemic potential and could be useful on the diabetes therapy [10].

*Holoptelea integrifolia* (Chirabilva) is also a drug



of specific use. Ether extract of leaves of *Holoptelea integrifolia* was screened for anti-diabetic activity and was compared with standard drug with Glibenclamide for alloxan induced method. In all the methods better results were observed with statistical significances [11].

*Anogeissus latifolia* (Dhava) is a drug usually very restricted in prescriptions of ayurvedic physicians individually. However a study shows that aqueous extract of *Anogeissus latifolia* bark possess significant anti-diabetic, anti-hyperlipidemic and in vivo antioxidant activity in type-2 diabetic rats [12].

*Leucas cephalotes* (Dronapusi) is also highly recommended in urinary tract diseases. However as per a study the *Leucas cephalotes* ethanolic extract shows anti-diabetic activity [13].

*Elephantopus scaber* (Gojihva/Mayursikha) is a plant used in Ayurveda combined with other materials. But an investigation suggests that *Elephantopus scaber* leaves and root extract exhibit anti-hyperglycaemic effects and consequently may alleviate damage of pancreas and liver associated with alloxan-induced diabetes mellitus in rats [14].

*Tribulus alatus/ Tribulus terrestris* (Gokshura) usually prescribed for urinary disorders. A study indicates that alcoholic extract of *Tribulus alatus* possesses hypoglycaemic activity in type-1 model of diabetes [15].

*Tinospora cordifolia* (Guduchi) is otherwise known as *Amruta* is a potent drug in Ayurvedic system and is used for a various disease conditions. The system is generally used for medicines in the processed form called *Guduchi satva* which is an aqueous extract of the plant. A study shows that the root extract of *Tinospora cordifolia* is protective and is hypoglycaemic in nature [16].

*Commifera wightii* (Guggulu) is a very common drug useful for management of all sorts of vatic diseases in Ayurveda and several compound formulations are available also. As per a study the administration of CMEE( *Commifera mukul* ethalonic extract) 200 mg/kg/day daily for 60 days in high-fructose induced diabetic rats reversed the parameter significantly designed for study [17].

*Curcuma longa* (Haridra) is a household item used from cosmetics to medicine. Several human studies have been done, having its anti-diabetic effect single or mixed with Amla (*Embllica officinalis*) [18]. A study reveals that the spent turmeric oleoresin being wasted at present can be used as anti-oxidant and anti-diabetic agent in food and nutraceutical products [19].

Haritaki or *Terminalia chebula* a well-known drug in Ayurvedic field and is an important component of *Triphala*. After search it was found that the fruit of *Terminalia chebula* or *Haritaki* extract was comparable with glibenclamide, a well-known hypoglycaemic drug in modern medicine. A study shows that the ethanolic extract of *Terminalia chebula* fruit has potential hypoglycaemic action [20].

Now a days *Citrullus colocynthis* (Indrayan) has

become rare due to massive deforestation. A study has been undertaken with aqueous extracts *Citrullus colocynthis* (2000 mg/kg) exhibited significant antidiabetic activity in alloxan induced diabetic rats [21].

*Solanum nigrum* (Kakamachi) is usually used for liver or billary problems in Ayurveda. A study suggests the validity of the clinical use of the plant in diabetes mellitus control after further toxicological and in vivo antidiabetic studies, it has been concluded that the leaves and fruit of *Solanum nigrum* have significant hypoglycaemic activity [22].

*Terminalia arjuna* (Kakubha/Arjuna) is a drug used as *hridaya* (Cardiac) but a study suggests that *Terminalia arjuna* is effective in reducing hyperglycemia, hyperlipidemia and oxidative stress related to the risk of diabetes. Thus it may have a therapeutic value for treatment of Type-2 diabetes Mellitus [23].

Kampillaka or *Mallotus philippinensis* is an indigenous drug used as anthelmintic usually in powder form by the the system physicians. Interestingly this drug is described as *Pramehaghna* in Bhaba Prakasa which has been confirmed by a study. Phytochemical studies also revealed the presence of phenolics in the bark extract which may be responsible to exert anti-diabetic activity of *Mallotus philippinensis*. Hence, it can be used as a drug for diabetes mellitus [24].

*Momordica charantia*(Karavella) or bittergourd is known for its anti-diabetic effect and is used by the people as a vegetable. Several studies have been done to highlight the anti-diabetic activity as well as phytochemical and pharmacological reports on *Momordica charantia* for its possible therapeutic effects on diabetes [25].

*Careya arborea* (Katabhi) is also a drug which is not abundantly used but it is found as co-ingredient in few formulations. A study reveals hypoglycaemic by a method of making *Careya arborea* herbal drug [26].

The drug kataphala is used for nasya purpose under *Panchakarma*. A study shows the anti-diabetic action of the extracts of *Myrica nagi* (Kataphala) may be due to the blocking of glucose absorption [27].

*Picrorhiza kurrora* (Katuki) is a very common item used in Ayurveda mostly for liver disorders. It was known that extract of *Picrorhiza kurrora* possess significant anti-diabetic activity in Streptozotocin-nicotinamide induced type-2 diabetes mellitus in rats. Therefore it may be potentially beneficial in type-2 diabetes and associated dyslipidemia [28].

*Costus speciosus* (Kemuka) is also a noted drug used for various diseases like uterine problem and digestive problem etc. and it is often used by tribals of Assam. However, a study signifies that *Costus speciosus* root extract possesses hypoglycemic, anti-hyperlipidemic and anti-oxidative effects, which may prove to be of clinical importance in the management of diabetes and its complications [29].

*Accacia catechu* (Khadira) is a drug used in



various types of skin disorders and a study shows the ethanolic extract of *Acacia catechu* and the water insoluble fraction of ethanolic extract exhibited significant anti-hyperglycaemic activity and produced dose dependent hypoglycaemia in fasted normal rats [30].

*Melia azadirachta* (Mahanimba) is used for several disease conditions but particularly *Melia azadirachta* is highly significant medicinal plant have been used for the treatment of diabetes [31].

*Centella asiatica* (Mandukaparni) is a potent drug used for neurological disorders like loss of memory and insomnia etc. but a study shows that ethanol extract and its chloroform fraction of *Centella asiatica* urban open up a new vista for the discovery of new generations single or combinational safe oral hypoglycaemic agents [32].

Manjistha is extensively used for skin diseases both externally and internally. A study suggests that *Rubia cordifolia* (Manjistha) is a natural anti-oxidant, which might be helpful in management of disease like diabetes. The study represents root of *Rubia cordifolia* as a potential hypoglycaemic agent [33].

Pippali or *Piper longum* is a bitter substance and is used with restriction due to its burning sensation when used orally. Most often it is used in anti-cough preparations but it has potent anti-diabetic effect which was confirmed from a study that the result indicates PLEF (*Piper longum* ethanolic extract) has potent hypoglycemic and anti-lipidperoxidative effects in alloxan induced diabetic rats [34].

*Gymnema sylvestre* (Meshashringi) is commonly used by the people to control sugar in the name of *gudamari*. A study reveals that *Gymnema sylvestre* has significant anti-diabetic activity in alloxan induced and normal fasting rats. The extract seems promising for the development of a phytomedicine for diabetes mellitus. It can be used as an adjuvant along with allopathic treatment of medicine to that diabetes as well as to delay the late complications of diabetes [35]. This plant is also marketed as a potent anti-diabetic drug.

*Azadirachta indica* (Nimba) is used as a drug from time immemorial for skin diseases and for various diseases also. From an experiment it is concluded that *Azadirachta indica* is potent hypoglycaemic agent as glibenclamide. Moreover, *Azadirachta indica* alcoholic leaf extract significantly lowered the blood sugar level in glucose-fed and adrenaline induced hyperglycaemic rats [36].

*Butea frondosa* (Palasa) is considerably used as anthelmintics but anti-hyperglycemic action of methanolic extract of *Butea frondosa* leaves may be due to antioxidant potential of extract which is revealed by improvement in the level of antioxidant enzymes in pancreas of alloxan diabetic rats and validate in Indian system of medicine [37].

Pasanabheda (*Saxifraga ligulata*) or stone breaker is a well known Indian Drug. This plant already has been

recognized for its role in dissolving kidney stone. Its pharmacological activities are anti-diabetic and antipyretic etc [38] which is comparable to another similar study like *Piperine*, the active principles of *Piper longum* has statistically significant anti-hyperglycemic activity while acutely it raises blood glucose at high doses [39].

*Marsilea minuta* (Sunmisanaka) is widely used as a leafy vegetable and is used as a drug to induce sleep but ethanolic leaf extract of *Marsilea minuta* is having significant anti-hyperglycemic potential and can be further fractioned in order to get a responsible constituent for this very action as per a study conducted [40].

Adrak or *Zingiber officinale* which is otherwise called as Sunthi an important material used for medicine and as spices and condiments even it is taken raw also. A lot of medicinal qualities are described and used in different forms with various formulations in Ayurveda. It was found anti-diabetic in a study that shows the ginger (*Zingiber officinale*) extract has hypoglycaemic effect on diabetic rats [41].

*Diospyros pregrina* (Tinduka) is also known for fruit which is tasty and most often used to control dysentery and diarrhoea and polyurea. It possesses significant anti-diabetic activity and supports the traditional usage of the matured fruits for the control of diabetes [42].

*Lagerstroemia speciosa* (Tinisha), the drug is still in controversy so far Ayurvedic name is concerned however it is being named as *patala*, *tinisha*, *arjuna* (?), and in vernacular name *jarula* in hindi *azar* in Assamease etc. However, there have been many studies done on this remarkable herb. *Corosolic* acid presents in the leaves activate the transport of glucose across cell membrane. The herb, therefore serves as a glucose transporter which helps reduce blood sugar level [43].

*Psoralea corylifolia* (somaraji) is generally used for skin diseases in Ayurveda. As per a study composite extract of above plant part have more potential anti-diabetogenic activities than separate extracts [44].

*Dioscorea bulbifera* (Varahikanda) is a noted drug used with specific instruction as an aphrodisiac. The confirmation of anti-diabetic potentials of the *Dioscorea bulbifera* tuber has been justified in a study as claimed by traditional medicine practitioners in akwa ibom state. The evaluation of *Dioscorea bulbifera* tuber extract for its anti-diabetic activity in alloxan induced diabetic rats demonstrated a significant ( $P < 0.05$ ) reduction in hyperglycemia. The significant lowering of blood glucose level shown in the alloxan-induced diabetic rats in the study is good manifestation to show that *Dioscorea bulbifera* is an effective anti-diabetic regimen. This result has given credence to the use of the aerial yam as a menu for diabetic patient under dieting [45].

As like Haritaki and Amlaki, Bibhitaki (*Terminalia bellerica*) is one of the component of *Triphala*





which is widely used with various formulations in Ayurvedic system of medicine. A study shows that *Terminalia bellerica* fruit extract possessed anti-diabetic and anti-oxidant activity and these activities may be interrelated. Administration of *Terminalia bellerica* extract did not have any significant effect on serum glucose level in alloxan diabetic rats during first five days. However, as compared with untreated control animals treated with *Terminalia bellerica* showed much lowered serum glucose in extract treated animals found to be reduced to 54% ( $P < 0.001$ ) when compared with that of control diabetic animals [46].

*Peterocarpus marsupium* (Vijaka) has already been established as a potent anti-diabetic drug both in Ayurveda and modern. In another study, it concluded that phenolic C-glycosides present in *Peterocarpus marsupium* heart wood are the phytoconstituents

responsible for the anti-hyperglycemic activity and validate the claim of anti-diabetic activity of heart wood of *Peterocarpus marsupium* [47].

*Bacopa monnieri* (Vrahmi) is used for neurological disorders like loss of memory, insomnia but astonishingly it was found that it has anti-diabetic effect. A study shows that the extract might have insulin like activity and the anti-hyperglycemic effect of the extract might be due to an increase in peripheral glucose consumption as well as protection against oxidative damage in alloxanised diabetes [48].

*Argyreia speciosa* (Vridhadaruka) and its use have become restricted due to poor availability. The anti-hyperglycemic effect of *Argyreia speciosa* was compared with the reference standard tolbutamide (40 mg/kg) in a study [49].

**Table 1. Plants detail**

| Sl. No | Name of the plants available in |             | Latin / Botanical Name                        | Family         | Guna as described in Bhava Prakasha | Ref. Varga/Shlok Number |
|--------|---------------------------------|-------------|---|----------------|-------------------------------------|-------------------------|
|        | Bhava prakasa                   | Vrihatrayee |   |                |                                     |                         |
| 1      | Amalaki                         | C,S,V       | <i>Emblca officinalis</i>                     | Euphorbiaceae  | Pramehaghna                         | Haritakyadi Varga /39   |
| 2      | Amra (Flower)                   | S           | <i>Mangifera indica</i>                       | Anacardiaceae  | Pramehaghna                         | Amradiphala Varga/2     |
| 3      | Arkapuspi/ Payasya              |             | <i>Holostemma annularis</i>                   | Asclepiadaceae | Pramehaghna                         | Guduchyadi varga /271   |
| 4      | Brihanloni                      |             | <i>Portulaca oleracea</i>                     | Portulacaceae  | Pramehaghna                         | Shakavarga/22           |
| 5      | Chirabilva                      |             | <i>Holoptelia integrifolia</i>                | Ulmaceae       | Pramehaghna                         | Guduchyadi varga /124   |
| 6      | Devadaru                        | C,S,V       | <i>Cedrus deodara</i>                         | Pinaceae       | Pramehaghna                         | Karpuradi Varga/25      |
| 7      | Dhava                           |             | <i>Anogeissus latifolia</i>                   | Combretaceae   | Pramehaghna                         | Vatadi Varga /59        |
| 8      | Dronapuspi                      |             | <i>Leucas cephalotes</i>                      | Lebiatae       | Pramehaghna                         | Shakavarga/34           |
| 9      | Gojihva/ Mayursikha             |             | <i>Elephantopus scaber</i>                    | Polypodiaceae  | Pramehaghna                         | Guduchyadi varga /298   |
| 10     | Gokshura                        | C,V         | <i>Tribulus terrestris</i>                    | Zygophyllaceae | Pramehaghna                         | Guduchyadi varga /46    |
| 11     | Guduchi                         | C,S,V       | <i>Tinospora cordifolia</i>                   | Merisparnaceae | Mehaghna                            | Guduchyadi varga/10     |
| 12     | Guggulu                         |             | <i>Balsamodendron mukul/Commifera wighiti</i> | Burseraceae    | Pramehaghna                         | Karpuradi Varga /40     |
| 13     | Haridra                         | C,S,V       | <i>Curcuma longa</i>                          | Zingiberaceae  | Mehaghna                            | Haritakyadi Varga /196  |
| 14     | Haritaki                        | C,S,V       | <i>Terminalia chebula</i>                     | Combretaceae   | Pramehaghna                         | Haritakyadi Varga /20   |
| 15     | Indrayan                        | C,S,V       | <i>Citrullus colocynthis</i>                  | Cucurbitaceae  | Pramehaghna                         | Guduchyadi varga /206   |
| 16     | Kakamachi                       |             | <i>Solanum nigrum</i>                         | Salanaceae     | Mehaghna                            | Guduchyadi varga /247   |



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|--------|---------------------------------|-------------|---|-----------------------|-------------------------------------|-------------------------|
|        | Bhava prakasa                   | Vrihatrayee |   |                       |                                     |                         |
| 17     | Kakubha(Arjun)                  |             | <i>Terminalia arjuna</i>                                  | Combretaceae          | Pramehaghna                         | Vatadi Varga /27        |
| 18     | Kampilaka                       | C,S,V       | <i>Mallotus philippinensis</i>                            | Euphorbiaceae         | Pramehaghna                         | Haritakyadi Varga /147  |
| 19     | Karavella                       |             | <i>Momordica charantia</i>                                | Cucurbitaceae         | Pramehaghna                         | Shakavarga/63           |
| 20     | Katabhi                         |             | <i>Careya arborea</i>                                     | Leguminoceae          | Pramehaghna                         | Vatadi Varga /68        |
| 21     | Kataphala                       | C,V         | <i>Myrica nagi</i>  | Esculerata-myricaceae | Pramehaghna                         | Haritakyadi Varga /181  |
| 22     | Katuki                          | C,S,V       | <i>Picrorhiza kurroa</i>                                  | Scrophulariaceae      | Pramehaghna                         | Haritakyadi Varga 152   |
| 23     | Kemuka                          |             | <i>Costus speciosus</i>                                   | Zingiberaceae         | Pramehaghna                         | Shakavarga/111          |
| 24     | Khadira                         |             | <i>Acacia catechu</i>                                     | Leguminoceae          | Mehaghna                            | Vatadi Varga /32        |
| 25     | Mahanimba                       | C,S,V       | <i>Melia azedarach</i>                                    | Meliaceae             | Pramehaghna                         | Guduchyadi varga /99    |
| 26     | Mandukaparni                    |             | <i>Centella asiatica</i>                                  | Scrophulariaceae      | Pramehaghna                         | Guduchyadi varga /281   |
| 27     | Manjistha                       | S           | <i>Rubia cordifolia</i>                                   | Rubiaceae             | Mehaghna                            | Haritakyadi Varga /191  |
| 28     | Maricha                         | C,S         | <i>Piper nigrum</i>                                       | Piperaceae            | Mehaghna                            | Haritakyadi Varga /63   |
| 29     | Meshashringi                    |             | <i>Gymnema sylvestre</i>                                  | Asclepiadaceae        | Mehaghna                            | Guduchyadi varga /255   |
| 30     | Murva*                          | C,S,V       | <i>Marsdenia tenacissima</i>                              | Asclepiadaceae        | Mehaghna                            | Guduchyadi varga /245   |
| 31     | Nimba                           | C,S         | <i>Azadirachta indica</i>                                 | Meliaceae             | Pramehaghna                         | Guduchyadi varga /96    |
| 32     | Palasa                          |             | <i>Butea frondosa</i>                                     | Leguminoceae          | Mehaghna                            | Vatadi Varga /53        |
| 33     | Pasanabheda                     |             | <i>Saxifraga ligulata</i>                                 | Saxifragaceae         | Pramehaghna                         | Haritakyadi Varga /185  |
| 34     | Pippali                         | C,S,V       | <i>Piper longum</i>                                       | Piperaceae            | Pramehaghna                         | Haritakyadi Varga /55   |
| 35     | Sarjaka*                        | C,V         | <i>Vateria indica</i>                                     | Dipterocarpaceae      | Pramehaghna                         | Vatadi Varga/21         |
| 36     | Sunnisanaka                     |             | <i>Marsilea minuta</i>                                    | Marsileaceae          | Pramehaghna                         | Shakavarga/32           |
| 37     | Sunthi                          | S,V         | <i>Zingiber officinale</i>                                | Zingiberaceae         | Mehaghna                            | Haritakyadi Varga /63   |
| 38     | Suvarchala*                     |             | <i>Gynandropsis pentaphylla</i>                           | Capparidaceae         | Pramehaghna                         | Guduchyadi varga /286   |
| 39     | Tinduka                         | S,V         | <i>Diospyros peregrina</i>                                | Eberaceae             | Pramehaghna                         | Amradiphala Varga /65   |
| 40     | Tinisha S                       |             | <i>Ougeinia dalbergioides/ Lagerstroemia flos-reginae</i> | Leguminoceae          | Pramehaghna                         | Vatadi Varga /75        |



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|--------|---------------------------------|-------------|------------------------------|----------------|-------------------------------------|-------------------------|
|        | Bhava prakasa                   | Vrihatrayee |                              |                |                                     |                         |
| 41     | Vakuchi                         |             | <i>Psoralea corylifolia</i>  | Leguminasae    | Mehaghna                            | Haritakyadi Varga /208  |
| 42     | Varahikanda                     |             | <i>Dioscorea bulbifera</i>   | Dioscoreaceae  | Mehaghna                            | Guduchyadi varga /179   |
| 43     | Vasa*                           |             | <i>Adhatoda vasica</i>       | Acanthaceae    | Pramehaghna                         | Guduchyadi varga /90    |
| 44     | Vibhitaki                       | C,S,V       | <i>Terminalia belerica</i>   | Combretaceae   | Pramehaghna                         | Haritakyadi Varga /37   |
| 45     | Vijaka                          | S           | <i>Pterocarpus marsupium</i> | Leguminoceae   | Pramehaghna                         | Vatadi Varga /29        |
| 46     | Vrahmi                          |             | <i>Bacopa monnieri</i>       | Umbelliferae   | Pramehaghna                         | Guduchyadi varga /281   |
| 47     | Vridhadaruka                    |             | <i>Argyria speciosa</i>      | Convolvulaceae | Pramehaghna                         | Guduchyadi varga/210    |

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## CONCLUSION

Since the description of Madhumeha (diabetes mellitus) gets its entity separately in the chapter of prameha, which refers to group of pathological conditions involving in the urogenital system. The drugs indicated as *pramehaghna/mehaghna/madhumezhghna* are also supposed to possess anti-diabetic effect. Further, it is also important to find out which part of a plant possesses anti-diabetic effect, as the particular part of plant only may have such potency or may have a better potency than other parts. Some of these plants as described in *Vrihatrayee*

have been well-proven as anti-diabetics. Most notable drugs are the Amala (fruit-pulp), chiraita (whole-plant), jamun (seeds), Haridra (rhizome), Karanja (seeds) etc. As such, all these plants need to be studied individually and in different combinations, so that a potent anti-diabetic formulation can be evolved.

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