Review Article

Anti-inflammatory, analgesic and cognitive enhancer plants present in Bangladesh: A study review

Abstract:
The use of traditional medicine is expanding to newer horizons and plants still remain as the novel source of structurally important compounds that lead to the development of innovative drugs. Bangladesh has about 45,000 plant species among which medicinal property has been attributed to several thousands. The traditional Bangladeshi system of medicine, the Ayurveda, mentions the use of plants in the treatment of various diseased conditions. Ethnobotanical research done in last few decades have revealed the anti-inflammatory, analgesic and cognitive properties of plants cited in the traditional literature. Many herbal preparations are being prescribed as anti-inflammatory, analgesic and cognitive in the traditional literature. The search for new anti-inflammatory, analgesic and cognitive agents from the huge array of medicinal plant resources is intensifying. This chapter reviews such plant species and their products that have shown experimental or clinical anti-inflammatory or analgesic or cognitive activities,the possible mechanism of action and their therapeutic value. Some of the important taxa which are found effective as anti-inflammatory, analgesic and cognitive agents are Ananas comosus (L.) Merr. Callophyllum inophyllum L., Calotropis gigantea (L.) R.Br., Calotropis procera (Ak.) R.Br., Camellia sinensis (L.) Kuntz., Cannabis sativa L., Curcuma longa L., Kalanchoe crenata Andr., Mangifera indica L., Ricinus communis Linn., Sida cordifolia L., Spillanthes acmella Murr , Zingiber officinale Roscoe,Ginkgo biloba ,Zizyphus jujube,Emblica Officinalis,Cocos nucifera,Celastrus paniculatus .These plants have shown varying degrees of anti-inflammatory, analgesic and cognitive activities.
Keywords: Medicinal Plant, Review, Anti-inflammatory, Analgesic and Cognitive activities.

Introduction

Plants are the backbone of all life in the earth and an essential resource for human well-being. The human race started using plants as a means of treatment of diseases and injuries from the early days of civilization on earth and in its long journey from ancient time to modern age the human has successfully used plants and plant products as effective therapeutic tools for fighting against diseases and various other health hazards (1).Plants are living organisms belonging to the kingdom plantae.They obtain most of their energy fro, sunlight via photosynthesis using cholorophyll contained choloroplasts, which gives them green color. Plants are important for human life in many ways. Without plants animal life on planet earth would be almost impossible. Plants have been used as a potent and powerful source of medication throughout the world since long (2). Plants are probably most important to people as food. Plants make up the largest proportion in our diet everything we eat comes directly or indirectly from plant. Throughout human history, approximately 7,000 different plant species have been used as food by people. Sometimes we eat plants themselves, as when we eat apples, peas or potatoes. But even when we eat meat or drink milk, we are using foods that come from an animal that eat plants. The seed of such plants as corn, rice and wheat are the chief source of food in most parts of the world (3). When we eat beets, carrots or sweet potatoes we are eating roots of plants.

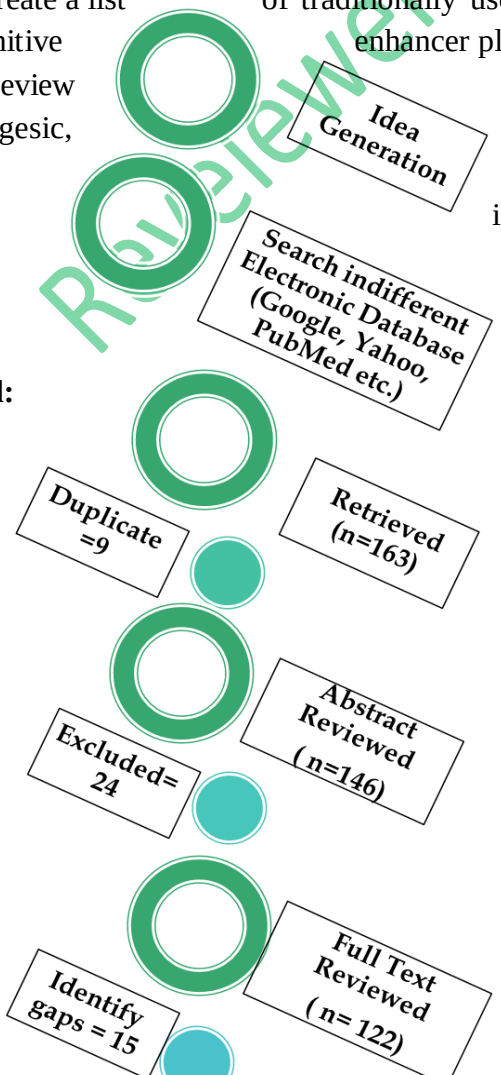
Coffee, tea and many soft drinks get their flavor from plants. Plants supply people with many important raw materials. Trees give us lumber for building homes and making furniture and other goods. Other important sources of fuel-coal, oil and natural gas also comes from plants. All living things plants, animals, fungi, protists and prokaryotes are linked by the cycle of nature. This natural process gives people oxygen to breathe, food to eat and heat to keep them warm (4). Medicinal plantsare rich sources of bioactive compounds and thus serve as important raw materials for drug production. They may constitute a valuable natural asset of a country and contribute a great deal to its health care systems. Medicinal plants and plant-derived drugs plays very important role in the economy of tropical countries. Bangladesh, being one of them and possessing such a rich flora of medicinal plant, should make serious efforts to derive maximum economic benefit from these plants by using them as raw materials for its indigenous drug manufacturing industries, if not by exporting to other countries. This will drastically reduce the volume of pharmaceutical raw materials and processed medicine of plant origin in the country and bring self-sufficiency in the indigenous drug industry, thus saving huge amount of foreign exchange (5). Although there are no apparent morphological characteristics in the medicinal plants that make them distinct from other plants growing with them, yet they possess some special qualities or virtues that make them medicinally important. It has now been established that the plant which naturally synthesis and accumulate some secondary metabolites, like alkaloids, glycoside, tannins, volatile oils and contain minerals and vitamins, possess medicinal properties (6).

Materials and Methods:

The aim of this review work is

- To create a list of traditionally used Analgesic, Anti-inflammatory and Cognitive enhancer plants in Bangladesh.
- To review scientific papers reposting Analgesic, Anti-inflammatory and Cognitive enhancer plants in Bangladesh.
- To identify the plants which used in both Analgesic and Cognitive enhancer in Bangladesh.

Research Protocol:



Results and Discussion:

Plants having Analgesic and Anti-Inflammatory activity available in Bangladesh:

Sl no	Plant name	Family	Used parts	Chemical Constituents	Area	Traditional use	Pharmacology use
01	*Ananas comosus (anarash)*	Bromeliaceae	Leaf extracts	high holocellulose,cellulose, hemi cellulose ,lignin	Tangail, Mymensingh, Gazipur, Sylhet, Moulvibazar, Chittagong	induce menstruation, induce abortion	Anti - inflammatory and analgesic effect (7)
02	*Clotropis Procera (akanda)*	Asclepiadaceae	Latax	alkaloids, tannins	kurigram , Rajshahi, jessore	Diarrhoea, Stomatic, Skin disease	Analgesic effect. (7)
03	*Calotropis gigantea s* (Akanda)		Leaves	Calotropnaphthalene, terpenes	bogura, natore	Fevers, Elephantiasis, Nausea, Vomiting, Diarrhea	Anti-inflammatory (7).
04	*Callophyllum inophyllum L* (Sultan chapa)	Clusiaceae	Leaves extracts	alkaloid , triterpenoid, flavonoid, tannin, saponin	coastal areas and Sundarban	Wounds, ulcers and to treat phthisis, orchitis and lung affections	Anti - inflammatory and analgesic effect (8).
05	*Camellia sinensis (cha)*	Theaceae	extract of dried tea	epigallocatechin gallate , gallocatechin gallate , Gallocatechin,catechin, epicatechin ,gallate, epicatechin and epigallocatechin	Chattogram, Brahmanbaria. Habiganj, Moulvibazar, Sylhet	Stimulant, Diuretic, astringent	Anti - inflammatory and analgesic effect (8).
06	*Cannabis*		leaves ,	α-Pinene ,Myrcene,	Naogaon,	Hallucinogenic Hypnotic,	Anti-

	sativa L (Ghaja)	Cannabinaceae	flowers and fruits	Linalool, Limonene, α-Terpinolene,Trans-caryophyllene, α-Humulene,.	Rajshahi, Jamalpur and Netrokona, Cox's Bazaar	sedative, analgesic,anti-inflammatory	inflammatory and analgesic effect (9).
07	*Kalanchoe crenata Andr.*	Crassulaceae	bark extract	*alkaloids*, carbohydrate, phytosterols, resins, phenol, tannins, flavonoids and amino acid, triterpene	Rangamati and Khagrachari	otitis, headache, inflammations, convulsions	Anti-inflammatory and analgesic effect (9).
08	*Curcuma longa L (Holud)*	Zingiberaceae	Rhizom, leaves and flowers	Zingiberen, terpinolene , β-sesquiphellandrene	sherpur, shatkhikra	anticancer, antimicrobial Anti-inflammatory	Anti-inflammatory and analgesic effect (9).
09	*Zingiber officinale Roscoe (Ada)*		whole plant, leaves	Flavonols, Terpenoids, Alkaloids, Sterols , Tanins	Dinajpur, Rangpur, Tangail, Chittagong and Rangamati	stomach upset, nausea, vomiting	Anti-inflammatory and analgesic effect (9).
10	*Mangifera Indica L (Aam)*	Anacardiaceae	leaf, root and seed oil	triterpenoids, quercetin and gallic acid, athujone, camphor and beta thujone	Rajshahi ,naogha ,chapainobabgonj	Dentifrices, antiseptic	Anti-inflammatory and analgesic effect (10).
11	*Sida cordifolia L (Bon methi)*	Malvaceae	leaves and flowers	spilanthol, alkaloids ,carbohydrates, pungent amide tannins, steroids, carotenoids	-	Bronchial asthma cold and flu head ache nasal congestion	Anti - inflammatory and analgesic effect (10).
12	*Hibiscus rosa sinensis (Joba)*		leaves	Flavons, alkaloids, beta-sitosterol,vitamin	Anywhere in BD	dysentery and diarrhea analgesic	Analgesic effect (10).
13	*Spilanthes acmella Murr. (Shormoni)*	Asteraceae	whole plant, leaves	Flavonols, Terpenoids, Alkaloids, Sterols , Tanins	-	antiseptic Antibacterial antifungal antimalarial	Anti - inflammatory and analgesic effect (10).
14	*Scoparia dulcis L (Modhu maloti)*	Scrophulariacae	whole herb	Alkaloids, carbohydrates, glycosides & tannins	Narshingdi, bogura, kurigra, tangail, noakhali	fever, hypertension hemorrhoids diarrhea	Analgesic effect (10)

15	*Manilkara zapota (sofeda)*	Sapotaceae	Leaves	Alkaloids, flavonoids, steroids, phenolic compounds	Chattogram, Dhaka,tangail	coughs and colds antidiarrheal	Analgesic effect (10).

Plants having cognitive enhancer activity available in Bangladesh:

Sl no	Plant name	Family	Used parts	Chemical constituents	Area	Traditional uses	Pharmacological uses
01	*Ginkgo biloba*	Ginkgoaceae	Plant seed, leaf	alkaloid, tannins, steroid, terpenoid, volatile oil, glycoside, fixed oil.	-	nerve tonic Rejuvenant, Sedative, diuretic	Cognitive Enhancer (11).
02	*Cyperus rotundus (Badhali))*	Cyperaceae	rhizome	Pinene, Cineole, Terpenes, Isociprol	Noakhali	diarrhea Diabetes Pyresis Inflammation malaria	Cognitive Enhancer (11).
03	*Zizyphus jujube (Kul)*	Rhamnaceae	fruit	Terpenoid, flavonoid and alkaloid , phenyl glycosides	rajshahi, Khulna , anywhere in BD	gastrointestinal problems stomach pain constipation	Cognitive Enhancer, anti – inflammatory (12)
04	*Emblica Officinalis (Amalaki)*	Phyllanthaceae	fruit	gallic acid, tannins, flavonoids, pectin, and quercetin	Rangamati	Antioxidant immune modulatory Antipyretic analgesic	Cognitive Enhancer (12)
05	*Cocos nucifera (Narikel)*	Arecaceae	fruit	catechins, epicatechins ,tannins, and flavonoids	Jessore ,noakhali etc	diarrhea	Cognitive Enhancer (13)
06	*Celastrus paniculatus (Jyotishmati)*	Celastraceae	Plant seed, leaf	alkaloid, tannins, steroid, terpenoid, volatile oil,	-	nerve tonic, Rejuvenant Sedative Diuretic	Cognitive Enhancer (13)

				glycoside, fixed oil.			
07	*Camellia sinensis (Cha)*	Theaceae	leaves	epigallocatechin gallate , gallocatechin gallate , Gallocatechin, catechin, epicatechin ,gallate, epicatechin and epigallocatechin	Chattogram, Brahmanbari, Sylhet rangamati	Diuretic astringent.	Cognitive Enhancer, Anti-inflammatory (14)
08	*bacopa monnieri (Brahmi shakh)*	Plantaginaceae	leavesandflowers	alkaloids brahmine, herpestine, nicotine, saponin, monierin, hersaponin, triterpene, and bacosine	coastal areas	improve memory	Cognitive Enhancer (14)
09	*Rhodiola Rosea*	Crassulaceae	roots	flavonoids, proanthocyanidines, tyrosol, cinnamyl alcohol, glycosides, organic acids.	-	fatigue Depression anemia	Cognitive Enhancer, anti-inflammatory (15)
10	*Panax ginseng (ginseng)*	Araliaceae	roots	ginseng saponins,phytosterol, carbohydrates and sugars.	-	diabetes	Cognitive Enhancer (15)

Conclusion:

The current review highlighted the medicinal plants possessed analgesic and anti-inflammatory effects with special focus on their mode of action, as promising future

drugs because of their safety and effectiveness. Many studies have been performed to identify Analgesic, Anti-inflammatory and Cognitive enhancer compounds with desired pharmacological activity and a limited toxicity. This review makes an attempt to give scientific account of use of valuable plant in Bangladesh as Analgesic, Anti-inflammatory and Cognitive enhancer source. The future direction is to identify chemical constituents of the plants which is not has been discovered yet and evaluate its *in-vivo* data with animal models.

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