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From Nature to Treatment: Unraveling the Healing Potential of Phytotherapy in Inflammatory Bowel Disease (IBD) - A Comprehensive Review

Manisha Agrawal[1], Kanta Rani[1*], Vandana Kalra[2], Neha Bhatnagar[2]
[1]Department of Botany, GGDSD College, Palwal 121102, Haryana, India
[2]Department of Zoology, GGDSD College, Palwal 121102, Haryana, India
Corresponding Author E-mail: drkantachhokar@gmail.com
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Abstract

Inflammatory Bowel Disease is an idiopathic, refractory disease that causes chronic inflammation of the entire alimentary canal. It is associated with two major disorders, namely, Ulcerative Colitis (UC) and Crohn's Disease (CD). Ulcerative Colitis,is responsible for long-term inflammation and soreness in the innermost lining of the colon and rectum. In Crohn's disease, the entire lining of digestive tract becomeinflamed, especially the terminal ileum of the small intestine. For the treatment of IBD, medical prescriptions include antibiotics, immunosuppressants, topical and systemic corticosteroids, 5-aminosalicylates etc. However, all these medications have major side effects on human health. Besides these chemical treatments, phytotherapy can also be used as an alternative treatment . Some medicinal plants used to treat IBD include – Curcuma longa, Vacciniummyrtillus, Pistacialentiscus, Aloe vera, Boswelliaserrata, Triticumaestivum(wheatgrass), Hordeumvulgare (germinated Barley foodstuff) , Commiphorawightii, Matricariachamomilla, Glycyrrhizaglabra, Althaea officinalis, Plantagopsyllium etc.Nowadays phytotherapy is gaining more attention for the treatment of various diseases owing to its being safer and cheaper than conventional drugs. This paper highlights the competence of phytotherapy in the treatment of IBD by shedding light on its efficacy and adequacy.

Keywords: Inflammatory Bowel Disease IBD, Ulcerative colitis, Crohn's disease, Phytotherapy.

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Introduction

Inflammatory Bowel Disease (IBD) refers to Crohn's Disease (CD) and Ulcerative Colitis (UC), both of which are associated with inflamed gut tract chronically. Prolonged inflammation can damage the entire gastrointestinal (GI) tract. From mouth to anus, any part of the GI tract may be affected by Crohn's disease though it mainly targets the small intestine. The damage can be seen in patches where the inflammation can even penetrate the multi-layered walls of the GI tract. However, in Ulcerative Colitis, the large intestine (colon) and rectum are affected, causing a continuous area of damageand inflammation in the innermost lining (mucosa) of the colon. Thus people with Inflammatory Bowel Disease (IBD) experience chronic intestinal inflammation (pain and swelling). IBD most commonly occurs in the age group of 15 to 30 but it can appear at any age and in any gender. Ulcerative Colitis is seen mostly in the Northwestern Hemisphere, with highest numbers in theUSA and the UK. In the past two decades, it has also observed more in the Middle East and Asia due to westernization of thediet. The incidence of Crohn's disease increased from the 1950s to 1980s but may now have reached a plateau.About onemillion residents of USA and 2.5 million residents of Europe are estimated to have IBD (Kaplan, G.G., 2015).In 2019, there were 4.9 million cases of IBD globally (Dharni*et al* ; 2024).

In India, the estimated number of IBD patients has gone up from 0.13 million in 1990 to 0.27 million in 2019 (Dutta, A.K., 2024). About 10 million people worldwide are suffering from IBD. The main cause of IBD is genetic; there is a family history of the disease in one in four IBD patients. The second main cause of IBD is a weak immune system. A weak immune system responds inappropriately and inadequately to environmental triggers, like a virus or bacteria affecting the digestive tract. The most common pathogens that are associated with IBD are Mycobacterium avium sub species paratuberculosis, Clostridium difficile, Escherichia coli,Listeria monocytogenes, Campylobacter concisus, Cytomegalovirus, Epstein-Barr virus, Bacteroidesfragilis, Fusobacteriumvariumetc (Zhang *et al* ; 2022) . In India, the risingincidence of IBD is due to familial aggregation, nicotine consumption, oral contraceptives, physical inactivity, early weaning, poor hygiene, dietary habits like refined sugar, fast food, baker's yeast, etc. .

Sign and Symptoms of IBD

Symptoms observed in both CD and UC are diarrhoea, pain in the abdominal region, fever, fatigue, blood in the stool, nausea, painful bowel movement, reduced appetite, unintended weight loss, pus or mucus in the stool, vomiting, anaemia and inflammation of affected area (Colombel *et al* ; 2019) . If any person experiences a persistent change in his/her bowel movement or any of the symptoms mentioned above should consult to doctor, as this disease may cause life threatening complications.

IBD not only associated with digestive system, it may cause other problems too such as eye inflammation, skin disorders, arthritis and canker sores in the mouth etc.

Diagnosis of IBD

The Following techniques are used to diagnose IBD (Fig-1)

Blood and stool samples: Blood and stool samples are used for detecting anaemia and inflammation. Anaemia may be detected through the CBC (Complete Blood Count) blood tests. A high count of white blood cells indicates inflammation or infection (Schoepfer *et al* ; 2008). Proteins found in blood and stool are another biomarker to detect inflammation.

Colonoscopy: It is used to examine entire colon (large Intestine) (Parente *et al* ; 2010).

Sigmoidoscopy: This technique is useful for examining rectum and sigmoid colon.

Upper endoscopy: TheOesophagus, stomach and duodenum are examined using this technique.

Capsule endoscopy: It is useful in Crohn's disease to examine the small intestine (Parente *et al;* 2004).

Balloon-assisted enteroscopy: This technique is beneficial for examiningthe small bowel, as standard endoscopes have limitations in that area.

X-ray: To examine the abdominal region (Parente *et al* ; 2004).

CT Enterography:A special kind of CT scan for better imaging of the small intestine (Schreyer *et al* ; 2004).

MRIEnterography: Thistechnique does not involve radiation exposure. An MRI of the Pelvic and anal region as well as the small intestine (MR Enterography), should be performed (Minordi *et al;* 2022)

Barium enema: This procedure involves inserting Barium into the colon directly using a tube that's inserted into the rectum. An X-ray machine is then used to takes imagess of the colon, providing better visualization.

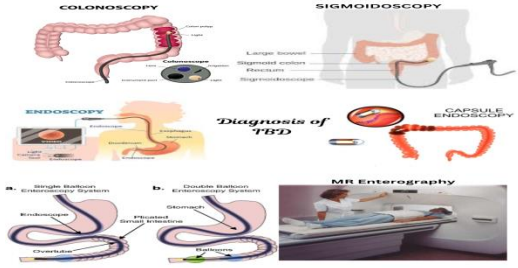

Fig.1: Various techniques used for the diagnosis of IBD

Management of IBD

i) **Pharmacological Management of IBD:** There are many drugs used to reduce inflammation, control symptoms and maintain remission of IBD. Pharmacological treatment depends on the types of IBD, severity and patient-specific factors. Table1 depicts the mode of action and side effects of drug classes used for IBD treatment.

Table 1. Drugs Used In the Treatment of IBD

S.No	Drugs	Mode of action	Side-effects	References
1.	**Corticosteriods or Glucocorticoids** ● Prednisone ● Methylprednisolone ● Hydrocortisone	They inhibit the immune system by blocking inflammatory cell movement towards the intestines and preventing inflammatory chemicals called cytokines from being expressed. They cause activated white blood cells to die, and this reduces inflammation in the body. Therefore, they are mainly used to reduce inflammation .	Acne, weight gain, stretch marks, mood swings, depression, muscle weakness, osteoporosis, hypertension, glaucoma, high BP etc.	Bruscoli*et al* ; 2021 Barrett *et al* ; 2018 Coward *et al* ; 2017
2.	**Immunosuppressant** ● Azathioprine ● 6-mercaptopurine	Immunosuppressant suppress the immune system in order to reduce inflammation. The twomain drugs Azathioprine and 6-mercaptopurine, are employed to modify lymphocyte activity, decrease the number of plasma cells in the lamina propria, and impact the function of natural killer cells.	Head-Ache, nausea, diarrhoea, vomiting, feeling of illness abdominal pain, loss of appetite, fatigue, hair loss, mouth sores etc.	Lewis *et al* ; 2008
3.	**Antibiotics** ● Ciprofloxacin ● Metronidazale ● Clarithromycin ● Rifaximin ● Vancomycin	Antibiotics decrease the count of harmful bacteria and control immune responses, which lower inflammation and increase the amount of useful gut bacteria.	Tendonitis (tendon rupture) lack of cartilage growth in unborn babies, oral thrush, light sensitivity, joint pain, muscle tightness, itching on whole upper body, redness of skin, loss of appetite, nerve damage, GI tract issues etc.	Perencevich, M. and Burakoff, R., 2006.
4.	**5- ASA Agents (5- Aminosalicylates)** ● Pentasa ● Salofalk ● Mezavant ● Salazopyrin	5-ASA works by activating a group of nuclear receptors that regulate inflammation, cell death (apoptosis), metabolic activity, and cell growth. Chemically resembling aspirin, 5-ASA helps reduce inflammation, thereby promoting the healing of damaged tissue.	Nausea, loss of appetite, abdominal pain, fever, vomiting, headache, respiratory infection etc.	Ford *et al* ; 2011

ii) **Phytotherapeutic Management of IBD**- It includes the plant-basedtherapies to manage symptoms and inflammation and is a complementary approach to pharmacological management due to several potential advantages as it minimizes the side effects associated with conventional drugs. Phytotherapyof IBD involves the use of many medicinal plants, as shown in Table 2.

Table 2. Medicinal plants used in the treatment of IBD

S.No.	Scientific Name	Common Name	Family	Part Used	Phytochemical Present	Action	References
1	***Althaea officinalis*** 	Marsh mallow	Malvaceae	Leaves, flowers, roots	Flavonoids as hypolaentin-8-glucoside isoquercitrin etc.	Anti- inflammatory, anti- infective, immunomodutator, emollient, antiulcer.	Kianitalaei *et al* ; 2019
2	***Glycyrrhiza glabra*** 	Licorice or Mulaithi	Fabaceae	Roots	Glycyrrhizic acid, isoflavonoids	Repair stomach lining due to anti-inflammatory and immune boosting properties	Leite *et al* ; 2022
3	***Matricaria chamomilla*** 	Chamomile or Babuna	Asteraceae	Dried flowers	Chamazulene and other flavonoids are generally metabolized from volatile oils such as matricin (a sesquiterpene), alpha-bisabolol and alpha-bisabolol oxides (A and B).	Laxative, bactericidal and anti inflammatory	El Joumaa, M.M. and Borjac, J.M., 2022
4	***Boswellia serrata*** 	Indian frankin cense	Burseraceae	Tree trunk gum resin (oleoresin)	Acetyl boswellic acid	Anti inflammatory action by inhibiting leukotriene synthesis analgesic.	Catanzaro *et al* ; 2015
5	***Curcuma longa*** 	Turmeric	Zingiberaceae	rhizome	curcumin	Inhibit many cytokine pathway as interleukin IL-6. Antipasmodic, antioxidant, anti inflammatory, wound healing, antibacterial.	Cunha Neto *et al* ; 2019

6	***Vaccinium myrtillus*** 	Bilberry	Ericaceae	fruits	Anthocyanin as delphinidins, cyanidins etc. flavonols as quercetin, catechins etc.	Antioxidative and anti inflammatory effect.	Sharma, A. and Lee, H.J., 2022
7	***Pistacia lentiscus*** 	Mastic or Lenstisk	Anacardiaceae	Bark (mastic gum resin)	Isomasticadienolic acid	Antioxidant mastic act as an immunomodulator and inhibitor of TNF - alpha	Boutemine *et al* ; 2021
8	***Aloe barbadensis*** 	Aloe vera	Asphodelaceae	Leaves (gel)	Aloin, lupeol, aloesin, c-glycosylchromone compounds, anthraquinones, bradykinase	Laxative due to aloin, anti inflammatory due to c-glycosylchromoneanthraquinones control gastric secretion and inhibit ulcer formation. Bradykinase breakdown Bradykinin which is inflammatory modulator and induces pain.	Langmead *et al* ; 2004
9	***Commiphora wightii*** 	Guggul tree	Burseraceae	Gummy resin	Guggulsterone (steroid)	Anti inflammatory effect.	Kunnumakkara *et al* ;2018
10	***Hordeum vulgare*** 	Barley	Poaceae	Grains (Germinated barley food stuff)	Glutamine rich protein and hemicellulose rich dietary fibre	Having prebiotic action, reduce colonic inflammation by inhibiting STAT – 3 from expressing itself and preventing binding activity of NF-KB.	Lim, T.K. and Lim, T.K., 2013
11	***Plantago sp.*** 	Isabgol	Plantaginaceae	seeds	Dietary mucilaginous fiber (polysaccharide arabinoxylan)	Laxative, reduce diarrhea, prevent colorectal cancer (CRC) in susceptible IBD patients.	El-Rhman, A.A., 2022.
12	***Triticum aestivum*** 	Wheat	Poaceae	Juice of wheat grass	Chlorophyll, amino acids, vitamins, various enzymes	Control rectal bleeding.	Grace *et al* ;2022

General Dietary Suggestions to Manage the IBD

Dietary management also plays an essential role in managing IBDalong with various treatment approaches by reducing inflammation, preventing flare-ups, and providing essential nutrients to maintain overall health. Some dietary suggestions for managing IBD are as follows:

Conclusion

Medicinal plants have high potential for the treatment of IBD without causing any side effects and they are much cheaper in comparison to conventional drugs. Medicinal plants summarized in the table possess different properties like anti-inflammatory, antioxidant, laxative, immunomodulatory, antimicrobial, emollient, analgesic, etc., play a major role in the treatment of ulcers and Crohn's disease. Hence, the manufacture, marketing and prescription of herbal medicines should be promoted as a cure of this disease. We can manage the disease also by making changes in our lifestyle and dietary habits. If IBD is not curable either by dietary changes lifestyle changes or drug treatment (herbal or chemical), then one should consider surgery to remove the damaged part of the intestine, colon or rectum.

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