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MEDICINAL PLANTS OF BANGLADESH FOR DRUG DEVELOPMENT

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Abstract: Since the beginning of man's life on Earth, medicinal plants have played an essential role in sustaining human health as restorative and therapeutic agents in preventing diseases and deterioration. It also goes over the various significant contributions that medicinal plants have made and continue to make to the development of traditional, herbal, and allopathic medicines in the modern world, as well as the extent to which medicinal plants and their constituents are still used in the preparation of both herbal and modern allopathic medicines. A large portion of this talk is devoted to discussions regarding the challenges and potential of producing modern pharmaceuticals from plant resources. The systematic approaches to be taken, as well as the procedure and methods to be used in developing novel medications from medicinal plants, have been detailed. Medicinal plants I formed the basis and foundation stone of both traditional and modern medicines, (ii) have contributed significantly to the development of modern allopathic medicines, (iii) constitute a significant volume of modern medicinal and pharmaceutical preparations, and (iv) still have a lot more to offer to the field of medicine, according to this paper, which examined various historical facts and records concerning medicinal plants. The paper concludes by discussing the medicinal plants of Bangladesh's potential for development as modern chemical and vegetable medications. At the conclusion of the talk, a list of such medicinal plants is provided, along with the indications for which they could be developed as modern pharmaceuticals.

1. Introduction

Including competition with and vicious attacks from fellow animals, injuries and wounds caused by them and plants, adverse environmental and climatic conditions causing discomfort and disease, and health degeneration and decay causing death. (Topol, 2019). (Kahn, 2004). From the beginning of man's battle against disease, plants have been the main source of drugs. He looked for therapeutic herbs as well as food in the wilderness (Gurib-Fakim, 2006).Medicinal plants were thus the cornerstone of medicine and disease treatment from the dawn of human civilisation. Since then, thousands of therapeutic plants

have been discovered, and over 20,000 have been identified (Levingston and Zamora, 1983, (Strobel, Daisy, & reviews, 2003). Many important medications have been discovered and developed from phytochemical and pharmacological research of some of these plants. (Khan et al., 2020). Examples of such plant-derived drugs include anti-malarials from Cinchona species, sedative-analgesics from Papaver somniferum, cardioactives from Digitalis and Strophanthus, antispasmodics and mydriatics from Atropa, Datura, Hyoscyamus and Duboisia, laxatives from Cassia acutifolia, Rhamnus purshiana and Rheum palmat.(Gunjan et al., 2015). Between 1949 and 1981, 60 novel Chinese medications were derived directly or indirectly from medicinal plants (Ogunlana, 1983). Many modern pharmaceuticals and processed medicines utilized in hina are likewise plant-based. More than 25% (now 36%) of all prescription medications used in industrialized countries have active principles still derived from plants (Farnsworth and Morris, 1976).

Medicinal plants having these chemical elements were used as main raw materials for medication and medicine manufacture before man learned synthetic chemistry(Seleiman et al., 2021). (Cahyaningsih, Magos Brehm, Maxted, & evolution, 2021). Despite phenomenal advances in synthetic chemistry, it has yet to meet the complete demand for pharmaceuticals and therapies, and man has yet to develop adequate alternatives for many key natural drugs. Contrary to synthetic chemistry's restrictions, the plant kingdom contains an enormous pool of chemical molecules with potential medicinal qualities, many of which are unknown to modern chemistry. It's true that the plant kingdom is a virtually unexplored source of new chemical compounds, many of which are biodynamic, and on which synthetic chemists might build even more fascinating structures with more therapeutic action (Said, 1995). We don't know how much more these plants can contribute to the field of medicine, especially in terms of generating new modern medications (Farnsworth and Bingel, 1977). (Hao & Xiao, 2020)

2.Material and methods

2.1. Drug Development

Because a medical plant's crude extract comprises a variety of chemical elements, each of these constituents may have a different effect on the live organism, resulting in unwanted side effects(Griffin et al., 2018). However, a plant extract may have a chemical component in such a low concentration that it may be ineffective for the medicinal purpose for which it was originally intended(Duggan, 2021). Once again, the crude extract may contain a number of chemical elements that are capable of performing the same medicinal function. Because of the synergistic action of the elements in such an extract, ingestion of such an extract may result in significant side effects. As a result, (Awuchi, Igwe, & Amagwula, 2020)An illustration of this is the case of Catharanthus roseus, a plant that has long been employed in the treatment of type 2 diabetes. Despite the fact that this plant has been used in traditional medicine for the treatment of diabetes for a long time, scientific investigations have been unable to identify any specific

anti-diabetic properties in the plant(Behl et al., 2021). As a matter of fact, this plant contains a number of indole alkaloids that have leukopenic activity (such as vincristine, vinblastine, vinleurosine, pentosidine, and others), as well as minor amounts of a few alkaloids that have anti-diabetic activity (such as pentosidine). A fulminating reaction caused by severe leukopenia has been observed in experimental animals exposed to a crude extract of the plant, according to published reports. Due to the synergistic activity of multiple anti-leukemic alkaloids found in the extract, a fulminating reaction was observed in the patients. As a result, rather of employing the plant directly, the creation of the anti-leukemic medicines vincristine and vinblastine sulfates, derived from Catharanthus roseus became unavoidable instead (Goldstein et al, 1974). Several occurrences involving Ammi visnaga, *Rauvolfia serpentina*, Ruta graveolens, and other species were similar in nature. Khellin, a coronary vasodilator medicine that is an excellent treatment for angina pectoris, was derived from Ammi visnaga, a plant that was previously recommended as a diuretic and antispasmodic for the treatment of renal colic(Ghukasyan & Yenokyan). Reserpine, a highly effective hypotensive medication, was derived from *Rauvolfia serpentine*, a plant that had previously been employed as an antidote to snake bites as well as in the treatment of crazy patients. Rutin, a glycosidic medication that is presently employed in the treatment of capillary fragility, was created from the plant Ruta graveolens, which was previously solely of interest in the laboratory (Chopra et al, 1958). As a result, medication discovery based on medicinal plants is frequently an essential and fruitful endeavor(Ghukasyan & Yenokyan).

It is believed that 1.5 billion people (now projected to be 3.5 billion, or approximately 88 percent) of the world's population are still being treated for ailments with herbal medicines, according to the World Health Organization (WHO) (Said, 1995). Hundreds of different medicinal plants are used in the preparation of these herbal medications(Pathan). Additionally, it is generally assumed that up to two-thirds of the population in underdeveloped countries rely on plants as sources of medications. It is sufficient to mention that plants continue to supply beneficial medications for human use" (Farnsworth, 1984). (Ozioma & Chinwe, 2019). By conducting research using modern technology and scientific knowledge, many important modern drugs with greater therapeutic efficacy and potency may be developed from these plants(Ozioma & Chinwe, 2019). Acceptability, quality, and efficacy of these medicaments will undoubtedly improve as a result of the creation of modern pharmaceuticals that are derived from herbal medicines or their plant constituents that have been stripped of their less active or inert ingredients.

Research into the production of medications derived from medicinal plants has the potential to make significant contributions to the advancement of modern pharmacology(Ozioma & Chinwe, 2019). If a novel chemical molecule from a medical plant or plant medicine is discovered, this discovery may serve as the foundation for further development of key therapeutic medicines with improved pharmacological

properties. Moreover, because of its unique structure, the isolated novel chemical may serve as a model for synthesizing the same compound or a series of its derivatives with the goal of discovering an ideal medication with increased potency and improved selectivity of action(B. Liu, Li, Zhou, Tang, & Hu, 2018). In this section, examples of such prospects include the synthesis of more effective anti-malarial drugs derived from quinine, which has been isolated from the barks of Cinchona species, and the synthesis of hemorrhagic drugs such as Cumopyran, Tromexan ethyl acetate, Dindivan, Marcoumar, Warfarin, and several other similar compounds allied in structure to dicoumarol (bishydroxycoumarin), which has been isolated from Sweet (Said, 1982). Medical plant research may also lead to the identification and development of suitable raw materials or starting materials for drug manufacturing and synthesis, as well as the development of new drugs(C. Liu, Guo, & Liu, 2018). Because diosgenin, a sterol derived from the Dioscorea species, is such a naturally occurring component of plant origin, it is now being employed in the synthesis and commercial manufacturing of progesterone(Lebot, Faloye, Okon, Gueye, & Plants, 2019). It was discovered that progesterone could be obtained from natural sources in less than ten years, and the price of progesterone plummeted to 1.75 dollars per grain from an earlier value of approximately 80.00 dollars per grain at that time (Goldstein et al, 1974).

The examples and insights shown above demonstrate that medication development from medicinal plants is critical for improving the usage of these plant resources as well as for improving the management of our health.

2.2. Develop Drugs from Medicinal Plants

The development of drugs from medicinal plants is often an elaborate, laborious, time-consuming, and expensive exercise. Careful phytochemical analysis and pharmacological and clinical tests are pre-requisites for developing drugs from medicinal plants. The stages involved in this exercise may be summarized in the following way:

2.2.1 Selection and correct identification of the medicinal plant and extraction of the identified plant with suitable solvents.

For selecting a potential plant for drug development approaches may be made in the following ways (cf. Farnsworth, 1984): Plants may be selected randomly for *phytochemical screening* (by spot tests or color reactions) to identify those which contain one or more of the secondary metabolites having therapeutic properties. Plants that are known to contain a specified class of chemical compounds may be selected and their extracts may be subjected to pharmacological screening(Lebot et al., 2019). Selection of plants may be based on folkloric and traditional uses. Most of the plant-derived drugs of modern medicine were discovered and developed through scientific investigation of folkloric and traditional claims of medicinal properties(Petran, Dragos, Gilca, & Ethnomedicine, 2020). Quinine, morphine, digoxin, digitoxin, tubocurarine, reserpine, vincristine, vinblastine, and many other useful drugs were discovered in this way.

Detection of biological activity of the crude extract and establishment of a bioassay system to permit the identification of the active fractions and rapid discarding of the inactive ones(Hossain, 2019). Fractionation of the crude extract by using physicochemical procedures, and, monitored by biological tests, identification, and separation of the active fractions. Isolation of the active constituents by chromatographic and/ or other suitable techniques and purification of the isolated compounds by repeated chromatography and crystallization(Citti et al., 2019). Establishment of the chemical structures of the pure compounds by various physicochemical techniques and determination of their biological activity by various pharmacological and toxicological tests

2.2.2. Production of the drug in an appropriate dosage form

Drugs thus developed from medicinal plants may further be improved in the following ways:Improvement of the efficacy and potency of the newly developed drugs by structural modification of the biologically active compounds.Designing and modifying the compounds to influence specific biological processes in patients or organisms.Having obtained the potential 'drug', it is then subjected to a series of screening tests to determine its pharmacological profile and its potential therapeutic usefulness. Armed with this information, the compound is then evaluated for safety and efficacy(Mekhail et al., 2020). This evaluation exercise includes pharmacodynamic studies, and acute, sub-acute, and chronic toxicity studies. Stability and storage conditions, dose, suitable dosage form, etc. should also be established during this evaluation exercise. The new drug is then put under clinical trials with official permission from the drug regulatory authorities which stipulate the type of information required for such trials(Jansen-Van Der Weide et al., 2018). It is only after the new drug has satisfactorily undergone clinical trials that it is licensed for general use.The development of a new drug from medicinal plants is a lengthy process and the cost of the development of one new drug to the point at which it is licensed for general use depends on several factors and can vary from $2 to $50 million (Djerassi, 1979). However, for an important drug, the returns can be very rewarding as well. For example, during the financial year ending in June 1983, one of the British Pharmaceuticals manufacturing companies, Glaxo, realized about £100 million from the sales of just one product, Ranitidine (Zantac), a drug used in the management of peptic ulcers. The profit on the sales of this product was about £25 million (Obianwu, 1984).

2.2.3. Category of the Drugs to be Developed

Medicinal plants can be considered for development as modern scientific plant medicines or as new chemical medicines(Jugran, Rawat, Devkota, Bhatt, & Rawal, 2021). If the objective is to isolate and identify the bioactive constituents of the medicinal plants and to formulate them into suitable dosage forms, then the products will be treated as new natural chemical drugs, in which case the general procedure indicated previously should

be followed(Puhlmann, Mols, Olsson, Slootweg, & Kümmerer, 2021). Most of the modern drugs of plant origin have been developed in this way. If on the other hand, a medicinal plant is to be evaluated, developed, and used as plant medicine, a slightly different procedure should be adopted. In this case, preliminary clinical trials may proceed after limited toxicity studies to validate the therapeutic claim before further evaluation. This procedure can be adopted in cases of those medicinal plants where there is an indication that the particular plant has been widely used over a long period without any toxic effects. This approach has been adopted at the Centre for Research into Medicinal plants, Mampong-Akwapim, Ghana, with considerable success (Obianwu, 1984). The clinically effective and safe medicinal plant may then be subjected to other necessary tests to determine the various parameters required for formulating it into a suitable dosage form. The medicinal preparations of the Unani and Ayurvedic systems, which are now produced using modern pharmaceutical technology and presented in various modern pharmaceutical dosage forms, may be developed as scientific plant medicines following this approach.

2.2.4 Problems of Drug Development from Medicinal Plants

Multifarious problems are associated with the development of drugs from plants sources. Some of these are briefly discussed here. As apparent from the foregoing discussion, the development of drugs from medicinal plants is a complicated, lengthy, and time-consuming process. The cost involved is also exorbitant. “In developed countries, the cost of taking a drug from the discovery stage to the marketplace can exceed $50 million and span several years” (Farnsworth, 1984). Getting approval for use of a new drug is also a complicated procedure in many countries. Commercial production of drugs based on specific medicinal plants often suffers serious setbacks as certain plants grow in specific geographical locations(Williams, Burness, & Byrne, 2022). Uninterrupted supply of such raw materials cannot always be guaranteed because of several factors, such as the existing political situation in that area, crop failure due to natural calamities, non-cooperation of the suppliers, etc. It is a fact that geographical location, season, time of collection, and age of the plants often affect the quality and quantity of active constituents of plants(Adhikari & Adhikari, 2021). That is why the quality of the supplied natural raw materials varies from time to time, place to place, and sample to sample which in turn affects the quality and price of the drugs produced. In the process of the development of drugs from medicinal plants, testing of their pharmacological properties often becomes difficult as crude plant extracts are most frequently water-insoluble. This property of the crude extracts poses a problem while converting them into suitable dosage forms for administration to an animal, particularly when it involves the intravenous route. The pharmacological properties exhibited by many crude plant extracts under experimental conditions are often ambiguous and are not always reproducible(Abdel-Tawab, 2021). Thus, assessment of the actual pharmacological effects of such extracts often becomes difficult. Above all, patent protection for plant-

derived drugs is weak, particularly in those cases where the concerned plant contains active principles of known chemical structures.

However, none of these problems are insurmountable. The continued supply of raw materials for industrial production of plant-derived drugs can be assured by systematic cultivation of the plants in different geographical areas. The quality of the raw materials can be maintained and monitored by specifying suitable standards for their cultivation, collection, and processing. Suitable bioassay methods for monitoring pharmacological properties of plant extracts can be and have already been developed.

2.2.5 Potentiality of the Medicinal Plants of Bangladesh for Drug Development

More than five hundred plants growing in Bangladesh have so far been enumerated which are reputed to be medicinally effective in many conditions of health(Srivastava, Srivastava, & Singh, 2021) (Yusuf *et al*, 1994; Ghani, 1998). But it has been observed that many other medicinal plants growing in this country have not yet been identified and that there are many of them which have not been chemically examined and no attention has yet been paid to their pharmacognosy (Said, 1995). Thus it is expected that the number of medicinal plants growing or available in Bangladesh may be more than what has so far been enumerated. It has further been observed that the countless herbs found in Bangladesh should be used for the promotion of health and for fighting disease (Said, 1995). Thus the medicinal plants of Bangladesh hold good promises as potential resources for drug development. A large number of medicinal plants suitable for development as therapeutic agents are available in Bangladesh. The development of both plant medicines and modern chemical drugs from them has great potential of contributing substantially to the economy of the country also. Below is given a list of such local plants which may be evaluated for developing new scientific plant medicines as well as new natural chemical medicines.

Table-01: List of the Medicinal plants of Bangladesh included in different Pharmacopoeias with potentiality of being developed as New drugs

(B.P.= *British Pharmacopoeia*, I.P.= *Indian Pharmacopoeia).*

Scientific Names of Plants	**Official/Bengali Names of Drugs**	**Indications f development**
1. *Abroma augusta* (I.P.	Abroma bark/Ulatkambal	Female diseases
2. *Acacia catechu* (I.P.)	Black Catechu/Khoyer	Astringent drugs
3. *Acacia nilotica* (I.P.) (=*Acacia arabica*)	Indian Acacia/Babla	Adhesive agent, Tablet binder
4. *Acalypha indica* (I.P.)	Acalypha/Muktajhuri	Coughs, Cold

5. *Achyranthes aspera* (I.P.)	Achyranthes/Apang	Diabetes
6. *Adhatoda zeylanica* (I.P) (=*Adhatoda vasica*)	Vasaka/Basak	Coughs, Respiratory diseases
7. *Aegle marmelos* (I.P.)	Belae fructus/Bael	Constipation, Dysente
8. *Allium sativum* (I.P.)	Garlic allium/Rashun	Hypertension, Hypercholesteromia
9. *Aloe barbadensis* (=*A. indica*) (B.P., I.P.)	Aloes/Ghritakumari	Laxative drugs
10. *Alstonia scholaris* (I.P.)	Alstonia bark/Chhatim	Fever, Hypertension
11. *Andrographis paniculata* (I.P.)	Kalmegh/Kalomegh	Liver diseases, fever
12. *Arachis hypogea* (B.P., I.P.)	Groundnut/Cheena Badam	Aperient, Oil
13. *Areca catechu* (I.P.)	Betel nut/Supari	Astringent, Stimulant
14. *Aristolochia indica* (I.P.)	Aristolochia/Isharmul	Antifertility, Impotenc
15. *Asparagus racemosus* (I.P.)	Asparagus/Satamuli	Diuretic, Urinary problems
16. *Azadirachta indica* (I.P.)	Neem/ Neem pata	Malaria, Gum and ski diseases
17. *Bacopa monniera* (I.P.) (=*Herpestis monniera*)	Herpestis/Brahmi shak	Brain tonic, Anaemia
18. *Boerhaavia diffusa* (I.P.) (=*Boerhaavia repens*)	Punarnaba/Punarnava	Diuretic, Jaundice
19. *Butea monosperma* (I.P.) (=*Butea frondosa*)	Butea seed/Polash	Anthelmintic
20. *Calotropis gigantea* (I.P.)	Calotropis/Bara Akanda	Cancers, Boils, Woun
21. *Calotropis procera* (I.P.)	Calotropis/Chhota Akanda	Dyspepsia, Flatulenc
22. *Camellia sinensis* (B.P., I.P.) (=*Thea sinensis*)	Tea plant/Cha	Astringent, Stimulan
23. *Cannabis sativa* (I.P.) (=*Cannabis indica*)	Cannabis/Ganja	Analgesic, Sedative
24. *Capsicum frutescens* (I.P.) (=*Capsicum minimum*)	Capsicum/Marich	Stimulant, Carminati
25. *Carica papaya* (B.P., I.P)	Papaya/Penpey	Digestive enzymes
26. Cassia fistula (B.P., I.P.)	Cassia fruit/Bandarlathi	Constipation, Laxativ
27. *Catharanthus roseus* (B.P., I.P.)	Catharanthus/Nayantara	Cancers, Diabetes

28. *Chenopodium album* (I.P.)	Wormseed/Batua shak	Hepatic disorder
29. *C. ambrosioides* (B.P., I.P.)	American Wormseed/ Chandan betu	Anthelmintic drug
30. *Citrullus colocynthis* (B.P., I.P.)	Colocynth/Indrayan	Cathartic drug
31. *Citrus aurantifolia* (B.P., I.P.) (=*Citrus medica* var.*acida*)	Lemon peel/Lebu	Flavour, Carminative
32. *Cocos nucifera* (I.P.)	Coconut/Narikel	Dehydration, Aperien
33. *Coriandrum sativum* (B.P., I.P.)	Coriander/Dhania	Flavour, Carminative
34. *Cuminum cyminum* (I.P.)	Cumin/Jira	Flavour, Carminative
35. *Curcuma longa* (I.P.) (=*C. domestica*)	Turmeric/Halud	Inflammation, Skin diseases
36. *Cymbopogon citratus* (I.P.) (=*Andropogon citratus*)	Lemongrass/Gondhabena	Analgesic, Antipyretic Essential oil
37. *Datura metel* (I.P.) (=*Datura fastuosa*)	Datura/Kalo Dhutra	Antispasmodic drug
38. *Datura stramonium* (B.P., I.P.)	Stramonium/ada Dhutra	Antispasmodic drug
39. *Eucalyptus* spp. (B.P., I.P.)	Eucalyptus/Eucalyptus	Flavour, Carminative
40. *Eupatorium triplinerve* (I.P.) (=*Eupatorium ayapana*)	Ayapana/Ayapan	Haemostatic, Antisept
41. *Hemidesmus indicus* (I.P.)	Indian Sarsaparilla/ Anantamul	Ant-tumour, Anti-vira
42. *Holarrhena antidysenterica* (B.P., I.P.)	Kurchi bark/Kurchi	Dysentery
43. *Hydnocarpus kurzii* (I.P.)	Chaulmoogra/Chaulmugra	Leprosy, Skin disease
44. *Ipomoea nil* (I.P.) (=*Ipomoea hederacea*)	Indian Jalap/Kalodana	Purgative drug
45. *Lawsonia inermis* (I.P.)	Henna/Mehedi	Skin diseases
46. *Linum usitatissimum* (B.P., I.P.)	Linseed/Tishi	Emollient, Oil
47. *Mentha arvensis* (I.P.)	Peppermint/Pudina	Carminative, Flavour
48. *Moringa oleifera* (I.P.)	Moringa/Sajna	Paralysis, Epilepsy
49. *Nigella sativa* (I.P.)	Black Cumin/Kalojira	Carminative
50. Ocimum sanctum (I.P.)	Basil/Tulshi	Cough, Carminative
51. *Phyllanthus emblica* (I.P.)	Amlaki/Amlaki	Scurvy, Vitamin C

52. *Piper betle* (I.P.)	Betel/Paan	Carminative, Antifertil
53. *Polygala chinensis* (I.P.)	Indian Senega/Meradu	Emetic, Antiseptic
54.*Psoralea corylifolia* (I.P.)	Babchi/Babchi	Leucoderma, Leprosy
55. *Rauvolfia serpentina* (B.P., I.P.)	Rauwolfia/Sarpagondha	Hypertension, Insomn Sedative
56. *Ricinus communis* (B.P., I .P.)	Castor oil/Bherenda	Constipation, Cathart
57. *Saraca asoca* (I.P.) (=*Saraca indica*)	Asoka bark/Ashok	Menorrhagia, Haemorrhoids
58. *Sesamum indicum* (B.P., I.P.)	Sesame oil/Til	Demulcent, Dysentery
59. *Strychnos nux-vomica* (B.P.,I.P.)	Nux-Vomica/Kuchila	CNS stimulant
60. *Terminalia arjuna* (I.P.)	Arjuna/Arjun	Cardiovascular diseas
61. *Terminalia chebula* (I.P.)	Myrobalan/Haritaki	Jaundice, Indigestion
62. *Tinospora cordifolia* (I.P.)	Tinospora/Gulancha	Fevers, Jaundice
63. *Tylophora indica* (I.P.) (=*T. asthmatica*)	Indian Ipecac/Antamul	Bronchitis, Asthma
64. *Trigonella foenum-graecum* (I.P.)	Fenugreek/Methi	Diuretic, Carminative
65. *Urginea indica* (I.P.)	Indian Squill/Bon Piaj	Heart disease
66. *Vitex negundo* (I.P.)	Vitex leaf/Nishinda	Rheumatism, Gout
67. *Withania somnifera* (I.P.)	Withania/Ashwagondha	Insomnia, Sedative
68. *Zingiber officinale* (B.P., I.P	Ginger/Ada	Carminative, Digestiv

3.Result and Discussion

Before attempting to develop these medicinal plants into medications, it is necessary to correctly identify them and conduct biological and clinical investigations on them to determine whether or not they possess the alleged therapeutic capabilities claimed by the plants. These investigations are extremely significant for drug development activities since the biological activity of a plant or its preparation will aid in assessing whether or not the development of the plant or its preparation is worthwhile. Because the chemical constituents and pharmacological actions of the majority of the plants growing in Bangladesh are well understood, and because they are currently in use in traditional medicine, clinical evaluation of these plants can be carried out with only a minimal amount of pharmacological and toxicological research.

4.Conclusions

Medicinal plants formed the basis of both traditional and modern medicines. They have contributed significantly to the development of modern allopathic medicines. constituting a significant volume of modern medicinal and pharmaceutical preparations. Still have a lot more to offer to the field of medicine, particularly to developing new drugs and pharmaceutical raw materials. Problems associated with the development of drugs from medicinal plants are not insuperable.

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