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Research Article

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Medicinal Properties and Phytochemical Analysis of Some Indian Medicinal Plants

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ABSTRACT

The present study was conducted with a view to evaluate the therapeutic potentials of fifteen plant extracts traditionally used against human pathogens. Phytomedicine and herbal drugs are used in health treatment system from olden days. Medicinal plants had been used by different ethnic group, societies and cultures throughout the world since long. Plants are the potential source of medicinal substances which have high pharmacological values and huge utility in healthcare development. Herbal medicines have hugs of prospects in the developing and developed nations for healing different diseases of human beings. Different types of ethnomedicinal plants have several utilities for giving protection from many severe diseases. Plants secondary metabolites are getting huge importance in nutraceutical and pharmaceutical industries, too. Ethnomedicinal plant products are cost-effective and have minimal side effects or toxicity. Plant secondary metabolites are actually used for safeguard mechanism. It gives protection against microbe, viruses, parasites and with other severe diseases and it boosts human immunity, too. It identifies foreign harmful substances and neutralizes them. The current review study deals with those plants that are traditionally used for prevention and healing purposes of several diseases. These medicinal plants are highly available in world with various reported pharmacological properties. This review was done to compile those ethnomedicinal plants which can give protection against various human ailments. This review can be helpful for a large scale of population throughout the world to find out the naturally available prevention and curing agents as well.

Keywords: Medicinal plants; Antifungal; Antibacterial; Phytoconstituents

Introduction

Plants are considered the most important source of medicines. Plants play a valuable role in the basic health requirement of the developing countries. The use of plants and plant products as medicines could be traced as dates back as the beginning of human civilization. The earliest reported of medicinal use of plants in Hindu culture is get going in “Rigveda”, which is said to have been written between 4500 B.C.-1600 B.C. and is intended to be the oldest depository of human knowledge. It is Ayurveda, the foundation of medicinal science of Hindu culture, in its eight-division arrangements with specific properties of drugs and various details of science of life and the art of curing (remedial) [1]. According to the WHO most population which cannot confer the products of western pharmaceutical industries, still depended on traditional medicines [2].

Medicinal plants are a source of significant economic value all over the world. Nature has permit on us a great off botanical wealth and an abounding of diverse types of plants grow in a different part of the country and the use of different parts of several medicinal plants to cure specific ailment has been in fashion since ancient times. Herbal medicine is still the mainstay of about 75%-80% of the whole population and the major part of traditional therapy involves the use of plant extract and their active constituents [3].

Multiple drug resistance has developed due to the indiscriminate use of commercial antimicrobial drugs commonly used in the treatment of infectious disease. In addition to this problem, antibiotics are sometimes associated with adverse effects on the host including hypersensitivity, immune suppression and allergic reactions. This situation forced scientists to search for new antimicrobial substances. Given the alarming incidence of antibiotic resistance in bacteria of medical importance, there is a constant need for new and effective therapeutic agents. Therefore, there is a need to develop alternative antimicrobial drugs for the treatment of infectious diseases from medicinal plants [4]. The drug-resistant bacteria and fungal pathogens have further complicated the treatment of infectious diseases in immune-compromised, cancer and AIDS patients [5].

Traditionally used medicinal plants produce a variety of compounds of known therapeutic properties [6]. The substances that can either inhibit the growth of pathogens or kill them and have no or least toxicity to host cells are considered candidates for developing new antimicrobial drugs. The therapeutic potential are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobials. The beneficial medicinal effects of plant materials typically result from the combinations of secondary products present in the plants. In plants these compound are mostly secondary metabolites such as alkaloids, phenol, flavonoid, steroids, tannins, margosic acid, nimbin, glucoside, resins and fatty acid gums which are capable of producing definite physiological action on body. Compound extracted from different parts of the plants can be used to cure dysentery, diarrhea, cold, cough, cholera, fever bronchitis, etc. [7].

In the present study, we have selected some Indian medicinal plants to be screened against multi-drug resistant bacteria. The selection of medicinal plants based on their traditional uses in India [8].

At present nearly 30% or more of the modern pharmacological drugs are derived directly or indirectly from plants and their extracts dominant in homeopathic or ayurvedic medicines [9-11]. Regarding the wide potentiality of plant sources for medicine, the study intended to recognize the medicinal properties of some natural plant extract and look into the effect of so commercial infract multi-drug resistant human clinical bacteria isolates.

Antimicrobial activity of different plants

Many powerful medicines are extracted from different parts of bioactive plants such as leaf, stem, seeds, bark, flowers and roots. Different chemical agents of the plants such as terpenoids, tannin and flavonoids have antimicrobial activity **Table 1** [12].

Table 1: List of medicinal plants used for healing purposes of various human diseases.

S.No	Plant common name	Botanical name	Family	Showing Antimicrobial Activity of plants parts
1	Onion	*Allium cepa* L.	Amaryllidaceae	Bulb
2	Neem	*Azadirachta indica* A. Juss.	Meliaceae	Leaf, Bark
3	Garlic	*Allium sativum* L.	Amaryllidaceae	Bulb
4	Lemon	*Citrus × limon* (L.) Burm. fil.	Rutaceae	Fruit, leaf
5	Haldi/Turmeric	*Curcuma longa* L.	Zingiberaceae	Stem
6	Papaya	*Carica papaya* L.	Caricaceae	Leaf, Fruit
7	Tea	*Camellia sinensis* (L.) Kuntze	Theaceae	Leaf
8	Tejpata	*Cinnamomum tamala* (Buch.-Ham.) T. Nees and Eberm.	Lauraceae	Leaf
9	Drumstick	*Moringa oleifera* Lam.	Moringaceae	Leaf, Seed
10	Kamini/Orange	*Murraya paniculata* (L.) Jacq.	Rutaceae	Leaf, Fruit
11	Tulsi	*Ocimum tenuiflorum* L.	Lamiaceae	Leaf, Seed
12	Alubokhara	*Prunus domestica* L.	Maloideae	Fruit
13	Black carob	*Prosopis nigra* Hieron.	Fabaceae	Leaf, Bark, Seed
14	Phuli	*Senegalia modesta* (Wall.) P.J.H.Hurter	Fabaceae	Leaf
15	Adarak/Ginger	*Zingiber officinal*/Roscoe	Zingiberaceae	Stem/Rhizome

Azadirachta indica: plant contains Azadirachtin, Margosic acid, Nimbin, Nimbidin as phytoconstituents and showing astringent tonic, antiperiodic, snake periodic bite activity **Figure 1** [8].

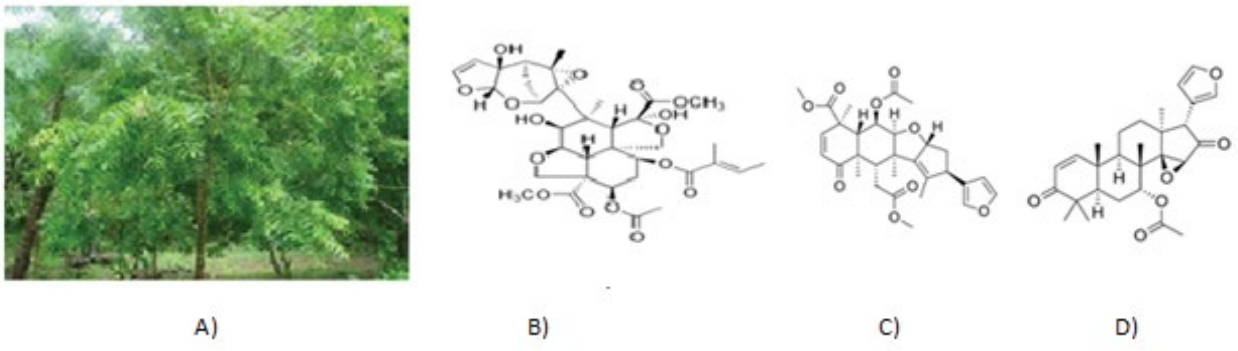


Figure 1: *Azadirachta indica* with chemical structure; A): *Azadirachta indica*; B): Azadirachtin; C): Nimbin; D): Nimbinin.

Nimbin, Nimbidin, Ninbidol, Gedunin, Quercetin, Azadirachtin, etc. are active compounds found in different parts of the Neem and used for the treatment of dermatological, gastrointestinal disease, immune dysfunction respiratory disease, inflammatory infection [13, 14].

Nimbin: Anti-inflammatory, anti-pyretic, anti-histamine, anti-fungal

Nimbidin: Anti-bacterial, anti-ulcer, analgesic, anti-arrhythmic, anti-fungal

Ninbidol: Anti-tubercular, anti-protozoan, anti-pyretic

Gedunin: Vasodilator, anti-malarial, anti-fungal

Sodium nimbinate: Diuretic, spermicide, anti-arthritic

Quercetin: Anti-protozoan

Azadirachtin: Insect repellent, anti-feedant, anti-hormonal

***Ocimum tenuiflorum* L:** Caryophyllene, Eugenol, Methyleugenol, Carvacrol, etc. are Phytoconstituents which showing bronchitis, gastric disorder, earache, diaphoretic, antiseptic and hepatic infections anti-activity **Figure 2** [8].

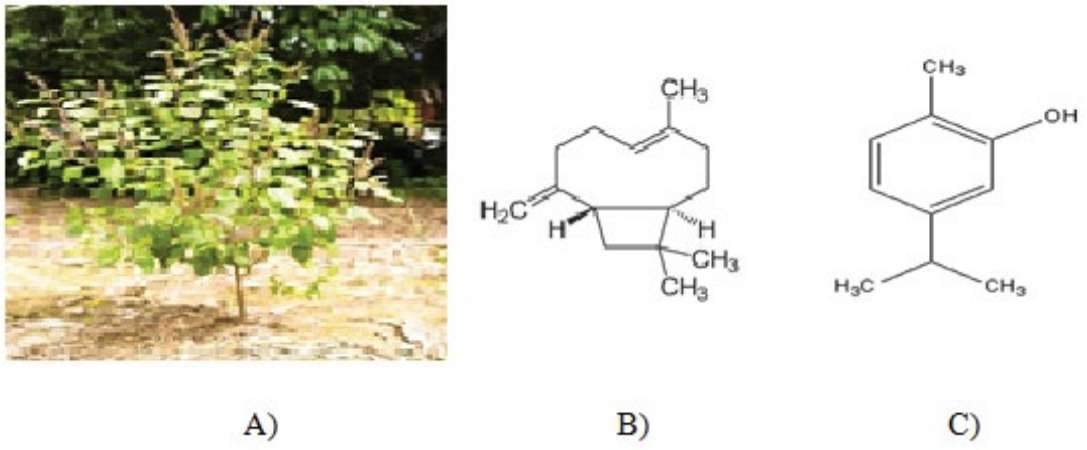


Figure 2: *Ocimum tenuiflorum* L with chemical structure; A): *Ocimum tenuiflorum* L; B): Caryophyllene; C): Carvacrol.

***Prosopis nigra*:** Prosopis contains alkaloids, tannins, cardiac glycosides, saponins, terpenoids, quinones, phenolic santhocyanins and flavonoids apigenin, luteolin, quercetin, etc. as phytoconstituents **Figure 3** [15, 16].

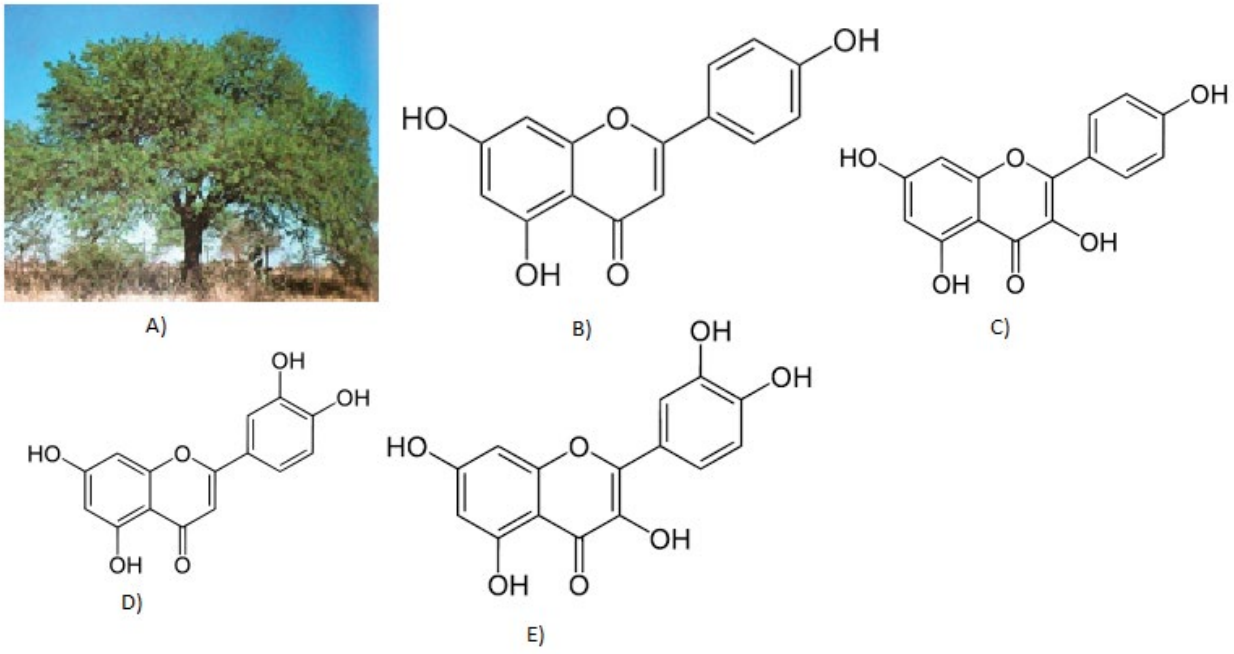


Figure 3: *Prosopis nigra* with chemical structure; A): *Prosopis nigra* B): Apigenin; C): Kaempferol; D): Luteolin; E): Querctine.

***Prosopis nigra*:** Used for treatment of diabetes, liver infection, diarrhea, bladder and pancreas stones, fever, flu, rheumatism, leucorrhea, boils, blisters, scorpion bite, chronic dysentery, cataract, asthma, sexually transmitted infections, and gynecological complaints, including menstrual disorders, as a contraceptive and to prevent abortion [17-19].

Senegalia modesta (Wall.): Octacosanol, nonaeicosanol, hentriacontanol, hydrocarbons, hentriacontane, octacosane, 4-hydroxy benzoic acid, palmitone, Quercetin, kaempherol, Lupeol, Betulin, α-amyrin, etc. phytoconstituents are present and used for the treatment of leprosy, wounds, dysentery, venereal diseases, cough, body weakness, bacterial infections and backache **Figure 4** [20].

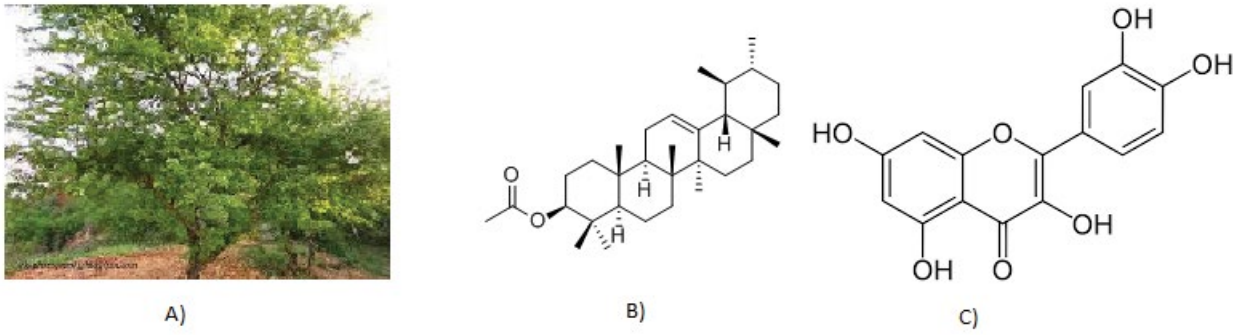


Figure 4: *Senegalia modesta* with chemical structure; A): *Senegalia modesta;* B): α amyrin; C): Quercetin.

Citrus × limon (L.): In Citrus limonene, β-pinene, α-citral and α-terpinene, etc. Phytocostituents are present and showing bactericidal, virucidal and fungicidal properties **Figure 5** [21].

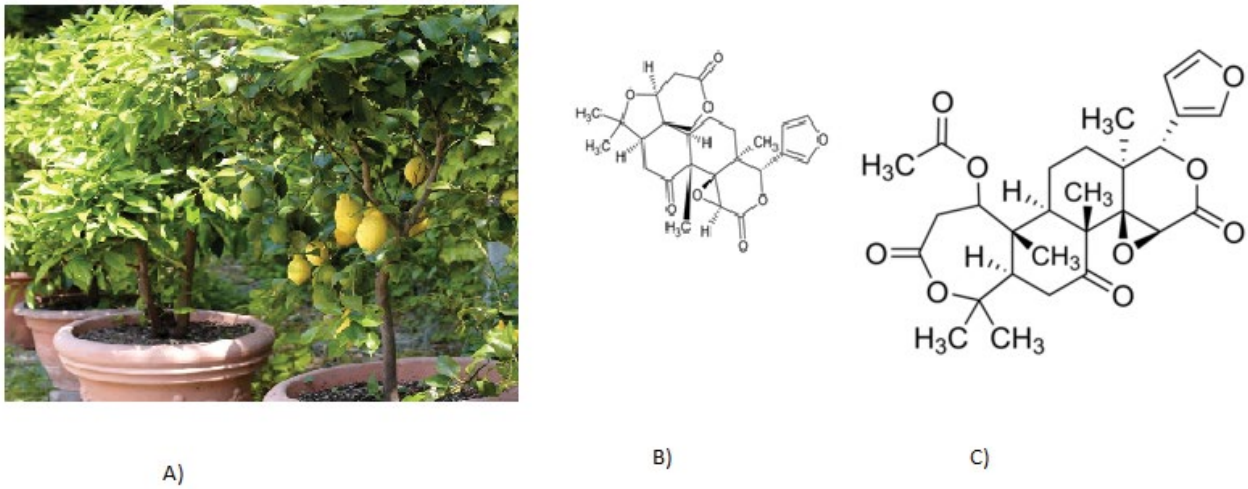


Figure 5: *Citrus × limon* with chemical structure*;* A): *Citrus limon*; B): Limonin; C): Limonin.

***Moringa oleifera*:** The active constituents are tannins, sterols, saponins, trepenoids, phenols, alkaloids and flavonoids like quercetin, isoquercitrin, kaemfericitin, isothiocyanates and glycosides which showing anti-fungal, anti-microbial, anti-atherosclerotic, anti-fertility, anti-inflammatory, anti-diuretic and regulating hypothyroidism, relieving pain, central nervous system depressant activity **Figure 6** [22].

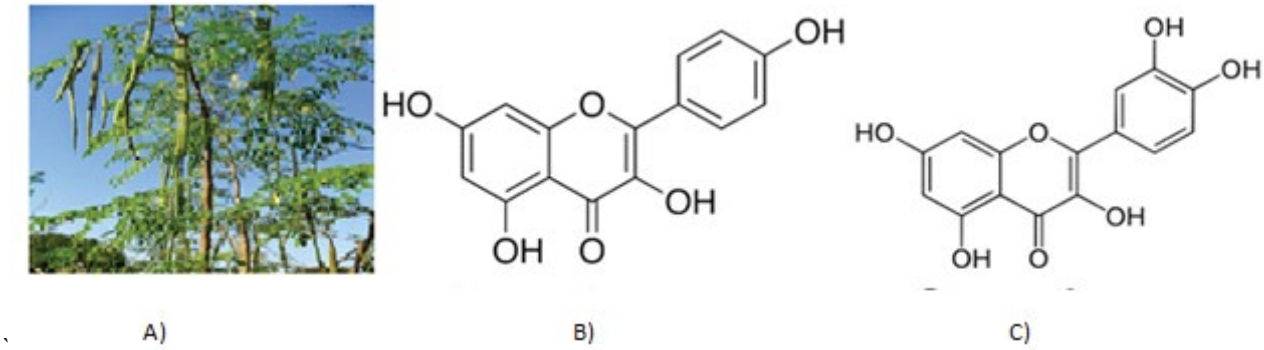
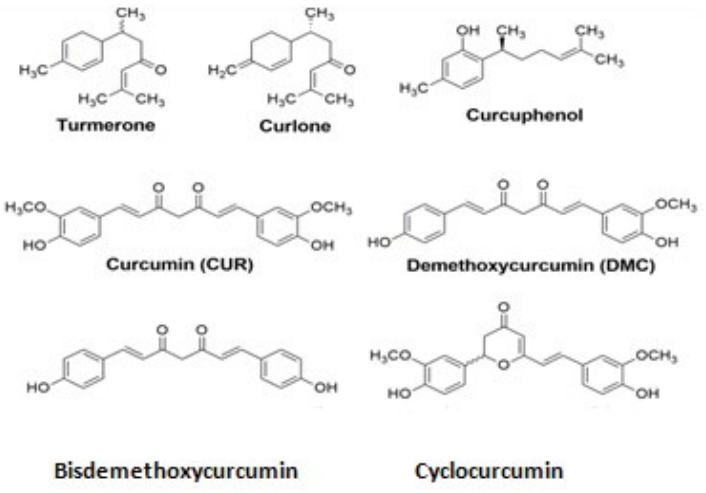


Figure 6: *Moringa oleifera* with chemical structure; A): *Moringa oleifera*; B): Kaemferol; C): Querceti.

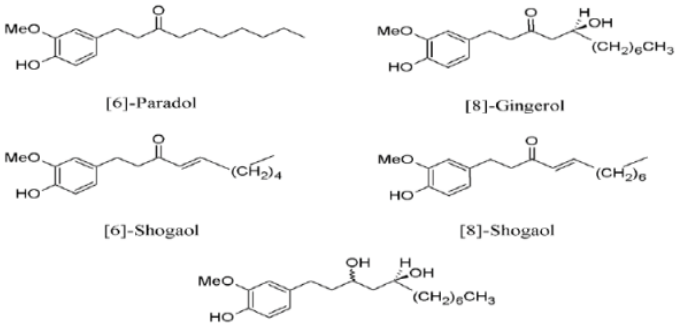
***Curcuma longa*:** Plant contains turmeron, curlone, curcuphenol, curcumin, demethoxy curcumin, bisdemethoxycurcumin, cyclocurcumin as phytoconstituents which are showing anti-inflammatory effects, hepatoprotective, antioxidant and notorious chemotherapeutic properties against bacteria, fungi, protozoa and tumor cells **Figure 7** [23].



A) B)

Figure 7: *Curcuma longa* with chemical structure; A): *Curcuma longa*; B): Chemical structures.

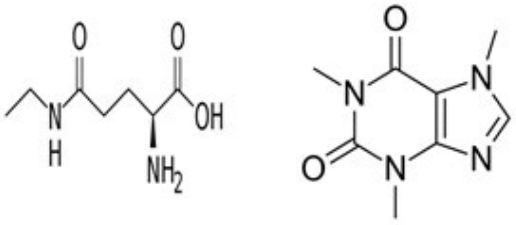
***Zingiber officinal*:** In this plant shogaol, gingerdiol, paradol, gingerol, shogaoland phytoconstituents are present and showing anti-inflamatory activity **Figure 8** [24].



A) B)

Figure 8: *Zingiber officinal* with chemical structure; A): *Zingiber officinal*; B): Chemical structures.

Camellia sinensis: Caffeine, Epi-gallotannins, theaine, theobromine, flavonols, chlorgenic acid, myricetin, are phytoconstituents of camellia and showing anti-astringent, anti-diuretic stimulation activity **Figure 9** [25].



A) B) C)

Figure 9: *Camellia sinensis* with chemical structure; A): *Camellia sinensis;* B): Theanine; C): Caffeine.

***Carica papaya*:** In this plant carpaine, pseudocarpaine, dehydrocarpaine quercetin 3-(2G-rhamnosyl-rutinoside), kaempferol 3-(2G-rhamno-syl-rutinoside), quercetin 3-rutinoside, myricetin 3-rhamnoside, kaempferol 3-rutinoside, quercetin, kaempferol and phytoconstituents are present and showing anti-bacterial, anti-oxidant, anti-pyretic, anti-insecticidal, anti-microbial, anti-mollusc etc. activities **Figure 10** [26].

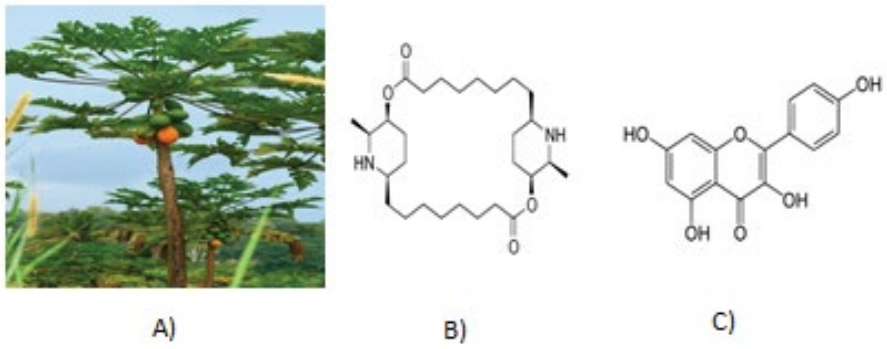


Figure 10: *Carica papaya* with chemical structure; A): *Carica papaya*; B): Carpaineka; C): Empferol.

***Cinnamom umtamala*:** In this plant Cinnamaldehyde, Procyanidin B2, C1, Cinnamtannin B1, cinnamon, tarns-cinnamaldehyde, trimerprocyanidins, Cinnamic acid, polyphenols etc. phytoconstituents are present and showing anti-oxidant, anti-inflammatory, anti-diabetic, anti-microbial, and anti-cancer activities **Figure 11** [27].

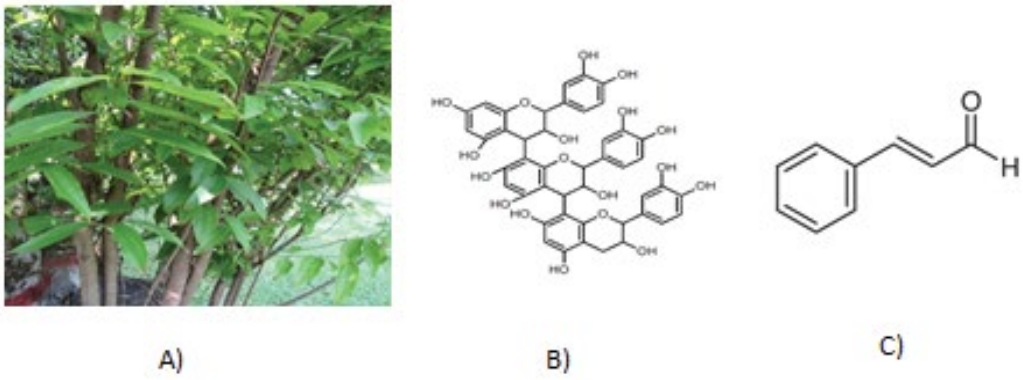


Figure 11: *Cinnamom umtamala* with chemical structure; A): *Cinnamom umtamala*; B): Procyanidin; C): Tarns-cinnamaldehyde.

***Allium cepa*:** In this plant phloroglucinol, propanethiol, methylallyl, dimethyl and phytoconstituents are present and showing anti-diabetic, anti-microbial, anti-inflammatory and anti-oxidant activity **Figure 12** [8,25].

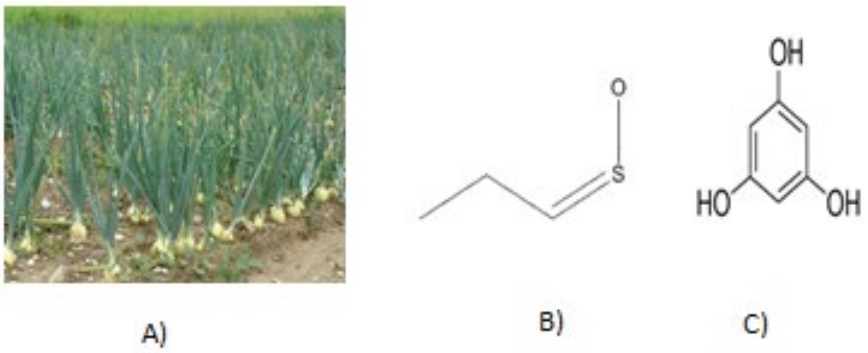


Figure 12: *Cinnamom umtamala* with chemical structure; A): *Allium cepa*; B): Propanethiol; C): Phloroglucinol.

***Allium sativum*:** In this plant protocatechuic acid, allicin, diallylcatechols, ajoene, allistin I and II, allylpropyl sulphide etc. phytoconstituents are present and used in treatment of ear aches, skin disease, atonic dyspepsia, fever and carminative **Figure 13** [28].

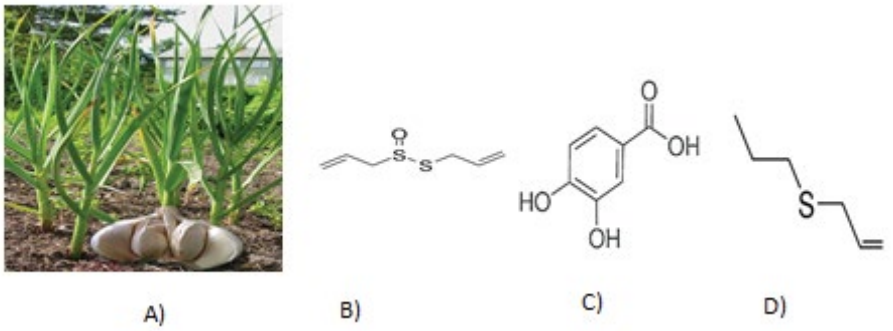


Figure 13: *Allium sativum* with chemical structure; A): *Allium sativum*; B): Allicin; C): Protocatechuic acid; D): Allylpropyl sulphide.

***Murraya paniculate*:** In this plant Linalool, Phenylethyl alcohol, Benzeneacetonitrile, α-Terpineol, p-Vinylguaiacol, Geraniol, Germacrene D, γ-Gurjunene, Methyl anthranilate, Bicycloelemeneetc phytoconstituents are present and showing anti-inflammatory, anti-diarrheal, anti-trypanocidal, anti-diabetic, anti-malarial, anti-bacterial, anti-fungal, and anti-oxidant activities **Figure 14** [29].

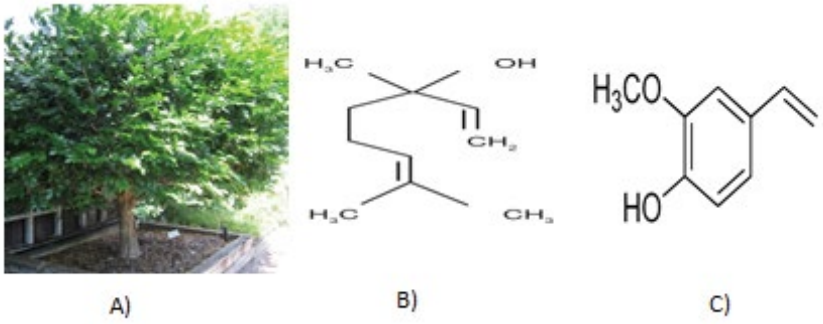


Figure 14: *Murraya paniculata* with chemical structure; A): *Murraya paniculate;* B): allicin; C): Linalool; D): P-Vinylguaiacol.

***Prunus domestica*:** In this plant flavonoids, flavonolignans, lignans, tannins, phenolic acids (neochlorogenic acid, chlorogenic acid, and caffeic acid), etc. phytoconstituents are presents and showing anti-oxidant activity **Figure 15** [30].

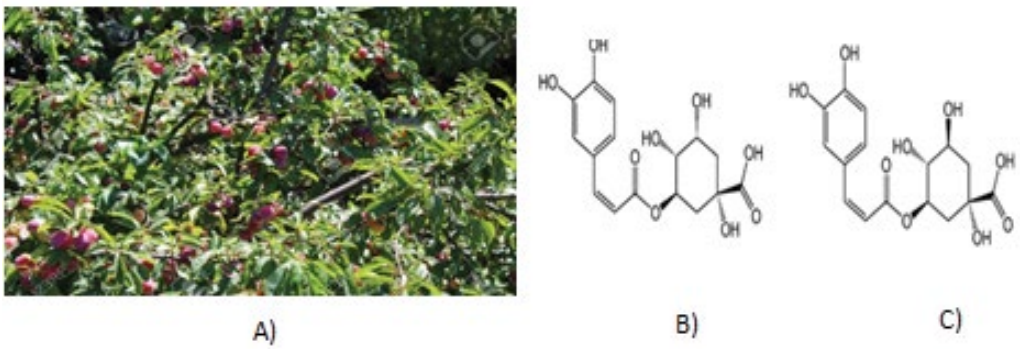


Figure 15: *Prunus domestica* with chemical structure; A): *Prunus domestica*; B): Chlorogenic acid; C): Neochlorogenic acid.

CONCLUSION

The present review focuses on the wide range of potentiality of phytochemicals, pharmacological, therapeutic and nutritional attributes of some important Indian traditional medicinal plants. From the above review and explanations, it can be concluded that these medicinal plants has been used as an important medicinal, pharmacological, therapeutic, pharmaceutical and nutritional source for different diseases and those are briefly mentioned in the current review study as well. The review study gives a clear idea on traditionally used Indian medicinal plants that these are much more worthy for healing from different diseases or to fight against any sort of other severe life-threatening diseases.

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