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Systemic Review Article

Recent Pharmacotherapy of Inflammatory Bowel Disease - A Systemic Review

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Abstract

Thousands of people worldwide suffer from inflammatory bowel diseases (IBD), which are long-term inflammatory conditions of the gastrointestinal tract. It is an inflammatory disease marked by metabolic abnormalities, alterations in gut microbial composition, and changes in mucosal structure. Weight loss, diarrhea, stomach pain, rectal bleeding, and systemic inflammatory indications are the primary symptoms. Conventional medicines, which are typically ineffectual because they do not stop relapses or mucosal healing, are still used to treat IBD despite advancements in the field. New therapeutic approaches were therefore required because many individuals who do not receive traditional treatment end up needing surgery as a result of the disease's subsequent deterioration. Nevertheless, there is a need for scientific research on the topic because the novel treatment alternatives have not been thoroughly examined in the literature. Therefore, the purpose of this study is to provide an update on the current state of clinical development of these novel treatment classes in IBD as well as new therapeutic choices for the condition. Patients with inflammatory bowel disease now have more hope and a higher quality of life thanks to new treatment options. The outlook for treating IBD is becoming more optimistic as research advances and more potent treatments are created. To further enhance the therapeutic choices available and improve the quality of life for those afflicted by this crippling ailment, further clinical trials and research funding are necessary.

Keywords: Crohn's Disease, Inflammatory Bowel Diseases, Biological Treatment.

Introduction

Among the chronic autoimmune disorders is Inflammatory Bowel Disease (IBD). Although its exact cause is unknown, it is defined by intestinal inflammation and can be further classified as Ulcerative Colitis (UC), which is limited to the intestinal mucosa, and Crohn's Disease (CD), which manifests as a discontinuous, transmural inflammation affecting the gastrointestinal tract [1,2]. In genetically predisposed people, the pathophysiology of CD and UC entails a dysregulated immune response to the commensal microbiota [3].Since the symptoms of CD and UC include inflammation, diarrhea, stomach pain, rectal bleeding, and weight loss, both diagnoses are marked by persistent histological inflammation and a reduced quality of life. In addition to affecting people of all sexes, the disorders can also impact adults and adolescents [4,5].

While UC affects the rectum and part or all of the colon, CD affects the colon, ter-minal ileum, cecum, and perianal area, however it can also affect other parts of the intestine. Although the exact etiology of the disorders is still unknown, new research indicates that immunological abnormalities, gut microbiota, genetic predisposition, and environmental variables are all linked to pathogenesis [6]. Although the pathophysiology of IBD involves many potential pathways, genetic studies have only partially explained the heritability of the condition [7]. It's also important to note that new opportunities for the development of more potent treatments than conventional ones have been made possible by our increasing understanding of the immunopathogenesis of inflammatory bowel disease (IBD).There is new hope for the appropriate management of the condition thanks to these advancements in therapy approaches that target several mechanisms of action [8].

According to Cambui and Natali (2015) [9], traditional treatments are generally ineffectual because they neither stop recurrent crises nor cure

the illness. Since the majority of patients who receive traditional treatment end up needing surgery because their condition worsens over time, new therapeutic approaches are therefore necessary. In order to change the clinical trajectory of IBD, new treatments must be developed. These treatments should improve the patient's quality of life and reduce the number of hospitalizations, surgeries, and clinical relapses.

Unfortunately, there is a need for scientific research on the topic because the novel therapy alternatives have not been thoroughly examined in the literature. Therefore, the purpose of this study is to provide an update on the state of clinical development for these novel classes of treatments for inflammatory bowel disease.

Presenting the new therapeutic options for the treatment of inflammatory bowel illnesses is the main goal of this study. Presenting the conventional management, which includes the use of sulfasalazine, corticosteroids, antibiotics, and immunosuppressants, as well as talking about the disease's biological agents and examining the advantages of using stem cells to treat it, are the specific goals.

Conceptual Structure

Thousands of people worldwide suffer from chronic inflammatory illnesses of the gastrointestinal tract known as Inflammatory Bowel Diseases (IBDs). It is a chronic inflammatory condition marked by metabolic abnormalities, alterations in gut microbial composition, and changes in mucosal structure [10].

The two primary clinical forms of IBDs, Crohn's disease (CD) and ulcerative colitis (UC), are differentiated by the many clinical signs of intestinal inflammation and location. Both diseases have distinct side effects and are more prevalent in cities than in rural areas [5].

UC is characterized by inflammation and ulcers (sores) along the rectum and large intestine (colon) walls. Regarding CD, its hallmark is inflammation of the gastrointestinal tract lining, which often affects the deeper layers of the digestive tract, including the small and large intestines and, in rare instances, the upper gastrointestinal tract [11].

Furthermore, CD can impact any area of the digestive system. Usually, it affects the section of the small intestine that comes before the colon or large intestine. The disease-affected areas can penetrate the several layers of the gastrointestinal tract's walls and appear as patches adjacent to healthy tissue. Only the deepest layer of the colon lining has damage in UC, and the damage is continuous, beginning in the rectum and moving to the colon [12]. The frequency of CD and UC is linked to a number of factors, including geography, nutrition, genetics, and a weakened immune system. However, the most widely accepted theory among scientists is that IBD is caused by an overreaction of the immune system, which is triggered by environmental variables related to changed gut microbiota or pathogenic bacteria in a host that is genetically predisposed. Though it is unknown whether this alteration is the cause or a result of intestinal inflammation, as well as how these bacteria contribute to the pathogenesis of IBD, it is possible that gut microbiota alteration occurs in IBD pathology [11].

In reference to genetic factors, Maranhão, Vieira, and Campos (2015) add that out of 163 gene loci linked to IBD, 110 are linked to both conditions, indicating that they share genetic bases and, consequently, similar mechanisms in their development. Thirty were linked exclusively to CD, and 23 to UC.

Diarrhea, abdominal pain, and, in the case of ulcerative colitis, bleeding are the prominent clinical characteristics of IBDs. The symptoms of CD include fever, anorexia, diarrhea, stomach pain, weight loss, and malaise. Bloody diarrhea, bladder tenesmus, mucous expulsion, cramping in the abdomen, and a need to evacuate are some of the specific symptoms of UC [13].

By assessing the patient's clinical status in accordance with imaging, laboratory, and histological testing, IBD is diagnosed. It should begin with a health professional interviewing the patient to confirm symptoms, followed by a physical examination and a review of family history (SOUSA, 2017).

Similarly, the use of laboratory diagnostic tools is emphasized, including an iron deficiency screening, complete blood count, C-Reactive Protein (CRP), Erythrocyte Sedimentation Rate (ESR), serum albumin biochemical parameter, and a test that looks for microorganisms that might be connected to changes in the gastrointestinal tract (coproscopy and stool culture) in order to rule out other diagnostic options (BARROS et al., 2020). The significance of ileo-colonoscopic examination and biopsy, which determine the severity and breadth of the disease, is presented by Barros et al. (2020) as a complement. The presence of inflammatory cells in the lamina propria and the loss of structure of undifferentiated cell mixes of all cell types are revealed by histological examination.

A gradual rise in the Erythrocyte Sedimentation Rate (ESR) and an increase in C-Reactive Protein (CRP), which indicate the presence of inflammation or infection, are two of the laboratory tests that may reveal anemia, which is caused by

difficulty of assimilation or blood loss, with an increase in the number of white blood cells per volume of circulating blood; and lower than normal blood potassium concentration in cases of severe diarrhea [13].

The kind and symptoms of IBD determine how it is treated. Reducing inflammation is the goal of IBD treatment because it can lower the risk of consequences in addition to relieving symptoms [14]. Usually, medication or surgery are used. Given the lack of knowledge about the nature of the agents causing the inflammatory process, the variations in the pharmacokinetics of the drugs, and the individual characteristics of each patient, the pharmacological approach required to improve symptoms, prevent recurrences, induce remission in patients, and heal fistulas is not straightforward [15].

Consequently, there are several methods of treatment, including: traditional treatment, which entails [15,16]:

- Sulfasalazine and mesalamine, anti-inflammatory medications. They function by reducing intestinal inflammation;
- Prednisone, a corticosteroid, is used. controls flare-ups and maintains the immune system;
- Use of immunosuppressants (azathioprine, 6-mercap-topurine, methotrexate, and tacrolimus);
- Use of antibiotics, such as ciprofloxacin and metronidazole, to treat infections and abscesses;

At the moment, biological agent-mediated treatment is unique. This is a relatively new treatment that aims to neutralize the body's inflammatory proteins. Some are given by intramuscular injection, while others are given via intravenous (IV) infusion. Adalimumab, Certolizumab, Golimunab, and Infliximab are the most often utilized [15,16].

Methodology

Study design: This study uses a qualitative approach and is exploratory and descriptive. Exploratory searches are mostly used to provide an overview of a particular fact and to clarify concepts and ideas. In doing so, it enables the researcher to deepen his investigation within the confines of a certain reality and expand his experience with the issue at hand. As a result, it can be utilized to bring up potential problems and has a plan to achieve the intended goals based on contact with a certain demographic [19]. Addressing the unique characteristics of a target audience is the goal of descriptive research. Since this study uses standardized data collection methodologies, the problem is highlighted by identifying, documenting, and analyzing the features or factors associated with the phenomena without the researcher's intervention (BRUCHÊZ, 2018).

Methodological Procedures

"Inflammatory Bowel Diseases AND Crohn's Disease," "Inflammatory Bowel Diseases and Ulcerative Colitis," and "Inflammatory Bowel Diseases and Therapeutic Adherence" were among the English-language search terms used in the LILACS, SciELO, BDENF, and PubMed databases. The chosen articles were those that addressed the study's objectives, were published within the previous five years, were available in both Portuguese and English, were not duplicates, and weren't monographs, theses, dissertations, review articles, news articles, texts in reviews, non-indexed articles, opinions, editorials, or manuals.

The three stages of Thematic Content Analysis—pre-analysis, material exploration or coding, and treatment of the results obtained/interpretation—were used to analyze the data. The corpus was created and hypotheses or assumptions were developed and revised throughout the pre-analysis phase.

1457 papers were first found using the methods employed in this integrative review. A total of 35 articles were found after filtering. After these articles were examined in an exploratory manner, 27 of them were eliminated because they were repeated or did not fit the predetermined criteria. As a result, eight articles in all were included in this search.

To guarantee a better systematization of information on the subject matter, the process was broken down into phases. The databases were first searched for the descriptors, and then the abstracts and goals of the chosen publications were read. Lastly, a thorough study of the papers that satisfied the review's inclusion requirements was done.

Reading and analyzing the information gleaned from the articles was the process of data analysis. A table containing the articles' profiles—title, authors, year, goal, methodology, results, database, and scientific journal—was created from the chosen studies. Descriptive and interpretative analyses were performed on the scholarly findings.

Results

The chosen papers were studied analytically, which made it possible to arrange the topics in order of significance and to combine the key concepts in order to meet the research's goal. Table 1 displays the papers that were chosen based on language and methodology.

Table 1: Manuscripts are arranged by language and research approach

Variables	Number	Percentage
Methodological Approach		
Exploratory and qualitative	7	87.5%
Retrospective cross-sectional study	1	12.5%
Language		
English	100	100%

According to Table 2, the methodological approach revealed that exploratory and qualitative investigations were the most common, accounting for 87.50% of the selected articles. In terms of the publications' languages, English was used in 100% of them.

Table 2: An explanation of the research

Author	Title	Goal	Conclusion	Database
Verstockt et al. (2018)	New treatment options for in-flammatory bowel diseases	Discuss recent advances in the treat-ment of IBD, including conventional therapies such as corticosteroids and immunosuppressants, and biologic therapies, which target specific im-mune system molecules involved in inflammation.	The study presents different treatment options for inflammatory bowel diseases, such as biologic therapies, cytokine inhibitors, monoclonal antibodies, integrin antagonists, and the modulation of the gut microbiome. These approaches offer new hope for the treatment and management of these conditions, improving patients' quality of life	PubMed
Duijvestein et al. (2018)	Novel Therapies and Treatment Strategies for Patients with Inflammatory Bowel Disease	Present current treatment options and strategies and provide an update on the status of programs developing new therapeutic agents for inflammatory bowel disease (IBD)	The results of studies show that biological therapies, such as anti-TNF monoclonal antibodies, have been shown to be effective in fighting intestinal inflammation and remitting the symptoms of inflammatory bowel disease (IBD). Drugs that inhibit inflammatory molecules, such as vedolizumab, and therapies that target specific targets in the immune system, such as JAK inhibitors and IL-12/23, have also shown positive results in controlling inflammation in IBD.	PubMed
Lee, Park and Park (2018)	Novel treatments for inflammatory bowel disease	Discuss new treatments for inflammatory bowel disease	The study by Lee, Park, and Park (2018) provided valuable insight into advances in the treatment of inflammatory bowel disease, highlighting biologic therapies, cytokine inhibitors, leukocyte modulators, novel targeted therapies, and combina- tion approaches as promising options for the management of IBD.	Scopus
Na and Moon (2019)	Perspectives on Current and Novel Treatments for Inflammatory Bowel Disease	Discuss new perspectives on current and new treatments for inflammatory bowel disease	The study showed promising results from different medica- tions for inflammatory bowel diseases such as ulcerative colitis and Crohn's disease. Some monoclonal antibodies and anticytokine molecules have shown clinical remission rates in patients, while	Scopus

			small molecules have demonstrated efficacy as induction therapy. Phase 3 studies are underway to validate its efficacy and safety.	
Shimizu et al. (2019	Stem cell-based therapy for inflammatory bowel disease	Stem cell-based therapy for inflamma- tory bowel disease	The results indicated that stem cell-based therapy may be a promising option for the treatment of refractory Inflammatory Bowel Disease (IBD). Hematopoietic stem cell transplanta- tion has been shown to be effective in reducing the need for immunosuppressive medication, but has had serious adverse events. Mesenchymal stem cell transplantation, on the other hand, has shown efficacy in the treatment of complex perianal fistulas, with encouraging results and adverse effects similar to the placebo group.	Scopus
Missel- witz et al. (2020)	Emerging Treatment Op- tions in Inflammatory Bowel Disease: Janus Kinases, Stem Cells, and More	Present the emerging treatment op- tions in inflammatory bowel disease: Janus Kinases and stem cells	The study highlights the development of new therapeutic agents that target selective cytokine inhibition and JAK-STAT signaling for the treatment of inflammatory bowel diseases. These therapies have the potential to improve efficacy and reduce side effects associated with existing treatments. Larger studies are needed to evaluate its long-term efficacy and safety.	
Schmidt, Grunert and Stallmach (2021)	An update for pharma- cologists on new treatment options for inflammatory bowel disease: the clinicians' perspective	Provide an update on new treatment options for inflammatory bowel disease	The study highlights the efficacy of vedolizumab and ustekinumab in the treatment of IBD. Although etrolizumab, AJM300, and ontamalimab have shown positive results in certain patient populations, their overall efficacy and future development require further investigation. Selective blockade of IL-23 with brazikumab, risankizumab, and mirikizumab has shown promise in inducing remission in patients with CD and UC, with optimization of dosing being an important consider- ation.	Scopus
Yama- moto-Furusho and Parra- Holguín (2021)	Emerging therapeutic op- tions in inflammatory bowel disease	Present the efficacy and safety of new treatments for IBD	The study presented the advances achieved in recent years in the development of new therapies for the treatment of inflammatory bowel diseases. These therapies aim to block inflammation in the gastrointestinal tract, promote mucosal healing, and offer more personalized treatments, aiming at clinical remission and healing of intestinal lesions.	Scopus

Discussion

Verstockt et al. (2018) reviewed the key research on treating inflammatory bowel illnesses (IBD) and offered fresh, promising strategies for doing so. Biological treatments, which employ medications that target particular immune system molecules to regulate the inflammatory cascade, are one of the strategies mentioned in the paper. These treatments are particularly useful in the management of ulcerative colitis and Crohn's disease.

The study emphasizes how the use of tumor necrosis factor inhibitors (anti-TNFs) as a biological therapy precursor has revolutionized treatment, enhancing quality of life, lowering hospitalizations, symptoms, and the need for surgeries. Some patients, on the other hand, do not react to this therapy, while another group responds initially but gradually loses effectiveness over time. In order to give clinical and histological control of the disease, new compounds are being developed to act on various immune pathways.

Ustekinumab, which was first approved for the treatment of psoriatic arthritis, has been tested in four large phase II and III clinical trials in patients with Crohn's disease and has proven effective in inducing and maintaining clinical remission. Other monoclonal antibodies and small molecules with an immune system action that have previously been approved for the treatment of other diseases are mentioned as therapeutic possibilities for inflammatory bowel diseases and are being tested in large studies to prove their effectiveness.

The study identifies several kinds of particularly promising drugs, including inhibitors of Janus Kinase (iJAK), anti-adhesion compounds (e.g., anti-intergrin A4, S1P receptor antagonist), and anti-interleukin 12 and 23 agents (anti-IL12/IL23).The study also discusses how the gut microbiota contributes to the onset and course of IBD. Probiotics, prebiotics, and fecal microbiota transplantation are thought to be effective adjuvant treatments for improving the management of various illnesses by modifying the microbiota.

The primary therapeutic developments in the management of Inflammatory Bowel Disease (IBD) are discussed in Duijvestein et al. (2018). Etrolizumab, a humanized IgG1 monoclonal antibody that targets the β7 subunit of certain integrins, is being assessed in phase II and III clinical trials for ulcerative colitis, according to the study. Additionally highlighted were medications belonging to the class of S1P receptor modulators, of which Ozanimod and Etrasimod are the leading examples. Ozanimod is currently undergoing phase III trials after being effective in phase II studies for the treatment of ulcerative colitis. The study also found that anti-cytokine antibodies, such Risankizumab, a humanized monoclonal antibody that blocks Interleukin-23 (IL-23), are a promising class of medications.

Significant findings about advancements in the treatment of inflammatory bowel disease (IBD) were provided by the study conducted by Lee, Park, and Park (2018). The use of biological treatments, which target the inflammatory molecules involved in the disease and reduce inflammation and symptoms, has been emphasized by research.

Researchers have also looked into how well direct interleukin blockers, anti-adhesion compounds, and signaling-blocking chemicals induce and sustain regression in ulcerative colitis and Crohn's disease. These drugs have demonstrated promise in reducing symptoms and managing intestinal inflammation. As demonstrated by tofacitinib, a medication that has shown promise in the treatment of ulcerative colitis, the researchers talked about the mechanisms of action of novel targeted medicines, such as Janus kinase (JAK) inhibitors, which work by primarily blocking the JAK 1 and JAK 3 isoforms. efficient in phase II studies for moderate to severe active Crohn's disease, and moderate to severe in phase II and III investigations.

The study also focused on Morgersen, an oligonucleotide that prevents the tissue from responding to endogenous anti-inflammatory medications by inhibiting the development of SMAD7, a protein that is elevated in inflammatory bowel disease patients. A phase II multicenter clinical trial demonstrated the drug's effectiveness, and it is presently undergoing a phase III investigation for ulcerative colitis and Crohn's disease.

The study brought to light the potential for combination therapeutic methods for IBD, which entail the concurrent use of various drug classes. These combinations seek to slow the course of the disease and increase the effectiveness of treatment. There are drawbacks, though, including the high expense, increased potential for side effects, and the paucity of data to back up the use of combination immunobiological treatments. As a result, the findings of this research offer important information for the creation of novel therapies and treatments for inflammatory bowel disease.

The findings of various medications in the last stages of development for the treatment of inflammatory bowel disorders, including Crohn's disease (CD) and ulcerative colitis (UC), were reported in the study by Na and Moon (2019). Monoclonal antibodies and small molecules were the three primary groups into which the medications under examination were separated.

In a phase II research, 124 patients with moderate to severe ulcerative colitis who had previously received anti-TNF treatment did not respond well to etrolizumab, an anti-integrin monoclonal antibody. When compared to the placebo group, the etrolizumab group exhibited a noticeably higher clinical response. To evaluate this medication's efficacy with alternative treatments, phase 3 studies are presently underway.

In a phase II study, etrolizumab, an anti-integrin monoclonal antibody, did not work effectively for 124 patients with moderate to severe ulcerative colitis who had previously had anti-TNF medication. The etrolizumab group had a significantly greater clinical response than the placebo group. Phase 3 trials are currently being conducted to assess the effectiveness of this drug in combination with other therapies.

Researchers described the subgroup of anticytokine compounds in the small molecule category, where a number of medications were tried as induction therapy for Crohn's disease patients. 71% of patients experienced clinical remission, 81% experienced clinical response, and 35% experienced endoscopic remission when using risankizumab. In the eighth week of use, 49.2% of patients showed a clinical response to brazikumab, whereas 26.7% of the placebo group did the same. The results of studies on the medications guselkumab and mirikizumab in Crohn's disease patients have not yet been made public. Phase 3 trials are being conducted to assess these drugs' efficacy in inflammatory bowel disease patients.

Preliminary phase 2a and 2b investigations of the anti-IL-12/IL-23 drug briakinumab did not show any appreciable variations in the induction of remission in Crohn's disease patients. There have been no documented clinical trials for ulcerative colitis to far.

With clinical remission rates of 47%, filgotinib, which is still in the small molecule group but falls under the subgroup of sig-naling molecules, showed promise in treating patients with moderate to severe Crohn's disease. In patients with Crohn's disease, upadacitinib has also demonstrated effectiveness as an induction therapy. Studies in phases two and three are being conducted to assess its efficacy in inflammatory bowel disease patients. The application of stem cell-based therapy for the management of inflammatory bowel disease (IBD) was examined in a 2019 study by Shimizu et al. Hematopoietic stem cell transplantation (HSCT) and mesenchymal stem cell transplantation (MSCT) were the two approaches that were examined.

Patients with refractory IBD participated in a randomized controlled trial for HSCT, according to the study. Twenty-two of the 45 patients undergoing randomization received conventional treatment, whereas 23 underwent HSCT. Compared to the control group, 38.1% more patients in the autologous hematopoietic stem cell transplant group were able to quit immunosuppressive medication after a year of treatment.

Both clinical remission and the disease activity index (CDAI) significantly improved. At the end of a year, there was no statistically significant improvement in persistent disease regression, and the study also noted that the hematopoietic stem cell transplant (HSCT) group experienced serious adverse events often. Consequently, it was determined that HSCT is not a suitable course of treatment for those suffering from refractory inflammatory bowel disease (IBD).

Phase I/II clinical trials utilizing bone marrow-derived mesenchymal stem cells (BM-TCM) and adipose tissue-derived mesenchymal stem cells (CTAs) were carried out in relation to mesenchymal stem cell transplantation (MSCT). In the autologous TCM-MO study, patients with complex perianal fistulas and luminal IBD responded well to allogeneic TCM-MO, which led to a significant decrease in CDAI, clinical remission, endoscopic improvement, and fistula healing, even though a significantly higher efficacy was not seen when compared to conventional therapy.

The paper also discusses intestinal stem cell transplantation (ISCT), a novel therapeutic strategy that makes use of organoids made from intestinal stem cells (ISCs). The goal of ISCT, a cutting-edge stem cell-based treatment, is to repair the intestinal mucosa. It aims to restore the integrity of the mucosal barrier and lessen inflammation by delivering functional epithelial cells and proliferative ISCs to the afflicted area.

Despite the lack of a clinical trial, scientists are hopeful that intestinal stem cell transplantation (ISCT) could be a promising treatment for inflammatory bowel disease (IBD). By supplying proliferative intestinal stem cells and functional epithelial cells to the afflicted area, ISCT is thought to help the intestinal mucosa repair.

Crucially, these stem cell-based treatments are still in the research stage and are not yet regarded as proven IBD treatment alternatives. To assess the safety, effectiveness, and viability of these strategies, more clinical research is required. Schmidt, Grunert, and Stallmach's (2021) study examined the use of IL-23 inhibition and anti-integrin antibodies in the management of inflammatory bowel disease (IBD). When compared to adalimumab, vedolizumab, an anti-β4β7 integrin monoclonal antibody, has

demonstrated a positive therapeutic effect in achieving clinical remission in patients with IBD.

In patients with symptomatic Ulcerative Colitis (UC) who had not previously had anti-TNF medication, etrolizumab, which operates on αEβ7integrin and αEβ7 interactions, was successful in causing remission. Its effectiveness in treating UC patients who had already received anti-TNF treatment and maintaining regression, however, was less clear.

For individuals with moderately active ulcerative colitis (UC), AJM300, an oral medication that blocks integrin, is an additional option. It has shown notable rates of clinical response and remission. In individuals with UC, ontamalimab (PF-00547659), which acts on MadCAM-1, was found to be more effective than a placebo at causing clinical remission; however, it had no such impact in patients with moderate to severe Crohn's disease (CD).

Nevertheless, in a study of CD patients, briakinumab, another anti-p40 monoclonal antibody, failed to meet the main clinical outcome. Both risankizumab and brazikumab (MEDI2070), which are selective anti-p19 monoclonal antibodies, had encouraging outcomes in causing clinical remission in CD patients. Moreover, during therapy maintenance, risankizumab also produced endoscopic and clinical remission. Patients with UC and CD showed notable rates of clinical response and remission while using the anti-p19 monoclonal antibody mirikizumab. To find the ideal induction therapy dosage regimen, more research is required.

The use of Janus kinase (JAK) inhibitors to inhibit JAK-STAT signaling was another therapeutic strategy that was investigated. A JAK1/JAK3 inhibitor called tofacitinib was authorized for the treatment of ulcerative colitis after demonstrating effectiveness in this condition.

Furthermore, it has been shown that filgotinib, a specific JAK1 inhibitor, is effective in treating Crohn's disease. Upadacitinib and TD-1473 are two other JAK inhibitors that have demonstrated encouraging outcomes in the treatment of IBD, providing more therapeutic options.

It has been demonstrated that anti-tumor necrosis factor alpha medication works well for IBD patients who don't react to standard care. New treatments must be created, though, and indicators that can forecast a patient's reaction to therapy must be found. In this regard, a number of pathways implicated in the development of IBD have been investigated, and novel treatments aim to inhibit the inflammatory process in the gastrointestinal tract using a variety of delivery methods, including topical, intravenous, subcutaneous, and oral.

The potential to provide more individualized treatments with greater success rates and fewer relapses is one benefit of these novel therapeutics. Additionally, these treatments seek to accomplish macroscopic changes in the mucosa through healing in addition to clinical remission. This indicates that the goal of treatment is to restore the integrity of the mucosa by promoting the healing of intestinal lesions both externally and microscopically.

The primary goals of the treatments currently under research are to alter the signaling pathways that cause inflammation, inhibit particular receptors or ligands, lessen cell migration, and maintain the integrity of the epithelial barrier. Studies conducted thus far have demonstrated the effectiveness and safety of these methods.

Conclusion

As clinical practice and molecular understanding have advanced over time, so too has the therapy of IBD. Recent advancements in the treatment of IBD are highlighted in this study. The review also covered the shift from traditional to innovative therapies, such as personalized medicine strategies, biologics, small-molecule inhibitors, and microbiome-based interventions. These tactics seek to improve disease control and patient quality of life by increasing accuracy and reducing systemic toxicity. The synergistic effects of both advanced and conventional medicines may be advantageous when combined. Probiotics and fecal microbiota transplantation can also aid in reestablishing the equilibrium of the gut microbiota, which lessens the likelihood of disease flare-ups. Although there are still a number of major obstacles to overcome, developments in artificial intelligence, endoscopic procedures, and stem cell therapies have demonstrated enormous promise in the treatment of IBD. In order to treat this illness, telemedicine and technology must be used in conjunction with multidisciplinary integration.

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Sharat Ranjan: Conceptualization; Formal analysis; Methodology; Writing—original draft; data collection. Barun Kumar Sinha: Conceptualization; Formal analysis; Methodology; Writing—original draft; data collection. Jeetendra Kumar:

Conceptualization; Formal analysis; Methodology; Writing—original draft; data collection.

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