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EXPLORING IRRITABLE BOWEL SYNDROME (IBS) AND INFLAMMATORY BOWEL DISEASE (IBD)CAUSES, DIAGNOSIS AND TREATMENT: SYSTEMATIC REVIEW

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1. Abstract

This systematic review gives the full picture and points out the difference between IBS and IBD discussing the epidemiology, pathophysiology, differential diagnosis, and treatment guidelines. IBS, a functional disease, which has either varying prevalence or higher prevalence invariably, in different parts of the world while on the other hand inflammatory IBD is a consistent higher prevalently, in the entire world with recent trends of the rise in the West. In terms of gender variations, age of onset, and socioeconomic consequences, all sides of this equation are considered. These characteristics are crucial for the differentiation of IBS and IBD. In contrast, IBD is production of autoimmune reaction in the back and end up with chronic inflammatory. The strategy for IBS management encompasses exercise, abdominal massage, diet alteration, and psychological techniques while in IBD, immune suppressors such as immune system suppressors, biologics or surgery could be considered.

2. Introduction

Huang et al. (2023) informed that the irritable bowel syndrome (IBS), which is a functional disorder, is typically associated with altered bowel function and a recurrent abdominal pain. These changes may be why the patient's daily routine and work have been disrupted or affected. 60-70% of individuals diagnosed with IBS are female patients who present other functional gastrointestinal disease (FGID) symptoms often (Fairbrass et al., 2020) problem by causing a considerable burden on life and the economy (Shaikh et al., 2023). Europe countries like Sweden, Norway, and Denmark have reported higher incidence rates compared to others. (Ng et al., 2017).

The articles by Liu et al. (2023) and Kaplan and Ng (2016) say that inflammatory bowel disease (IBD) is a term that includes many chronic and severe discomforts to the gastrointestinal tract, which occurs most often in adolescence and early adulthood. For the year 2017, it is

estimated that worldwide, there were 5.5 million cases of IBD (inflammatory bowel disease), and the incidence and prevalence are rising everywhere, with an apparent predominance in newly industrializing countries that are only recently being exposed to the western way of life. The main aim of this systematic review is to provide a recent synthesis of the literature on IBS and IBD, which comprehensively covers all aspects of this complex condition.

3. Methodology

The criteria for article selection

Inclusion criteria

i. Publication Period: Published between 2016 and 2024.
ii. Scope: Focused on epidemiology, pathophysiology, diagnosis, risk factors, or treatment of IBS or IBD.
iii. Language: Written in English.
iv. Type: Peer-reviewed original research or systematic reviews.

Exclusion criteria

i. Were in languages other than English.
ii. Were not peer-reviewed.
iii. Were published before 2016 or after 2024.

Databases and Search Terms

A thorough search was accomplished in Embase, MEDLINE, CENTRAL, and PubMed databases. The search strategy contained keywords and variations to guarantee a complete extraction of relevant articles. The base of the search for which the search terms were chosen was "irritable bowel syndrome," "inflammatory bowel disease," "epidemiology," "pathophysiology," "diagnostic criteria," "risk factors," and "treatment guidelines."

Critical Appraisal and Data Extraction

A total of 30 articles were found. Articles in the review underwent a thorough evaluation and screening process and were graded based on their methodological quality as shown in appendix 1. This aided in determining the strength of evidence that could be used in the review. CASP tools (Critical Appraisal Skills Programme), which are very popular for assessing the quality of different study designs, were used. This tool was important and was used in assessing the strength of evidence that was presented by the studies. This was vital in demonstrating the quality of this study. The logical analyzing stage helped the team understand the procedure, the ethical issues, and the biases. During the data extraction phase, the process was conducted accurately and systematically. Gathering pertinent data from the chosen articles was done carefully and organized. It also included information such as the description of the study design, sample size, participants' characteristics, and, of course, key findings.

4. Results

Epidemiology of IBS and IBD.

IBS has high regional variability in prevalence, possibly due to factors other than cultural, notwithstanding dietary and methodological differences. Research has shown that prevalence rates have varied quite notably; for instance, they range from 1.1% in France and Iran to 35.5% in

Mexico, which was highlighted by Huang et al. (2023). The global pandemic COVID-19 outbreak observed a similar prevalence trend in Europe and the United States, and lower rates were reported in Asia and Australia (Huang et al., 2023). Instead, Crohn's disease and ulcerative colitis (CD and UC) of Inflammatory Bowel Disease (IBD) are prone to more stable worldwide prevalence where the rates have risen drastically in Western countries and new industrial nations (Caviglia et al., 2023; Agrawal and Jess, 2022). As an illustration, in North-West Italy, it was reported an increase in IBD prevalence in a decisive manner in one year, which was 200 people per 100,000 inhabitants in 2006 to 321.2 persons per 100,000 inhabitants in 2021 (Caviglia et al., 2023).

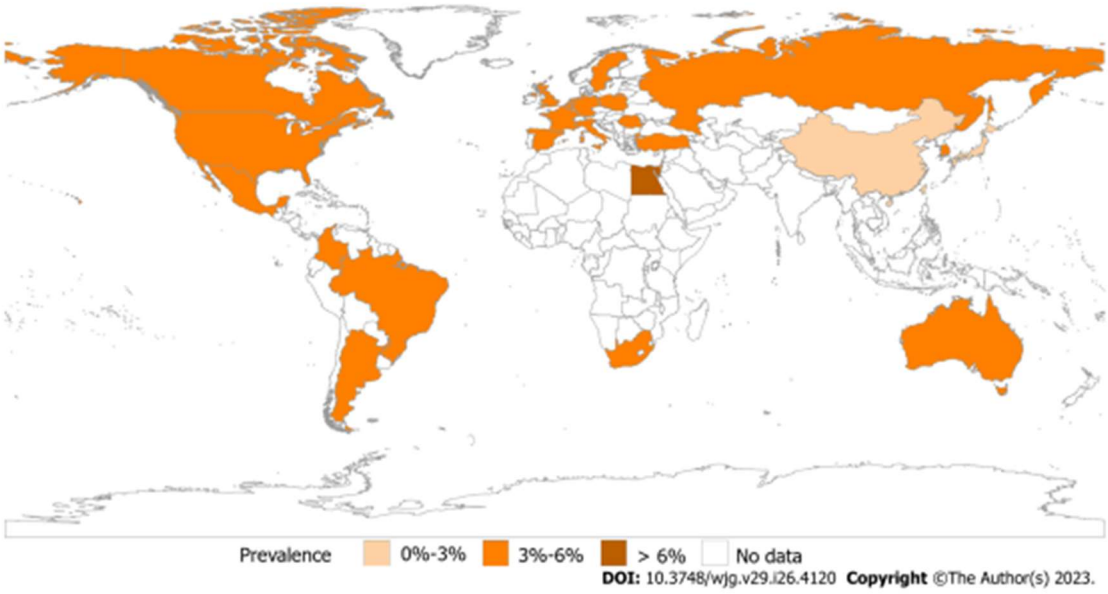

Figure 1: Global prevalence of IBS

Gender distributions are unequal between IBS and IBD. In Asian populations, IBS affects both genders equally; in Western societies, more women (1.5 to 3 times more) are involved compared to men (Shaikh et al., 2023). In contrast, IBD gender distributions are almost equal, and there is no significant gender predilection according to whatever recent studies have found (Singh et al., 2020). Age at onset is the difference between the two types of disorders. The average age of IBS symptom appearance is approximately 35 years old, with progressively lower rates reported in individuals over 50, according to the Shaikh et al. (2023) study. On the contrary, IBD most often shows up in early adulthood, with the mean age of diagnosis being approximately 42 years old (Caviglia et al., 2023; Alatab et al., 2020).

Pathophysiology of IBS and IBD.

IBS is characterized by various pathophysiological processes, such as changes in gut motility, enhanced viscera sensation, and the imbalance of gut microbiota. Clinical studies demonstrated that as a result of the microbiome alteration, gastrointestinal endocrine cells conviction, visceral hypersensitivity, and gastrointestinal motility disorders, could create the irritable bowel syndrome (Holtmann et al., 2016; Hellström, 2019). A high number of patients with IBS have increased TGR5 expression which is characterised by secretion of SCFA, FBA,

tryptophan and methane gases in colon mucosa. Risk factors are considered to be the ones that have the aberrant secretion pathways, they make IBS. An in-depth understanding of these influencers is reached by intragut microbiome regulation as well as the neurotransmitter signaling and immune system response that are connected to it. Therefore, the final cause of this process may be a radical increase in output of these molecules that could become the factors of IBS display. This strains that predominantly utilize only a small number of carbon substrates have been found to be involved in digestive malabsorption in their specific co-metabolites. They have been linked with symptoms such as hyperperistalsi, abdominal pain and distresses in the digestive tract (Hadjivasilis et al., 2019).

Unlike IBD, the triggering stimulus is commitment between both singular and adaptive responses against the organisms that delays in the tissues of your intestines microorganisms' organisms within the microbiota-induced chronic inflammation and ultimately tissue damage (Vorneveld et al., 2023). This disease involves multifactorial etiology, including genetic traits, environmental fluctuations and complex immune system dysregulations mechanisms, which play extremely important roles in the development and maintenance of the disease (Petagna et al., 2020). Thus, throughout this review, genetic risk factors in common between IBD and extra-intestinal manifestation are highlighted, implying that both these defects are of many steps in the disease pathogenesis. Moreover, mutations of genes like NOD2/CARD15 have been identified to lead both CD and EN such as sacroiliitis and uveitis (Abraham et al., 2017, pp.343; Anbazhagan et al., 2018 pp.55).

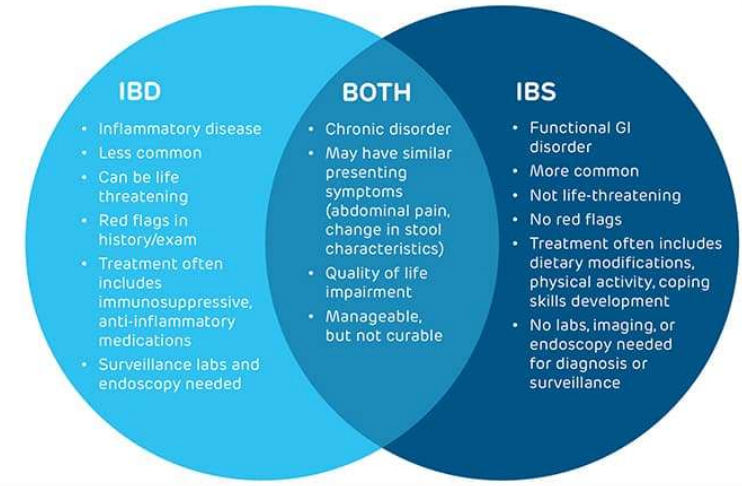

Figure 2: Comparison of IBD and IBS

Diagnosis of IBS and IBD.

Laboratory Tests

Laboratory tests' interpretation is a crucial part of IBD diagnosis, as inflammatory markers detection is detected. Examination and screening of anemia and other infections, such as blood tests to check for anemia and the presence of disease, are commonly done. In the event of conditions being inflammatory, inflammatory markers like the erythrocyte sedimentation rate (ESR) and the C are elevated in IBD (Mayo Clinic, 2017). Fecal calprotectin levels present signs

of intestinal inflammation, and microscopic stool analysis is used to rule out parasite organisms. So, IBS diagnosis doesn't go by laboratory tests. Instead, they are made to rule out organic diseases (Fukudo et al., 2020). Serum biomarkers such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) can be used to distinguish IBS from conditions that have inflammatory bowel diseases (Black, 2021).

Table 1: Normal and Irregular percentage range.

Laboratory Marker	Normal Percentage Range	Irregular Percentage in IBD
Erythrocyte Sedimentation Rate (ESR)	0-20 mm/hr	>20 mm/hr
High-Sensitivity C-Reactive Protein (hs-CRP)	<1.0 mg/L	>3.0 mg/L
Fecal Calprotectin	<50 mcg/g	>50 mcg/g

Imaging Procedures

Endoscopic procedures, such as colonoscopy and flexible sigmoidoscopy, are two of the most significant methods for diagnosing IBD. Therefore, these are used for anatomical visualization, and many biopsy samples are taken for laboratory analysis. As current as modern techniques like capsule endoscopy and balloon-assisted enteroscopy are, they are used whenever a standard endoscope is of no use (Dajti et al., 2023). For instance, imaging studies such as X-rays, CT scans, and MRs are used to determine the severity of inflammation, identify problems, and plan interventions. Nuclear imaging techniques play no role in routine IBS diagnostics. These procedures, like ultrasonography, can be used to diagnose IBS patients as they have a few diagnostic values in identifying the motility patterns.

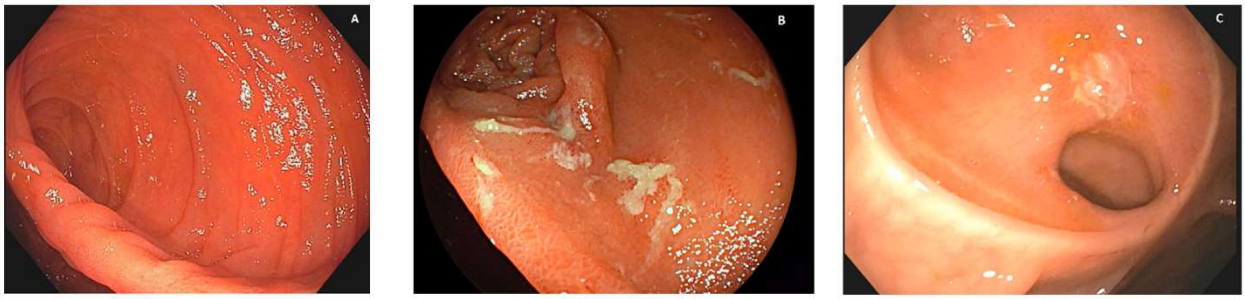

Figure 4: Endoscopic Procedures for IBD

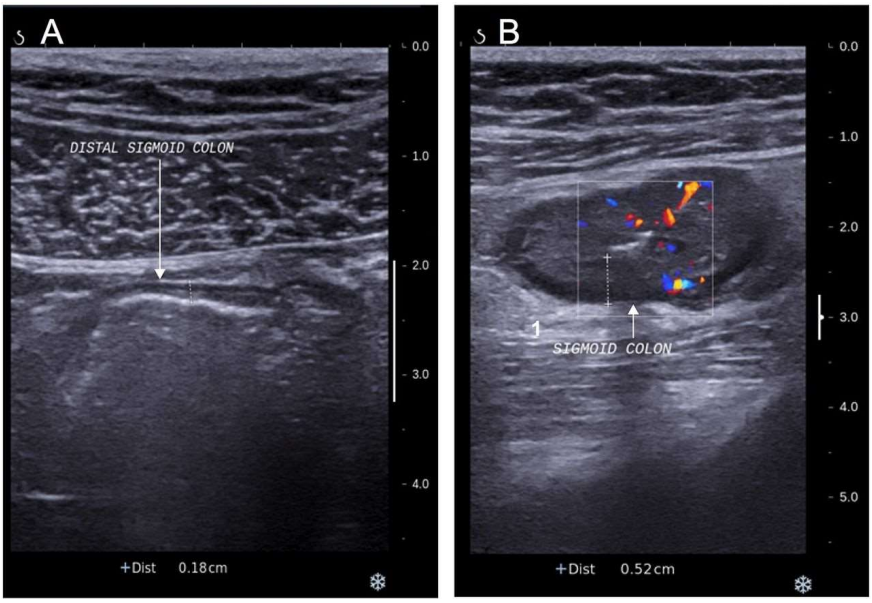

Figure 5: Ultrasonography in IBS

Endoscopic Procedures

Endoscopy is an essential technology in the diagnostic confirmation of IBD. Colonoscopy and flexible sigmoidoscopy supply physicians with a view into gastrointestinal tracts, and biopsies obtained from IBD can be easily differentiated from other types of inflammations (McDowell et al., 2023). Upper endoscopy may be a tool in discussing cases, and capsule endoscopy can be employed to diagnose Crohn's disease affecting the small intestine. However, coloscopy is out of the picture for IBS in routine diagnosis, as recommended by treatment guidelines confirmed by evidence. Nevertheless, it is helpful for differential diagnosis with other natural diseases, and it indicates non-responsive IBS (Fukudo et al., 2020).

Risk factors associated with IBS and IBD.

The investigations carried out in Saudi Arabia by (Makkawy et al., 2023) pinpoint that IBS has multidimensional potential risk factors. With the prevalence rates in Saudi Arabia ranging from 7.9% to 49.3%, the average being approximately 24%, the difference is a warning sign that something is wrong. It appears like gender distinctions are the case here, with females most likely to develop IBS as compared to males. These influential factors include educational discipline, living environment, mental health, eating behavior, family history, presence of comorbidities such as diabetes mellitus, and assaulting factors, which are low water intake and high caffeine consumption (Makkawy et al., 2023; Klem et al., 2017). Socio-economic factors like family income and academic performance are also significant.

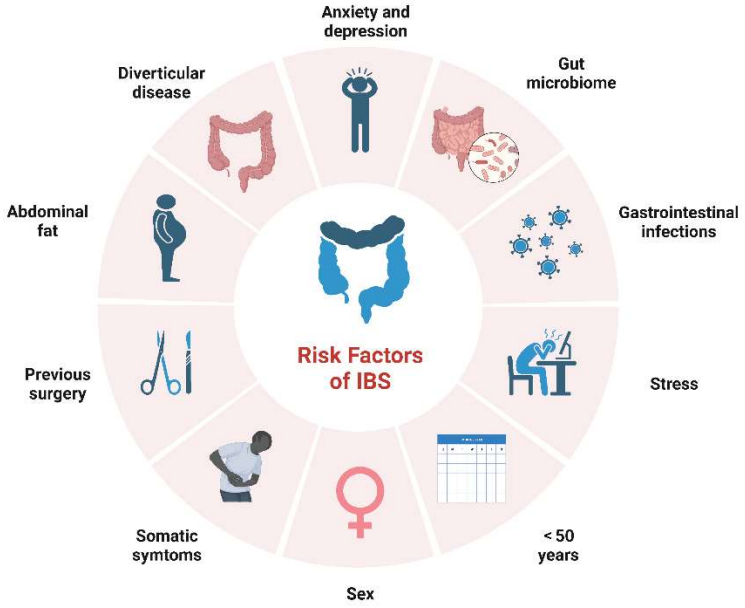

Figure 6: IBS risk factors

On the contrary, as the Mayo Clinic (2022) claims, reliable risks associated with IBD draw a different picture. Age is among the key factors driving IBD incidence, mainly in young adults with a maximum of 30 years of age (Van et al., 2020). Family background is mentioned because it strongly suggests a high chance of developing the disease if one has near kin with the same problem. Ethnicity plays its role, given IBD has been more frequent among white people. The use of non-steroidal anti-inflammatory drugs, for example, its standard form of ibuprofen, is recognized as a safety factor for IBD (Mayo Clinic, 2022).

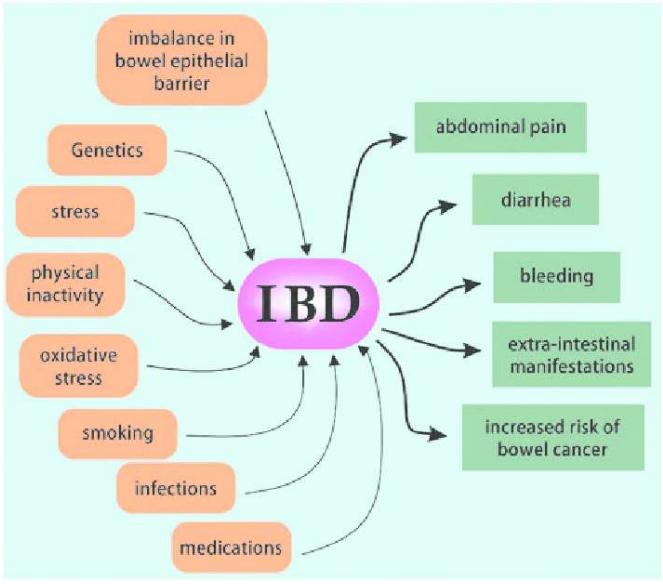

Figure 7: IBD risk factors

Treatment guidelines for IBS and IBD according to the latest sources.

IBD and IBS are gastrointestinal disorders that are treated in distinct ways. The underlying objective of treatment for IBD, as represented by the Mayo Clinic, is to put down the inflammation

to remove the symptoms and regress. Usually, the therapy that can be applied consists of pharmacotherapy or surgical procedures. Depending on the disease's severity or location in the colon, the drug therapy ideally needs to be customized. Non-steroidal anti-inflammatory drugs - aminosalicylates and cortico-steroids - are the most commonly prescribed drugs for the mild to moderate form of ulcerative colitis (Mayo Clinic, 2017). The Medicines used to stop the Immune system are azathioprine, mercaptopurine, and methotrexate, which reduce inflammation (Mayo Clinic, 2017). The recombinant DNA therapy called biologics involves infliximab and adalimumab, which neutralize the inflammation by targeting proteins (Mayo Clinic, 2017). Surgery is proposed in the cases when other treatments are ineffective, with these treatments including removing the dam involved in the digestive tract, creating pouches inside, or managing complications (Mayo Clinic, 2017).

Regarding IBS, the World Journal of Gastroenterology advocates for a diagnostic methodology based on the symptoms and bio-markers, including FBA and inflammatory markers (Huang et al., 2023). Lifestyle interventions, such as stress quelling, exercises, and diet modifications, including the Low FODMAP diet, are prescribed as remedial molecule-free strategies (Huang et al., 2023). Psychotherapeutic approaches such as hypnotherapy and cognitive-behavioral treatment are recommended, especially for patients with co-occurring psychological conditions (Huang et al., 2023). Since there are two recognized subtypes of IBS, the pharmacological treatment for IBS-D uses sigmoidal pharmacologists, including eluxadoline, rifaximin, and alosetron. At the same time, IBS-C involves more of the bulking agents, laxatives, and specific medicines like linaclotide (Huang et al., 2023). In contrast with the practice guidelines by Huang et al. (2023), which underscore the significance of lifestyle management with diet as the basis for the initiation and maintenance of the approach, notable among which is the low-FODMAP diet, the treatment approach focuses on making changes in substances and routines rather than the restriction of foods.

5. Discussion

Interpretation and Comparison of Results for IBS and IBD

Through systematic reviewing, we have uncovered significant disparities in the epidemiology, pathophysiology, diagnosis, prognostic factors, and treatment modalities for irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD). Results of IBS occur differently in different parts of the world, which are culture-specific and related to dietary habits and methodology. As shown from revolving studies in the UK (Wang et al., 2022) and Saudi Arabia (Makkaway et al., 2023) that reveal the rates increasing from 7.9% to 49.3%, these findings illustrate a variety of causes of the disease. However, IBD, composed of CD and UC, demonstrates a more prevalent global incidence getting underneath in the West and newly industrial countries (Caviglia et al., 2023). Unique patterns of the spread of the diseases require directly relevant public health tactics.

IBS and IBD are both complicated and multifactorial diseases. Brain-gut axis deregulation, altered gut motility, visceral hypersensitivity, and disturbed gut microbiome bacterial population

are shown to play critical roles in IBS (Huang et al., 2023). Unlike IBD, which involves immune responses against intestinal microorganisms, it results in chronic inflammations and tissue damage, the opposite of this (Liu et al., 2023). As genetically shared risk factors between IBD and EIMs are considered one of the components of IBD pathophysiology (Rogler et al., 2021), the interconnectivity between these two is even further confirmed. IBS is a class of diseases characterized by functional disturbances; on the contrary, IBD studies deeper, the modulators of the immune system, and to treat patients, one should personalize the medical interventions.

The diagnostics for IBS and IBD are different and multi-modal. For IBD, laboratory tests are essential by providing markers of inflammation, while colonoscopy endoscopic procedure is decisive for the final diagnosis (Mayo Clinic, 2017). Unlike IBD, which involves many laboratory methods, IBS diagnosis relies more on clinical criteria, and laboratory tests are used to rule out organic diseases (Fukudo et al., 2020). The various proposed skew toward the different diagnostic methods highlight that precision differential diagnosis is critical for successful disease intervention.

Risks to IBS are different from that of IBD. IBS risk factors were established through lifestyle, dietary, and psychosocial factors, and research reveals mention of gender, mental health, academic discipline, and nutritional habits (Makkawy et al., 2023). As opposed to the former, the Mayo Clinic highlights age, family history, ethnicity, smoking, or nonsteroidal anti-inflammatory medications as primary IBD risk factors (2022). Since the circumstances of each group are not the same, they require personalized ideas of prevention and management.

IBS and IBD treatment are based on two different sets of directives. The IBD therapeutic procedure mainly involves drugs or surgery to eliminate inflammation (Mayo Clinic, 2017). Among the medicines used, these include nonsteroidal anti-inflammatories (NSAIDs) and immune system modulators (i.e., biologics), with surgery considered for non-responsive patients (McDowell et al., 2023). However, IBS management has a different focus. It emphasizes non-pharmacological approaches, which consist of lifestyle interventions, modifications to the diet, and cognitive-behavioral therapies, and pharmacological treatment is reserved only for specific symptoms or subtypes (Huang et al., 2023).

Variations and Trends in the Literature

The various rates of IBS and IBD levels in different parts and cultures show how genetic, environmental, and cultural factors are involved. The rise in the risk of IBD development is characterized by accumulating burdens, which is more likely the case in the developing countries of industry (Liu et al., 2023). The spectrum of IBD in the Western world corresponds with the global wake in employees, and Westernization is paralleled by environmental triggers, suggesting a possibility of eco-instigators (Liu et al., 2023).

6. Summary

This systematic analysis evaluates IBS and IBD separately, focusing on the difference between inflammatory and functional conditions. IBS, by nature, a functional disorder, is to manifest varying prevalence on the global plane, while IBD, the chronic inflammation in the making, by nature, is to remain more global- consistent in prevalence. The mechanisms, diagnosis,

risk factors, and treatment decisions are not identical for AR, and CRHealthcare professionals can steer actions based on the knowledge they gain, which allows them to deliver unique solutions for these disorders of the gut.

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Appendices

Study	Clear statement of aims	Qualitative/ Quantitative methodology appropriate.	Research design appropriate to address research aim (s)	Recruitment strategy appropriat to address research aim (s)	Data collected in a way that addressed research issue	Relationship between researcher and participants adequately considered	Ethical consideration taken into consideration.	Data analysis sufficiently rigorous	Clear statement of finding.	Is the researcher valuable.
Abraham et al., 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Outlines the many treatments for inflammatory bowel illnesses, along with their indications, modes of action, and adverse effects.

Agrawal and Jess, 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the consequences of evolving IBD epidemiological patterns

Alatab et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Report the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2017 data, which covers 195 countries and territories, on the prevalence, mortality, and total burden of IBD between 1990 and 2017.

Anbazhagan et al., 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Examine the ways that diarrhoea linked to IBD is caused by decreased ion transport and poor epithelial barrier function.
Banerjee et al.,2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the difficulties in diagnosing and treating IBD in Asian environments with inadequate resources.

Black, 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Discusses the diagnosis and investigation of irritable bowel syndrome
Camilleri et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the treatment of Irritable Bowel Syndrome
Cavigilia, 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the clinical characteristics and evolving epidemiology of inflammatory bowel disease

Dajti et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Demonstrates how well faecal calprotectin performs as a diagnostic tool to help those with IBD
Fairbrass et al.,2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Examined the frequency of symptoms similar to those of irritable bowel syndrome in IBD patients.
Fukudo et al., 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Report the second edition of the JSGE-IBS guidelines

Gecse and Vermeire, 2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Shows the various inflammatory bowel disease diagnoses, along with its repercussions and problems.
Hadjivasilis et al., 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights classification of IBS based on predominant bowel habits
Hellstron, 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Addresses the irritable bowel syndrome's pathogenesis.

Hotmann et al., 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Explains how irritable bowel syndrome is caused.
Huang et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Reviewing the findings of IBS research on epidemiology, overlap diseases draw attention to future problems.

Kaplan and Ng, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Examines the internationalisation of inflammatory bowel disease from the viewpoints of how the condition has changed in China and the UK.
Klem et al., 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the risk factors, as well as outcomes of Irritable Bowel Syndrome After Infectious Enteritis

Liu et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Discusses the genetic makeup of inflammatory bowel disorders in people of European and East Asian ancestry
Makkawy et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the risk factors as well as management of Irritable Bowel Syndrome in Saudi Arabia

McDowell et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Describe the role of the intestinal immune system in the pathogenesis of inflammatory bowel disease.
Moayyedi et al., 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Developed guidelines for the management of IBS.
Ng et al., 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Demonstrates the increasing prevalence of inflammatory bowel disease around the world in the twenty-first century.

Petagna et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the pathophysiology of Crohn's disease inflammation as well as recurrence.
Rogler et al.,2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Discusses epidemiology, pathophysiology, clinical presentation, and treatment of EIMs in IBD.
Saez et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Explains the role of the innate immune system in the pathogenesis of inflammatory bowel disease.

Shaikh et al., 2023	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Addresses the gut microbiota and irritable bowel syndrome.
Singh et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Addresses the treatment of inflammatory bowel illnesses in specific groups, such as the elderly.
Van et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Identified the environmental risk factors linked to the onset of inflammatory bowel illness.

Wang et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Highlights the factors related to irritable bowel syndrome as well as differences among subtypes