



ANTI-INFLAMMATORY HERBAL PLANTS

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ABSTRACT-

Natural products are rich source for discovery of new medicines because of their chemical diversity. A natural product from medicinal shops plays a major part to cure numerous conditions associated with inflammation. The conventional medicine available in the request to treat inflammation produces colorful side-goods. Due to these side-goods, there's need for the hunt of newer new medicine, new drug medicine with lower or no side-goods. There are hundreds of phytoconstituents reported to have numerous pharmacological conditioning although utmost these reports are of academic interest and veritably many find entry in clinical trials. Multitudinous nonsteroidal anti-inflammatory specifics have been demonstrated to less pain and inflammation by precluding the isoform of cyclooxygenase enzyme from metabolising arachidonic acid, which lowers the generation of prostaglandin. Sorely, using nonsteroidal anti-inflammatory specifics has a lot of adverse goods. Still, there are medicinal sauces that have low to no adverse goods and anti-inflammatory remedial parcels. The African mainland is incredibly rich in medicinal shops, numerous of which have

Anti-seditious parcels and have been successfully used in traditional drug to treat seditious conditions. The use of medicinal shops and their secondary metabolites as a form of supplementary drug is adding. Rheumatoid and vulnerable mediated conditions, diabetes, cardiovascular accidents, and numerous other conditions are all included in the broad order of pathologic diseases known as inflammation. We include several shops whose anti-inflammatory parcels have been proven in both clinical and experimental explorations. Some of the remedial shops mentioned in this review are evening primrose, Devil's claw, Zingiberofficinale,, and, Allium sativum, Curcuma longa, Elettariacardamomum, Piper nigrumL., CamelliaL., Rosmarinusofficinalis, Cinnamomum, etc.

KEYWORD- Herbal factory, Active natural emulsion, Anti-Inflammatory, Inflammation, Treatment, etc

INTRODUCTION :

Inflammation is a normal, defensive response to towel injury caused by physical trauma, noxious chemicals or microbiological agents. There are substantially two types of inflammation which are as follows:

Acute inflammation

It's associated with increased vascular permeability, capillary infiltration and emigration of leukocytes.

Habitual inflammation

It's associated with infiltration of mononuclear vulnerable cells, macrophages, monocytes, neutrophils, fibroblast activation, proliferation (angiogenesis) and fibrosis.

Inflammation is a common clinical conditions and rheumatoid arthritis(RA) is a habitual enervating autoimmune disorder¹, that affects about 1 of the population in advanved countries². The classic signs of inflammation are original greenishness, swelling, pain, heat and loss of function³. Nitric oxide(NO) is a gassy short lived free revolutionary has been intertwined as a middleman

History and used of Herbal shops-

Herbal drug is the foremost type of healthcare ever used by humans. Man has been reliant on shops from the dawn of humanity. Since a veritably long time before recorded history, shops have been utilised as drugs. Herbal drugs, generally appertained to as botanical drugs or phytomedicine, are made from complete shops as well as leaves, seeds, roots, berries, dhingy, flowers, and other factory corridor. According to Ayurveda, further than a thousand sauces are employed in colorful treatments. Numerous conditions have been treated for a veritably long time using shops. In diurnal life, several shops are used as food, drug, or spices. India is one of the world's top directors of medicinal shops and one of the biggest nations for the product of sauces. Herbal shops are an interesting source of all-natural remedies for different medical issues.(1)

Inflammation- Around 2,000 times agone, Celsius defined inflammation using four Latin words rub or, tumour, dolour, and Caldor. The term" inflammation" is extensively used to describe the defensive response that the mortal body has to unwelcome stimulants(2) shops as natural anti-inflammatory agents- Herbal species serve in a way that depends on an unidentified medium, as opposed to current allopathic treatments, which have single active factors that target one particular pathway orchestral system multitudinous effects makeup a factory . Comprising several notes that work in musicale on Targets in the intricate natural pathway(3). Shops as natural anti-inflammatory agents

Unlike ultramodern allopathic medicines which are single active factors that target one specific pathway, herbal drugs work in a way that depends on an orchestral approach. A factory contains a multitude of different notes that act synergistically on targeted rudiments of the complex cellular pathway(11). Medicinal shops have been source of wide variety of biologically active composites for numerous centuries and used considerably as crude material or as pure composites for treating colorful complaint conditions 12. The use of herbal drugs getting popular due to toxins and side-goods of allopathic drugs. Medicinal shops play an important part in the development of potent remedial agents. There are over 1.5 million of interpreters traditional medicinal system using medicinal shops in preventative, promotional and restorative applications13. India with its biggest depository of medicinal shops in the world may maintain an important position in the product of raw accouterments either directly for crude medicine or as the bioactive composites in the expeession of medicinal and cosmetics etc.

OBJECTIVES :

- 1) Herbs have been in use for centuries both for culinary and medicinal purposes.
- 2) Plants could play a role in the treatment of pain and inflammatory diseases
- 3) Herbal medicine aims to return the body to a state of natural balance so that it can heal itself. Different herbs act on different systems of the body.
- 4) Explore origin of herbal medicine.
- 5) Understand the use of medicinal plants for treatment.
- 6) Understand quality, safety, and efficacy of using herbal medicine for treatment.
- 7) Find out whether or not herbal medicine should be used in this contemporary society.

REVIEW OF LITERATURE :

1.Abeloff MD, Armitage JO, Niederhuber JE, Kastan MB, McKenna WG. 2008

Many plant species have been used traditionally or as folk remedies for inflammatory illnesses.

Scientific research has shown that several of them are effective anti-inflammatory drugs. Due to their complex combinations, the active components of the majority of plant extracts have not been fully explained, despite the diverse bioactivities of plant medicines against various diseases. Natural herbs are more secure, efficient, and preferable solutions.

2.Tiwari S.2008

Herbal medicine is the earliest type of healthcare ever used by humans. Man has been reliant on plants from the dawn of humanity. Herbal medicines, usually referred to as botanical medicines or phytomedicine, are made from complete plants as well as leaves, seeds, roots, berries, bark, flowers, and other plant parts. According to Ayurveda, more than a thousand herbs are employed in various treatments. India is one of the world's top producers of medicinal plants and one of the biggest nations for the production of herbs. Herbal plants are an intriguing source of all-natural remedies for different medical issues.

3.Prajapati ND.2003

Medicinal plants have been source of wide variety of biologically active compounds for many centuries and used extensively as crude material or as pure compounds for treating various disease conditions'.The use of herbal medicines becoming

popular due to toxicity and side-effects of allopathic medicines. Medicinal plants play an important role in the development of potent therapeutic agents. There are over 1.5 million practitioners of traditional medicinal system using medicinal plants in preventive, promotional and curative applications.

4.Chandra D, Gupta SS.1972

The Anti-inflammatory effect of the co-treatment was intermediated through the NF- κ B/ COX- 2 pathway and iNOS inhibition. We concluded that co-treatment with *C. longa* and *A. hookeri* synergistically inhibited inflammation via the NF- κ B/ COX- 2/ iNOS pathway.

Table 1. List Of Anti-Inflammatory Herbal Plants.

Sr No.	Plant Name	Family
1.	<i>Zingiber officinalae</i> (Ginger)	Zingiberaceae
2.	<i>Allium sativum</i> (garlic)	Amaryllidaceae
3.	<i>Curcuma longa</i> (turmeric)	Zingiberaceae
4.	Asian Ginseng (Ginseng)	Araliaceae
5.	<i>Azadirachta indica</i> (Neem)	Meliaceae
6.	<i>Aloe barbadensis</i> Miller (Aloe vera)	Asphodelaceae
7.	<i>Emblica officinalis</i> (Amla)	Euphorbiaceae
8.	<i>Camellia sinensis</i> (Green tea)	Theaceae

1. ZINGIBER OFFICINALAE (GINGER):



Family : Zingiberaceae

Chemistry of Ginger-

Chemical makeup of gingerly were set up to be the primary active constituents in fresh gusto rhizomes, and (7)gingerol(5-hydroxy-1-(4-hydroxy-3-methoxy phenyl) decan-3-one is the most current gingerol in the series(Table 1). The powdered rhizome is made up of 3- 6% fat, 9% protein, 60 – 70 %carbs, 3- 8% crude fibre, 8% ash, and 2- 3 % unpredictable oil paintings. Nascence-farnesene, camphene, beta- phellandrene, curcumene, cineole, geranial acetate, terphineol, terpenes, borneol, geraniol, limonene, and linalool are among the main mono- and sesquiter- pene factors of unpredictable oil painting. Nascence- zingiberene, which makes up 30 – 70% of the Oil painting, beta- sesShogaol, a dehydrated form of gingerol, is the most potent pungent element in dried gusto grease paints and can contribute up to(8,9)

1. 6-gingerol (S)-5-hydroxy-1-(4-hydroxy-3- methoxyphenyl)-3-decanon
2. 8- gingerol (5S)-5-hydroxy-1-(4-hydroxy-3- methoxyphenyl) dodecan-3-one
3. 10-gingerol (E)-1-(4-hydroxy-3-methoxyphenyl) dec-4-en-3-one
4. 6-shogaol (E)-1-(4-Hydroxy-3- methoxyphenyl) dec-4-en-3-one

Table 2. Active anti-Inflammatory factors of ginger

Anti-inflammatory action of Ginger:

The Anti-inflammatory parcels of gusto have been known and valued for centuries. The original discovery of gusto's inhibitory goods on prostaglandin biosynthesis in the early 1970s has been constantly verified. This discovery linked gusto as an herbal medicinal product that shares pharmacological parcels with non-steroidal anti-inflammatory medicines. Gusto suppresses prostaglandin conflation through inhibition of cyclooxygenase- 1 and cyclooxygenase- 2. An important extension of this early work was the observation that gusto also suppresses leukotriene biosynthesis by inhibiting 5- lipoxygenase. This pharmacological property distinguishes gusto from nonsteroidal anti-inflammatory medicines.

Mechanism of Action-

Gusto reduces airway inflammation- gusto improves the Th1 response, which in turn reduces airway inflammation in mice, and it also reduces the Th2 responses that ovalbumin causes(10,11) also by dwindling the situations of IL4, IL5(12) Due to the modulation of calcium channel function, it can help lessen asthmatic symptoms by relaxing the smooth muscle in the airways.

2. ALLIUM SATIVUM (GARLIC) :

Family : Amaryllidaceae

Chemistry of Garlic- roughly 33 sulphur composites, including aliin, allicin, ajoene, allylpropyldisulfide, diallyltrisulfide, sallylcysteine, vinylthiines, S- allylmercaptocystein, and others, are set up in garlic, along with several enzymes, 17 amino acids, including arginine, and minerals like selenium, germanium, tellurium, and others

1. Allicin[S-(2-propenyl)-2-propene-1-sulfinothioate]
2. Aliin (S-allyl-L-cysteine sulfoxide)

Table 3. Active Anti-Inflammatory factors of garlic

Machanism of Action-

Garlic and its organosulfur composites have been shown to play Anti-inflammatory goods by modulating the nuclear factor- kappa B (NF- κ B) pathway. NF- κ B is a recap factor that regulates the expression of pro-inflammatory cytokines.

3) CURCUMA LONGA (TURMERIC) :

Family : Zingiberaceae

Chemistry of Turmeric- Turmeric contains protein(6.3%), fat(5.1%), minerals(3.5%), carbohydrates(69.4%) and humidity (13.1%). Phenolic diketone, curcumin(diferuloylmethane) (34%) is responsible for the unheroic colour, and comprises curcumin I (94%), curcumin II (6%) and curcumin III (0.3%). Other phenolic diketones demethoxycurcumin and bis-demethoxycurcumin have also been insulated from the rhizomes of *Curcuma longa*. Presence of tumerones(a and b), curdione, curzerenone, mono- and di- demethoxycurcumin have been reported in the rhizomes. The essential oil

painting(5.8%) attained by brume distillation of rhizomes has a-phellandrene (1%), sabinene(0.6%), cineol(1%), borneol(0.5%), zingiberene(25%) and sesquiterpines(53%) (40%) The essential canvases of leaves of C..

1. Curcumin (Curcumin I)	Diarylheptanoid
2. Bisacurone	Bisabolane
3. Bisacurone A.	Bisabolane
4. Bisacurone B.	Bisabolane
5. Bisacurone C.	Bisabolane

Table 4. Anti-Inflammatory Chemical ingredients of turmeric

Mechanism of action of curcuma longa-

The Anti-inflammatory effect of the co-treatment was intermediated through the NF- κB/ COX- 2 pathway and iNOS inhibition. We concluded that co-treatment with C. longa and A. hookeri synergistically inhibited inflammation via the NF-κB/ COX- 2/ iNOS pathway.

Compound/ Extract	Biological Activity
1. Turmeric powder	Antitumor. Ant protozoan Anti inflammatory and Wound-healing
2. Methylcurcumin	Anti protozoan
3. Demethovcurcumin and Bisdememnorvcurcumin	Antioxidant
4. Volatile oil	Anti-inflammatory, Antifungal, Antibacterial
5. Curcumin	Antibacterial , Anti protozoan , Antiviral , Anti tumor , Antioxidant

Table 5. Compound/Extract Of Turmeric and their Biological Activity

4. ASIAN GINSENG (Ginseng) :



Family : Araliaceae

Chemistry of Ginseng- Numerous diseases linked to inflammation can be treated with panax ginseng. One of the main active panaxadiols insulated from Panax ginseng is ginsenoside Rb3(GRb3), a natural substance with anti-seiditious and immunomodulatory activities.If GRb3 prevented LPS- convinced inflammation in macrophages by inhibiting TLR4/ NF- B/ MAPK signalling. By dwindling the expression of iNOS and COX2, GRb3 reduced the generation of NO and PGE2. Likewise, IL- 1, IL- 6, and TNF- a situations were reduced byGRb3.The restrictive

Goods of GRb3 on the NF- B/ MAPK pathway and seiditious intercessors were incompletely reversed by overexpressing TLR4.

1. Ginsenoside (Rb1)
2. Ginsenoside (Rg1)
3. Ginsenoside (Rh2)

Table 6. Anti-Inflammatory Chemical ingredients of Ginseng

Mechanism of action of Asian ginseng- ginseng suppressed airway hyperresponsiveness, ovalbumin-specific IgE situations, and seiditious cytokine product(42). Kim and Yang(43) demonstrated thatP. ginseng reduced airway inflammation in antipathetic asthma mice model and delved the beginning medium.

5. AZARDIRACHTAINDICA (Neem) :



Family : Meliaceae

Chemistry of Neem- Nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinat, gedunin, salannin, and quercetin are the other active constituents, with azadirachtin being the most significant. N- hexacosanol, amino acids, ascorbic acid, 6- desacetylnimbinene, nimbandiol, nimbolide, 7- desacetyl-7-benzoylazadiradione, 7- desacetyl-7-benzoylgedunin, 17- hydroxyazadiradione, and nimbiol are all factors set up in leaves.(55) Polyphenolic flavonoids insulated from lately

gathered neem leaves include quercetin and β - sitosterol, which are known to have antimicrobial and antifungal conditioning (56) Its seeds contain salutary substances including azadirachtin and gedunin.(57)

1. Nimbidin
2. Sodium nimbidate
3. Polysaccharides G2A,G3A

Table 7. Anti-Inflammatory ingredients of neem

Anti-Inflammatory Effect of Neem :

shops or their insulated detivations are in the practice to treat act as anti-inflammatory agents.

Mechanism of action-

Anti-inflammatory,pro-apoptotic, and anti-proliferative goods of a methanolic neem (*Azadirachta indica*) splint excerpt are intermediated via modulation of the nuclear factor- κ B pathway.

6. ALOE BARBADENSIS MILLER (Aloe vera) :



Family : Asphodelaceae

Chemistry of Aloe Vera-

Gas chromatography and mass spectrometric (GCMS) and high performance thin subcaste chromatographic (HPTLC) analyses are used to identify the following substances Up to 30 of anthroquinones, primarily C- glucosides. The admixture occasionally known as aloin, contains barbloin. Free anthroquinones, emodin (glycosides), and isobarbaloin(e.g. aloe- emodin). Resins, alosin, and its aglyconealoesone

(a chromene) are other factors. Bradykinase, Sorbitol, Sorbic Acid, Potassium Sorbate, Aloin, Benzoic Acid, Vitamin B, Vitamin C Acids similar as citric, salicylic,- sitosterol, and amino; Octadecanoic acid, C- glycosylchromone, D- mannitol, and Hexadecanoic acid.

1. Steroid
2. Saponin

Table 8. Anti-Inflammatory Chemical ingredients of Aloe vera

Active component of Aloe vera

further than 75 active constituents from inner gel have been linked including vitamins, minerals, enzymes, sugars, anthraquinones or phenolic composites, lignin, saponins, sterols, amino acids, and salicylic acid.

Anti-Inflammatory Effects :

It inhibits the cyclooxygenase pathway and reduces prostaglandin E2. Lately, the new anti-inflammatory emulsion called C- glucosyl chromone was insulated from gel excerpts(16). In addition, the peptidase bradykinase was insulated from Aloe and shown to break down the bradykinin, an seditious substance that induces pain.

Mechanism of Action- The cyclooxygenase pathway is blocked by aloe vera, which also lowers the quantum of prostaglandin E2 produced from arachidonic acid. C- glucosylchromone, a brand-new anti-inflammatory substance, was just lately insulated from gel excerpts.

7. EMBLICAOFFICINALIS(Amla):-



Chemistry of Amla:- One of the species that has received the most research is amla. Alkaloids, phenols, and polyphenols are reported to be present. 28% of the total tannins found in the plant are dispersed in the fruits. Emblicanin A and B are two hydrolyzable tannins found in the berry.[61]which both have antioxidant qualities; one when hydrolyzed yields gallic acid, ellagic acid, and glucose, whereas the other yields ellagic acid and respectively, glucose. The berry also contains Phyllemblin.[62]Numerous compounds, including gallic acid, corilagin, furosin, and geranin, were discovered through activity-directed fractionation.

1)	Garlic acid
2)	Methanolic fruit extract

Table 9. Anti- inflammatory constitute Of Amla

Mechanism of Action:-In the current study, we looked into the impacts of Emblicaofficinalis extracts on carrageenan- and dextran-induced rat hind paw oedema. The plant's leaf methanol extract's water fraction was discovered to have anti-inflammatory properties. The same fraction's effects on the production of inflammatory mediators like leukotriene B4 (LTB4), platelet-activating factor (PAF), and thromboxane B2 (TXB2), as well as on LTB4- and N-formyl-L-methionyl-L-leucyl-L-phenylalanine (FMLP)-induced in-vitro migration of human polymorphonuclear leukocyte Human PMs were blocked from migrating in relatively low quantities by the water part of the methanol extract. It did not prevent human PMNs from producing LTB4 or PAF, nor did it prevent

human platelets from producing TXB2 during clotting, indicating that the anti-inflammatory activity shown in the rat paw model is not caused by these processes.

8. CAMELLIA SINENSIS (Green tea):-



Chemistry of Green tea:-Green tea's active ingredient, epigallocatechin-3-gallate (EGG), has been shown to have anti-inflammatory properties. According to earlier research, inflammatory cytokines and enzymes associated to inflammation are suppressed by green tea and EGG at the gene and/or protein levels.

1)	Epigallocatechin-3-gallate (EGG)
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Table 10. Anti-inflammatory constitute of Green tea

Mechanism of Action:-Inflammatory bowel illnesses (IBD) such as ulcerative colitis and Crohn's disease have been linked to inflammation, and research on animals and in test tubes has demonstrated that EGG can help alleviate these symptoms. Moreover, green tea polyphenols seem to be helpful for inflammatory illnesses like osteoarthritis, rheumatoid arthritis, Alzheimer's disease, gum disorders, and even some cancers.

FUTURE SCOPE:

- 1) Medicinal plants have been recognised as potential drug candida because they possess drug like properties.
- 2) In diversified industries the contribution of plants is remarkable such as fine chemicals, cosmetics, pharmaceuticals and drugs and industrial raw materials.
- 3) The basic uses of plants in medicines will continue in the future, as a source of therapeutic agents, and as raw material base for the extraction of semi-synthetic chemical compounds such as cosmetics, perfumes, and food industries.
- 4) The importance of medicinal plants and derivatives is growing rapidly with human progress in pharmaceutical fields.
- 5) These plants are a potential source of bio molecules that plays a major role in modern medicine in the treatment of diseases like cancer, diabetes and hypertension among others.
- 6) The demand for medicinal herbs is increasing thanks in part to a reputation for fewer side effects.
- 7) They are also considered to be a cost effective means of developing new and breakthrough drug.

CONCLUSION-

Notwithstanding the efficacy of conventional synthetic medicines employed in the operation of arthritis, synthetic allopathic medicines have posed injurious goods on mortal health. Herbal medicinal shops have prominently shown colorful conditioning including the anti-inflammatory parcels the over mentioned factory shows the characteristics anti-

sedition activity. Despite the divergent bioactivities of the factory drugs against colorful conditions, active factors of utmost factory excerpts haven't been illustrated completely, due their complex fusion. Still, the core chemical classes of anti-inflammatory agents from natural sources have been reported to engage a vast range of composites similar as polyphenils, flavnoids, terpenoids, alkaloids, anthraquinones, lignans, polysaccharides, saponins and peptides.

REFERENCE:

1. Abeloff MD, Armitage JO, Niederhuber JE, Kastan MB, McKenna WG. *Abeloff's Clinical Oncology E-Book*. Elsevier Health Sciences. 2008;p4
2. Lalrinzuali K, Vabeiryureilai M, Jagetia GC. Investigation of the anti-inflammatory and analgesic activities of ethanol extract of stem bark of *SonapathaOroxylumindicum* in vivo. *International journal of inflammation*. 2016;8247014.
3. Durmowicz AG and Stenmak KR. Mechanisms of structural remodeling in Chronic pulmonary, Hypertension. *Pediatr Rev*. 1999;20:91-101
4. Arif T, Bhosale JD, Kumar N, Mandal TK, Bendre RS, Lavekar GS and Dabur R. NaturalProducts-antifungal agents derived From plants. *Journal of Asian Natural Products Research*. 2009;7:621-638.
5. Dasilva EJ. Medicinal plants: a reemerging health aid, *Electronic Journal of Biotechnology*. 1999;2:57-70.
6. Tiwari S. Plants: a rich source of herbal Medicines. *Journal of Natural Products*2008;1:27-35
7. Corbett JA. Interleukin-1 β -induced formation of EPR-detectable iron-nitrosyl complexes in islets of Langerhans. *J Biol Chem*.1991;266:21351-21354
8. Mederos M., Effect of chronic nitric oxide synthesis inhibition on the inflammatory response induced by carrageenan in rats, *Eur J Pharmacol*.1995; 285:109
9. Malizos KN. Do steroids, conventional non-steroidal anti-inflammatory drugs and selective Cox-2 inhibitors adversely effect fracture healing. *J Musculoskelet Neuronal Interact*. 2009;9:44-52
10. Barnes PM. Complementary and alternative medicine use among adults, United states. *Adv Data*. 2002;343:1-19.
11. Srinivasan K, Muruganandan S, Lal J, Chandra S, Tandan SK and Ravi Prakash V. Evaluation of anti-inflammatory activity of *Pongamia pinnata* in rats,. *J Ethnopharmacol*. 2011;78:151-157
12. Durmowicz AG and Stenmak KR. Mechanisms of structural remodeling in chronic pulmonary, Hypertension. *Pediatr Rev*. 1999;20:91-101
13. Arif T, Bhosale JD, Kumar N, Mandal TK, Bendre RS, Lavekar GS and Dabur R. NaturalProducts-antifungal agents derived from plants. *Journal of Asian Natural Products Research*. 2009;7:621-638.
14. Tiwari S. Plants: a rich source of herbal medicines. *Journal of Natural Products*. 2008;1:27-35.
15. David R Bruck, Zbigniew A Cichacz and Sasha M Daskalova. Aqueous extract of *Achillea millefolium* L. (Asteraceae) inflorescences suppresses lipopolysaccharide-induced inflammatory responses in RAW 264.7 murine macrophages, *Journal of Medicinal plants Research*. 2010;4:225-234.
16. Benedek B, Kopp B and Melzig MF. *Achillea millefolium* L.- Is anti-inflammatory activity mediated by protease inhibition. *J Ethnopharmacol*. 2007;2:312-317.
17. Prajapati ND. *A Handbook of Medicinal Plants*, Agrobois Publication, India.2003.
18. Schulick P. *Ginger-common spice and wonder drug*. Edn 2. Herbal Free Press Ltd. Brattleboro Vermont USA 1994; 111-125
19. Mustafa T, Srivastava KC, Jensen KB. Drug Development Report (9): Pharmacology of ginger, *Zingiberofficinale*. *J Drug Dev* 1993; 6(24).
20. Franzotti EM, Santos CV, Rodrigues HM, Mourao RH, Andrade MR and Antonioli AR. Anti-inflammatory, analgesic activity
21. Scientific Correspondence. Major constituents in leaf essential oils of *Curcuma longa* L. And *Curcuma aromatica* Salisb. *Current Science*. 83(11); 2002: 1312-1313.
22. Ukil A et al. Curcumin, the major component of food flavour turmeric, reduces mucosal injury in trinitrobenzenesulphonic acid induced colitis. *British journal of pharmacology*. 139; 2003:209-218.
23. P. X. Nunes, S. F. Silva, R. J. Guedes, and S. Almeida, "Biological oxidations and antioxidant activity of natural products," in *Phytochemicals as Nutraceuticals-global Approaches to Their Role in Nutrition and Health*. in Tech.2012
24. A. H. Rahmani and S. M. Aly, "Nigella sativa and its active constituents thymoquinone shows pivotal role in the diseases prevention and treatment." *Asian journal of Pharmaceutical and clinical Research*. vol. 8, no.1, pp. 48-53. 2015.
25. Apisariyakul A. Vanittanakom N, Buddhasukh D. Antifungal activity of turmeric oil extracted from *Curcuma longa* (Zingiberaceae). *J Ethnopharmacol*. 1995; 49:163-169.

