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Inflammatory Bowel Disease in Adolescents: A Review Article

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ABSTRACT

***Background*:** The intestinal immune system is key to the pathogenesis of inflammatory bowel disease (IBD). The intestinal epithelium prevents bacteria or antigen entry into the circulation by sealed intercellular junctions. In IBD, these junctions are defective from either a primary barrier function failure or as a result of severe inflammation. Additional protective mechanisms include mucus production by goblet cells and Paneth cells secretion of α defensins with intrinsic antimicrobial activity. Excessive inflammatory reactions lead to continued deterioration of the epithelium and further exposure to intestinal microbes, thereby further worsening the inflammation.

Keywords: Inflammatory Bowel Disease, Adolescents

INTRODUCTION

The intestinal immune system is key to the pathogenesis of inflammatory bowel disease (IBD). The intestinal epithelium prevents bacteria or antigen entry into the circulation by sealed intercellular junctions. In IBD, these junctions are defective from either a primary barrier function failure or as a result of severe inflammation. Additional protective mechanisms include mucus production by goblet cells and Paneth cells secretion of α defensins with intrinsic antimicrobial activity. Excessive inflammatory reactions lead to continued deterioration of the epithelium and further exposure to intestinal microbes, thereby further worsening the inflammation(**Sturm etal., 2019).**

Inflammatory bowel disease

Inflammatory bowel disease (IBD) is a chronic condition marked by recurrent inflammation of the gastrointestinal tract due to an abnormal immune response to intestinal microbes. It includes two main forms: ulcerative colitis (UC) and Crohn disease (CD). UC is limited to the colon and causes continuous inflammation of the mucosal layer, typically beginning in the rectum and potentially extending to the entire colon. In contrast, CD can affect any part of the GI tract, most commonly the terminal ileum and colon, and causes patchy, transmural inflammation. Both conditions are classified by disease severity and location, while CD is further categorized by behavior: inflammatory, stricturing, or penetrating **(Colombel etal., 2019).**

Chronic immune-mediated conditions known as inflammatory bowel diseases (IBDs) mostly impact the gastrointestinal (GI) tract and are typified by recurrent episodes of flare-ups and inflammation. The complex interactions between the host's genes, environment, microbiota, and immune system are what cause IBDs, which are multifactorial diseases. The term "inflammatory bowel disease" (IBD) refers to a chronic illness that includes ulcerative colitis (UC) and Crohn's disease (CD). They have a recurrent and intermittent pattern that can be unpredictable **(Caviglia etal., 2023).**

Epidemiology and immunopathogenesis*:*

Genetic susceptibility is believed to play a more important role in the etiology of pediatric IBD. Crohn's disease often runs in families, with 5–20% of IBD patients having a first-degree relative with the condition. The genetic risk is higher for Crohn's than for ulcerative colitis, and increases if both parents have IBD **(Uhlig and Muise, 2019)**.

The incidence of inflammatory bowel diseases (IBD) has risen over the past decade to become a global issue. The annual incidence rates varied by geographical region, with IBD estimates ranging from 1.59 to 10.9 per 100 000 in Europe, 0.47 to 2.16

per 100 000 in Asia and the Middle East, and 11.4 to 13.2 per 100 000 in North America, CD estimates ranging from 1.7 to 6.8 per 100 000 in Europe, 0.19 to 1.53 per 100 000 in Asia and the Middle East, and 6.0 to 7.9 per 100 000 in North America, and UC estimates ranging from 0.88 to 3.87 per 100 000 in Europe, 0.13 to 0.38 per 100 000 in Asia and the Middle East, and 4.1 to 4.2 per 100 000 in North America (**Caron etal., 2024).**

By 2025, the occurrence and frequency of inflammatory bowel disease (IBD) in Egypt are on the rise, especially among younger individuals. Although IBD has historically been more common in developed countries, its prevalence is now growing in developing countries such as Egypt. Research shows that Ulcerative Colitis (UC) is more commonly diagnosed than Crohn's Disease (CD) within the Egyptian population **(Abdelaal etal.,2022)**.

Causes of IBD

Multiple factors can contribute to the onset of inflammatory bowel disease (IBD). One key factor is the immune system's abnormal response to bacteria and viruses. The innate immune system which includes neutrophils, macrophages, and dendritic cells detects general microbial patterns or byproducts, while the adaptive immune system, made up of B and T cells, responds to specific antigens. A proper balance between innate and adaptive immunity is essential to prevent overreactions to the body's own gut microbiota. Environmental influences such as increased energy consumption, modern transportation, high-fat diets, and smoking have been associated with a greater risk of developing Crohn's disease (CD). Genetics also play a role, as individuals with a family history of CD are at higher risk. Additionally, certain medications, including nonsteroidal anti-inflammatory drugs (NSAIDs) and antibiotics, can provoke inflammation in the intestines **(Lee & Eun 2022).**

Classification of IBD

IBD is classified into three major subtypes: Ulcerative Colitis (UC), which primarily affects the colon, Crohn's disease (CD) which affects various GI sites, and a third subtype where histology assessments done on patients do not categorize to either UC or CD. This subtype is defined as "Inflammatory Bowel Disease, type unclassified" or "Undetermined" (IBD-U) **(Seyedian, Nokhostin & Malamir, 2019).**

Signs &Symptoms of IBD

Signs and symptoms that are common to IBD include: diarrhea, fatigue, abdominal pain, cramping, blood in stool, reduced appetite, unintended weight loss and extra intestinal manifestations may involve joints (spondyloarthropathies, arthritis), eyes (uveitis, episcleritis), hepatobiliary pathways (primary sclerosing cholangitis), and skin. Dermatological manifestations include pyoderma gangrenosum, erythema nodosum, psoriasis and metastatic Crohn's disease, **(Garber & Regueiro,2019).**

Diagnosis of IBD

The most accurate way to diagnose IBD is with a procedure called colonscopy that used to see inside the colon and take small samples of tissues for examination .The diagnosis of CD or UC is based on a combination of clinical, biochemical, stool, endoscopic, cross-sectional imaging, and histological investigations (**Maaser etal .,2019).**

Diagnosing inflammatory bowel disease (IBD) requires a combination of clinical findings, inflammatory laboratory markers, imaging findings, and endoscopic biopsies. Hematologic findings include microcytic anemia, leukocytosis, and thrombocytosis. Inflammatory markers such as the erythrocyte sedimentation rate (ESR) and high-sensitivity C-reactive protein (hs-CRP) are commonly elevated**.(Lee etal., 2019).**

Complications:

Children and adolescents with inflammatory bowel disease (IBD) may experience unique complications, including growth impairment, delayed puberty, and psychosocial challenges. Growth failure affects approximately 3–10% of pediatric patients with ulcerative colitis (UC), with a higher incidence in males. Delayed puberty is frequently observed in adolescents with chronic inflammatory conditions and is particularly common in females with Crohn's disease (CD). This delay can negatively impact bone mineralization and may affect a child's quality of life, especially when they become aware that their physical development lags behind that of their peers **(Jin et al. ,2021)**

Treatment Principles for the inflammatory bowel disease:

Exclusive Enteral Nutrition (EEN):

A first-line treatment for the induction of remission for mild-to-moderate pediatric CD is exclusive enteral nutrition, which is the most established, evidence-based dietary therapy used in IBD.EEN therapy is defined as the use of a complete nutritional formula as sole dietary intake over 6–10 weeks. This has been shown to achieve clinical and biochemical remission in approximately 80% of pediatric CD patients with significantly improved endoscopic mucosal healing as compared to corticosteroids **(Yu, Chen &Chen 2019).**

Pharmacological treatment

Pharmacological intervention is important for IBD treatment. The medications mainly include amino salicylates, corticosteroids, immunomodulators, biologics, and oral small molecules .Amino salicylates for IBD mainly include traditional sulfasalazine (SASP) and other types of 5-aminosalicylic acid (5-ASA) drugs (**Shin etal .,2016).**

Biological therapy

Tumor necrosis factor (TNF) is a major pro-inflammatory cytokine produced by the innate immune system and is highly elevated in individuals with inflammatory bowel disease (IBD). TNF exists in both soluble and membrane-bound forms, exerting its effects by binding to TNF receptors. This interaction triggers the release of other pro-inflammatory cytokines from macrophages, promotes T-cell activation and proliferation, stimulates collagen production by fibroblasts, and increases the expression of endothelial adhesion molecules that aid leukocyte migration. Three anti-TNF monoclonal antibodies—infliximab, adalimumab, and certolizumab—are approved for treating IBD in patients who do not respond to conventional therapies. However, all three drugs carry a black box warning due to a roughly 6% risk of serious infections (such as tuberculosis, bacterial, and fungal infections), resulting from their suppression of the immune response to these pathogens.(**McQuaid, 2021).**

Surgical Treatment

Surgical intervention is considered in specific cases of inflammatory bowel disease when medical therapy is no longer effective or poses significant risks. In patients with severe ulcerative colitis (UC) who do not respond to intensive medical treatment, or in those with toxic megacolon unresponsive to medication, early surgical intervention is advised. Surgery may also be indicated when medical therapy is ineffective or when adverse drug effects significantly impair quality of life. For patients with localized ileocecal Crohn's disease (CD) who experience treatment failure, relapse after initial therapy, or prefer surgery over prolonged medication use, laparoscopic resection is recommended. Surgical treatment for perianal Crohn's fistulas is generally reserved for selected patients—especially those with complex or active disease—due to poor long-term outcomes, and should follow thorough consultation. **(Lamb etal .,2019)**

Out come

Improving patient care and outcomes in inflammatory bowel disease (IBD) has been greatly supported by advancements in diagnosis and treatment. The efficiency and accuracy of diagnosing IBD have improved with advanced diagnostic tools like endoscopy, imaging techniques, and biomarker testing. The development of biologics and small molecule inhibitors has revolutionized treatment, offering personalized and effective options. The concept of personalized medicine, based on genetic profiles, holds potential for further improving treatment. Evidence supports the continuation of most IBD medications with appropriate precautions. Optimizing outcomes relies on effective disease management with the right medications. As most medications have minimal risks for fetal development, it is important for individuals with IBD to understand the risks of stopping their medications and the significance of maintaining remission. Achieving disease remission before pregnancy is recommended to reduce risks for both the pregnant individual and the fetus **(Haagen et al., 2024).**

Nursing role

IBD nurses play a critical and holistic role in patient care, addressing not only clinical management but also emotional and practical aspects of living with inflammatory bowel disease. Their responsibilities range from therapeutic education and effective

communication to managing complex conditions such as fistulas and ostomies. They also guide patients through sensitive issues related to daily life, including diet, body image, and sexuality—all of which can influence the disease course. IBD often leads to psychological distress, stemming from loss of bowel control, fear of being a burden, concerns over unpleasant odors, and altered body image—particularly in patients with an ostomy. In these situations, IBD nurses offer compassionate, empathic support and help ensure patients have timely access to appropriate care and facilities. During episodes of incontinence, maintaining patient dignity through discreet and respectful care is essential (**Dibley etal., 2021).**

Communication is an integral part of the nursing role, with both verbal and nonverbal skills for meeting the needs of adolsecents with IBD, and formation of relationships and confidence. nurses must be empathic and active listeners with enough expertise to offer practical guidance on key areas of concern to patients. They may provide emotional support to patients by encouraging them to express their concerns .The IBD nurse's role in fistula management may include wound management, drug administration, sepsis containment, support, and bridging. Nurses play a role in ensuring patient comfort, protecting skin integrity, and managing complications. Nurses who identify problems with sexual function and sexuality must be able to support and report appropriate information.**(O'Toole , etal .,2018).**

Nursing care for patients with intestinal stomas is crucial to ensure their comfort, prevent complications, and enhance their overall well-being. The quality of life for patients with stomas can vary greatly, depending on how well they adapt to their new physical, emotional, and social circumstances. Nurses specializing in ostomy care play an essential role in offering guidance and support throughout this transition. Many peristomal skin complications can be prevented with careful skin care. Follow-up care is vital for patients with newly acquired intestinal ostomies to identify and treat any ostomy-related complications. Regular monitoring and prompt intervention are key to managing parastomal hernias effectively and improving the patient's quality of life **(Albulescu etal .,2024).**

The role of the IBD nurse in biological therapy is currently the most widespread. a nurse dedicated to the administration of biological drugs intravenously over the years acquires great specific experience and is able to manage possible side effects (management of the infusion rate, allergic reactions) Furthermore, by being in contact for a prolonged time (for months or years) with the patient during infusions, the nurse forms a solid bond with the patient and becomes the first operator to whom the patient refers his problems(**Guarini etal .,2017).**

The education of patients and their families is considered a key factor when managing IBD. The patient's capacity to identify symptoms, autonomy, and knowledge about the disease and its treatment is essential to achieve optimal care. The implementation of educational programs resulted in improved disease-specific knowledge, transition competence, and medication adherence. The adolescent patient must demonstrate some degree of autonomy and be able to schedule visits, take his/her treatments, follow an adequate diet and be able not only to follow recommendations, but also to be able to reach out with questions and/or concerns. Ideally, the patient should be able to attend clinic visits independently. **(Tan &Ong ,2020).**

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