

Modalities of Treatment of Irritable Bowel Syndrome (IBS): A Multidisciplinary Approach, Patient Education and Support Programs

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Abstract

Background: IBS is a common gastrointestinal disorder characterized by abdominal pain and irregular bowel habits, significantly impacting the quality of life for those affected. Diagnosis relies on clinical evaluations based on the Rome III criteria, which help distinguish IBS from similar conditions while addressing its varied symptoms, including pain, bloating, and unpredictable bowel movements. Treatment often requires a comprehensive approach that combines medication and lifestyle modifications to manage both physical and psychological elements of the disorder. **Objective:** An overview of the modalities of treatment for IBS. **Methods:** The PUBMED And Google Scholar Search Engines Were the Main Databases Used For The Search Process, With Articles Collected From 1989 To 2024. **Conclusion:** The overall success of IBS treatment techniques is fundamentally associated with the relationship between the doctor and the patient, reinforcing the critical importance of providing individualized care responsive to each patient's unique needs and situations.

Keywords: IBS, Life Style Modification, Psychological Therapy, Pediatric Treatment, Medical Treatment.

Introduction

Irritable bowel syndrome (IBS), is a widely recognized functional gastrointestinal condition that is primarily noted for abdominal discomfort and significant variations in bowel actions, both of which can profoundly affect the life quality of people confronting this condition. IBS diagnosis is primarily determined through clinical assessment, fundamentally depending on the Rome III criteria outlined in 2006; these criteria deliver a thorough and systematic structure essential for precisely identifying the syndrome while facilitating the exclusion of other similar gastrointestinal conditions with overlapping symptoms(1). Besides, the symptoms associated with IBS are known for their variety, potentially featuring abdominal pain that may feel like discomfort or cramps, noticeable bloating that could result in a sense of fullness or swelling, and unpredictable bowel patterns that might fluctuate from chronic diarrhea to lengthy constipation, as well as alternating instances of both scenarios, highlighting the intricate characteristics of this digestive disorder. Furthermore, it is vital to acknowledge that these indicators are often heightened or exacerbated by a multitude of contributing elements, which could entail adjustments in nutrition, and psychological tensions, alongside various infections, thus emphasizing the intricate and multifaceted relationship between both physical and mental aspects that shape the overall experience of the affliction in those affected.

A robust insight into the factors and pathways involved in IBS is critically important, as it encompasses a detailed inquiry into the various underlying reasons and developmental routes that define this multifactorial condition. Despite the ongoing ambiguity surrounding the underlying mechanisms of the condition, it is broadly acknowledged in academic circles that the mismanagement of intestinal movement, sensory disruptions, and central nervous system

interactions are thought to be of great importance and play key roles in the appearance of the various symptoms tied to this syndrome. Also, Regarding IBS, the segmentation into diverse categories is primarily dictated by the principal traits of bowel behavior—notably, the variations between IBS with diarrhea (IBS-D), IBS with constipation (IBS-C), and the mixed variant (IBS-M)—which importantly facilitates the adaptation and enhancement of treatment methods that correspond with the distinct health situations of the patients. The task of discerning various health conditions plays a vital role in the holistic care of IBS, as it involves the meticulous differentiation of this syndrome from numerous other gastrointestinal ailments that might show overlapping symptoms, including but not limited to inflammatory bowel disease and colorectal cancer, which are both critical conditions that deserve extensive scrutiny. This meticulous diagnostic process is critically important to facilitate the implementation of suitable management strategies and to systematically exclude the possibility of more severe underlying health issues that could complicate the clinical picture. The strategies utilized in IBS treatment are intricate and frequently demand a combined approach that adeptly fuses pharmacological solutions for symptom control with multiple behavioral techniques that deal with the psychological and lifestyle concerns tied to the disorder(2).

IBS Risk Factors

IBS, which features a complicated gastrointestinal aspect, is predominantly determined by a range of risk factors that may differ widely among people. Understanding these various risk factors thoroughly is crucial not just for effectively preventing the syndrome but also for managing and treating the condition successfully over time. A considerable element that impacts the pathogenesis of IBS is genetic predisposition, which has been verified to contribute significantly to the emergence and progression of this issue. Individuals possessing a family history of this unique gastrointestinal ailment exhibit a higher probability of developing IBS, thus highlighting a hereditary aspect that could considerably affect the initiation and progression of the illness in predisposed persons (3). In addition, Experiences during childhood are key in influencing the risk and chances of a person developing IBS as they age, because such formative moments can lead to significant and lasting effects on gastrointestinal health. Notably, the influence of early life stressors and traumatic occurrences can intricately mold a person's susceptibility and inclination to IBS, thereby implying that the emotional and psychological aspects rooted in childhood could have persistent ramifications on the functionality and health of the gastrointestinal system across their lifetime. Moreover, this complicated relationship becomes increasingly difficult due to the presence of inflammation, which has been scientifically associated with the exacerbation and decline of IBS symptoms, hinting that inflammatory activities might be a major factor in the convoluted pathophysiology of this complex syndrome.

Moreover, Behavioral influences, notably emphasizing the constructs of tension and sorrow, are considered crucial risk determinants for the appearance and intensification of IBS. The presence of anxiety has the potential to significantly amplify the subjective perception of gastrointestinal discomfort, while concurrently, the experience of depression may exert an influence on the overall severity and intensity of the associated symptoms. The sophisticated connection between these psychosocial variables and the basic physiological features of IBS accentuates the significant value of embracing a complete and detailed method of care that involves both emotional and physical wellness. Diet represents another significant risk factor in this context, as the selection of particular dietary choices can either trigger or exacerbate the symptoms associated with IBS. People may find that eating certain foods significantly exacerbates their condition, which underscores the essential need for a customized and specialized approach to dietary management that considers personal sensitivities and responses. Additionally, it has been widely documented through countless research projects that various sleep disorders can certainly act as a key contributor to the worsening of gastrointestinal ailments, suggesting that inadequate sleep quality could have a notable link to the overall severity and intensity of symptoms encountered by those with IBS(4). Additionally, It is imperative to grasp how aspects like age and gender affect the onset of IBS, reinforcing the importance of factoring in these elements when investigating this diverse ailment. Statistics reveal that women experience IBS diagnoses at a rate roughly double that of their male counterparts, pointing to a notable gender difference in this digestive issue. Also, it has been identified that younger individuals, specifically those aged below 50, reveal a heightened tendency to show IBS symptoms when juxtaposed with older populations, indicating that various age-dependent dynamics might indeed affect the development of this syndrome(5).

IBS Lifestyle Modifications

Managing different health conditions often calls for a well-rounded and intricate method, incorporating numerous lifestyle alterations that can profoundly affect overall wellness. Recent empirical research has brought to light several critical domains in which specific alterations can yield substantial improvements in the manifestation of symptoms associated with these conditions. Healthcare experts are progressively acknowledging dietary therapy as a

fundamental and strategic measure for the successful handling of Symptoms, accentuating its crucial function in medical practices. This distinct technique underscores the significance of dietary alterations, notably enhancing fiber consumption, which has been validated to help mitigate several symptoms seen in IBS patients. More specifically, increasing dietary fiber along with a rise in the intake of fruits and vegetables can greatly influence improved gastrointestinal health and digestive functionality(6). In conjunction with the necessary dietary modifications that are often recommended for individuals suffering from gastrointestinal disorders, it is of paramount importance to address lifestyle factors, particularly those relating to stress management, which play a critical role in the overall health of affected individuals. Countless people identified with Instrumently share that they endure amplified stress levels and a considerable degradation in sleep quality, both of which can worsen the harshness and recurrence of their gastrointestinal issues. Utilizing impactful approaches for stress reduction, such as mindfulness meditation or cognitive behavioral therapy, can notably diminish these negative consequences and concurrently boost the overall wellness of individuals involved. Moreover, the establishment of regularized meal patterns is an essential component of lifestyle modification, particularly because many patients diagnosed with IBS tend to consume their meals irregularly, a habit that can severely disrupt the intricate processes of digestion. Keeping to a timetable of regular meals may help individuals find a balance in gut function, possibly resulting in fewer symptom flare-ups. In addition, a vital component of lifestyle adjustments for persons affected by IBS pertains to the elevation of sleep quality, as a lack of sufficient sleep is significantly found in this community, and by refining sleep hygiene methods, individuals may realize improved symptom management. Furthermore, one must acknowledge that resolving matters connected to appetite carries great weight, as a large portion of those affected by IB often indicate a lesser desire to eat or a marked distaste for foods, including a variety of meats. Encouraging the adoption of a well-balanced dietary regimen that not only incorporates foods that the individual prefers but also facilitates the gradual introduction of novel culinary options can play a crucial role in enhancing dietary adherence while simultaneously improving overall nutritional intake(7).

IBS Treatment Modalities

A holistic and varied plan is essential for the effective treatment of IBS, integrating multiple lifestyle changes, dietary adjustments, medication, and therapeutic practices, all focused on alleviating the wide array of symptoms that patients with this affliction endure. A fundamental technique for IBS management is the thoughtful execution of vital lifestyle modifications and dietary changes, designed to boost the patient's complete health. These particular changes possess the potential to significantly alleviate the symptoms associated with IBS by facilitating the identification and avoidance of specific dietary and lifestyle triggers that can exacerbate the condition(8). An often recognized and widely practiced nutritional method that has gained notable interest among both health experts and individuals in search of respite from digestive discomfort is the Low FODMAP diet, a meal plan specifically crafted to restrict the consumption of certain fermentable carbs that research has shown can potentially worsen symptoms related to IBS. Moreover, the incorporation of dietary supplements, particularly IBS Activecrafted with vital elements such as L-tryptophan, inulin, and probiotics has been supported by scientific evidence to facilitate remarkable progress in the control of diverse gastrointestinal problems, notably the reduction of stomach pain and the stabilization of bowel functions(9). Nevertheless, Medication is fundamental and critical in the oversight and treatment of IBS, particularly when the signs of the condition are both significantly strong and persistent. The collection of drugs employed in this situation might include serotonergic agents, which have gained approval from the Food and Drug Administration (FDA) and are particularly crafted to tackle the fundamental pathophysiological processes linked to IBS, thus delivering extensive relief from various symptoms by enhancing gastrointestinal motility and overall functionality(8). Other pharmacologic alternatives that may be considered in clinical practice encompass a variety of antispasmodic agents, such as Hyoscine butylbromide, Mebeverine, and Dicyclomine, all of which possess the therapeutic ability to alleviate muscle spasms and mitigate discomfort experienced within the gastrointestinal tract. Moreover, the application of probiotics has progressively captured considerable scholarly focus within the research community because of their encouraging capability to boost digestive wellness and ease the uncomfortable signs related to IBS , a reality that is strongly backed by a wealth of anecdotal insights and user experiences that have come to light lately(10). Also, A range of therapeutic methods, notably physical therapy among others, can significantly benefit individuals dealing with pelvic floor dysfunction, leading to better treatment outcomes. Emphasizing a unified and thorough methodology in patient care is vital, particularly concerning IBS , as the administration of this condition is often found to be surprisingly arduous due to the elusive and inadequately defined nature of its triggers, in addition to the highly variable clinical path that patients may traverse over time(8).

Pharmacological Treatments

Strategies focused on care that integrate drug-related methods for tackling IBS are developed with attention and adaptation to include the vital factors and health signs connected to the specific variations of this problem, especially

highlighting diarrhea-predominant IBS (usually recognized as IBS-D) and constipation-predominant IBS (generally called IBS-C)(10). In addition, Within the framework of clinical strategies for tackling irritable bowel syndrome with Diarrhea (IBS-D), a range of pharmaceutical agents has achieved regulatory sanction for therapeutic purposes, where eluxadoline and rifaximin notably emerge as important remedies. Eluxadoline operates as a mixed mu-opioid receptor agonist and is intended for managing IBS-D, having undergone thorough trials in clinical environments, demonstrating its efficacy in significantly alleviating abdominal pain in patients while also improving stool consistency, thus enhancing overall gastrointestinal health(11). Besides, Rifaximin functions as a multi-purpose antibiotic that is often applied to address several digestive challenges and has indicated considerable promise in lessening the unease linked to IBS , particularly in those whose foremost symptom is diarrhea(10). The previously noted therapeutic strategies considerably widen the selection of treatment choices that can be accessed by individuals diagnosed with Irritable Bowel Syndrome with Diarrhea, a condition that is often linked to many troubling symptoms, including but not limited to a pressing sense of rectal urgency and an observable rise in bowel movement occurrences(11).

Nevertheless, differing from other gastrointestinal ailments, the strategy for managing irritable bowel syndrome with Constipation (IBS-C) usually incorporates the use of targeted pharmaceutical treatments designed to encourage bowel activity and elevate fluid production in the digestive tract, thereby improving overall gut performance. Among the plethora of pharmacological agents available for this therapeutic endeavor, Linaclotide, commonly marketed under the brand name Linzess, and lubiprostone emerge as two significantly important compounds that are frequently employed to achieve these clinical objectives. The mechanism of action of Linaclotide involves a sophisticated enhancement of fluid secretion in the intestines, coupled with an acceleration of intestinal transit time, which collectively contribute to the alleviation of constipation symptoms that are characteristic of this particular syndrome. In the same way, lubiprostone boosts the release of intestinal fluid, which ultimately helps in easing the symptoms mainly tied to constipation, thereby improving the quality for individuals experiencing this ailment(10). To add, the medicinal agents classified as 5-HT₄ agonists, which involve compounds like prucalopride and tegaserod, have demonstrated substantial effectiveness in the control of irritable bowel syndrome with constipation (IBS-C), mainly due to their potential to significantly improve gastrointestinal motility and simultaneously decrease colon sensitivity. Still, the endeavor to find a treatment that can be regarded as universally effective for the wide-ranging symptoms of irritable bowel syndrome endures, given that there is a lack of any singular drug that has definitively shown effectiveness throughout the complete array of associated symptoms linked to this complicated disorder(12). However, Medications like dicyclomine and hyoscine butylbromide, which fall under the category of anticholinergics, are often utilized in medical practice to alleviate the various symptoms linked to IBS by considerably diminishing the overactivity of smooth muscle and offering significant comfort from the frequently distressing abdominal pains that individuals endure. The utilization of these pharmacological agents can prove to be especially advantageous for individuals who are particularly susceptible to discomfort that is provoked by the consumption of meals, thereby enhancing their overall quality of life. It is crucial to recognize that even though these therapeutic choices are accessible in the field of gastrointestinal care, the existing evidence backing their overall effectiveness is significantly sparse, highlighting an urgent requirement for the execution of more stringently structured and methodologically robust research that can effectively guide clinical treatment choices in a thorough and impactful way(10).

IBS Psychological Therapies

IBS embodies a complex and layered health disorder characterized by numerous gut-related symptoms, often calling for a wide-ranging and intricate treatment approach, with significant attention given to the integration of psychological care that supports the emotional and mental wellness of patients. In the realm of treatment methodologies, Cognitive Behavioral Therapy (CBT) has surfaced as an exceptionally effective technique, supported by studies that validate its advantages in alleviating symptoms and enhancing everyday functionality for individuals with IBS. This particular form of therapy is fundamentally centered on the modification and restructuring of maladaptive cognitive processes and negative thought patterns, as well as the distorted perceptions that are often associated with the experience of IBS, thereby highlighting its critical importance in achieving effective and sustained management of this complex syndrome(13). As well as the extensively validated effectiveness of Cognitive Behavioral Therapy (CBT), a diverse set of other psychological and behavioral therapeutic approaches have showcased substantial potential in alleviating the symptoms associated with numerous psychological ailments. Research indicates that a notable segment of the population with IBS, a functional gut disorder, often deals with several related psychological challenges, like panic disorder, which can greatly intensify their gut-related symptoms. As a result, dealing with these intricate psychological factors is not just helpful but truly vital for uplifting the overall life quality of those enduring the harsh consequences of IBS, thus encouraging a more

inclusive method of treatment and oversight(14). Additionally, the innovative approach of Gut-Directed Hypnotherapy (GDH), a category within hypnotherapy, has indicated that it is a notably advantageous and powerful psychological tool for individuals facing IBS, a condition that regularly introduces significant hurdles for both sufferers and the healthcare infrastructure. GDH is meticulously designed to specifically address and target the intricate and complex relationship that exists between the brain and the gastrointestinal system, with the primary objective of improving overall gut functionality and effectively mitigating the various distressing symptoms that are commonly associated with this syndrome.

An array of strict and systematically sound research efforts has revealed that hypnotherapy can exceed the efficacy of typical control therapies, yet it is significant to point out that the conclusive overall effectiveness of multiple psychological treatment modalities for IBS is yet to be firmly determined, largely due to the methodological limitations and challenges that are inherent in the available research on this issue(15). Moreover, Neuro-Linguistic Programming (NLP), acknowledged for its progressive and original treatment techniques, has been adeptly woven into the extensive array of tactics used for handling IBS, a multifaceted gastrointestinal challenge with numerous manifestations. This sophisticated approach significantly enhances the overall effectiveness of traditional therapeutic modalities by meticulously addressing and mitigating the psychological conflicts and underlying emotional disturbances that may contribute to the manifestation and exacerbation of this debilitating condition. Additionally, this comprehensive therapeutic structure is especially useful at all stages of IBS, facilitating the adjustments and customization of interventions to suit the individual psychological requirements and unique personality attributes of each patient, thereby maximizing treatment effectiveness and creating a more bespoke healing journey(2). Besides, Alternative therapeutic options, embracing strategies like Acceptance and Commitment Therapy (ACT) together with Mindfulness Therapy (MFT), manifestly exert a vital and varied effect on the complete framework for treating IBS. Acceptance and Commitment Therapy (ACT) inspires patients to confront their internal thoughts and emotions, while concurrently advocating for a commitment to effecting positive behavioral modifications, which can be immensely beneficial in the effective handling of the various symptoms connected to this condition. Similarly, Mindfulness Therapy (MFT) highlights the importance of being aware in the present moment, aiding individuals in dealing with anxiety and boosting their general mental wellness and health(16).

IBS pediatric Treatments

IBS among young patients introduces numerous specific hurdles that demand a detailed and diversified method for treatment strategies that can adequately confront the challenges linked with this ailment. A recent empirical investigation that involved a cohort of 203 pediatric subjects, ranging in age from 4 to 18 years, has demonstrated the significant efficacy and tolerability of a specific probiotic intervention known as Symbioflor 2, which is composed of both viable cells and autolysate derived from *Escherichia coli*. This innovative therapeutic approach was found to be particularly advantageous for children experiencing a variety of IBS-related symptoms, which prominently include manifestations such as abdominal pain and alterations in bowel habits; notably, a substantial majority of the patient population exhibited a favorable response to the probiotic therapy administered (17). Also, Probiotics, particularly those found in the well-known product Symbioflor 2, are increasingly acknowledged by scientists for their vital contribution to restoring and sustaining the fragile equilibrium of gut bacteria, a process proven to effectively ease various symptoms linked to IBS. A considerable range of academic literature shows that administering probiotics can ease numerous IBS symptoms, consequently identifying them as a precious treatment avenue for the youth, who typically experience unique hurdles in managing gut ailments. Despite this, the complicated and diverse aspects of IBS symptoms typically demand the introduction of extra dietary modifications, like committing to the Low FODMAP diet, a thoughtfully crafted nutritional method that aims to limit the ingestion of fermentable carbohydrates, known to worsen and amplify the expression of IBS symptoms in vulnerable individuals(10). Moreover, Complementing the employment of probiotics and the adjustment of diet aimed at enhancing gut health, it deserves emphasis that pharmaceutical solutions are also feasible alternatives that can be regarded in the oversight of specific gastrointestinal challenges. Commonly, medications such as Mebeverine and Dicyclomine are administered in healthcare to relieve symptoms related to IBS by relaxing smooth muscles in the gut and alleviating bowel spasms, which helps to boost patient comfort. These pharmacological interventions can be particularly advantageous for pediatric patients who exhibit insufficient responses to dietary adjustments or the administration of probiotics, thus necessitating alternative therapeutic approaches. For those children diagnosed with IBS-C, pharmacological treatments such as Amitiza and Linzess have proven beneficial in easing the uncomfortable symptoms tied to this disorder. Amitiza functions by increasing the frequency of bowel movements, whereas Linzess operates by promoting the secretion of fluids within the intestines, thereby providing significant relief from the discomfort of constipation that these children may experience(11). Additionally, when it comes to managing IBS, one must exercise extreme caution in children, despite the numerous treatment modalities available, because the

safety profiles and therapeutic efficacy of various drug treatments for this specific age group remain unverified by thorough clinical research. On top of that, pediatric gastroenterologists have referred to and accepted the application of immunosuppressive medications like 6-mercaptopurine and azathioprine for addressing inflammatory bowel disease (IBD), yet it is necessary to acknowledge that their use is somewhat limited in IBS care, which calls for an immediate effort for more extensive and comprehensive research to reveal their potential effects on this subject(18).

Patient Education and Support Programs

The effective oversight of this condition calls for the adoption of various management strategies, which must integrate thorough patient education efforts alongside the dedicated involvement of nursing staff during the complete care journey. The emphasis on educating patients is vital in the mission to support individuals with IBS in effectively navigating and mitigating their symptoms, thus enriching their life experience. To achieve these effective management strategies, it is essential to encompass a multitude of diverse educational methods, which may include verbal instruction, the distribution of informative written materials, and the utilization of digital resources, all of which collectively serve to enhance patients' understanding of their medical condition, the necessary dietary modifications they should consider, and the various techniques available for effective symptom management(19). Also, Nurses occupy a fundamentally crucial position in the dissemination of this essential educational information, given that they frequently serve as the initial and most consistent point of interaction for patients navigating the complex healthcare system. In their professional capacity, they meticulously evaluate the unique and specific needs of each patient, subsequently creating customized and comprehensive care plans that address those identified requirements, while also playing a significant role in facilitating effective and meaningful communication between patients and a diverse array of healthcare providers, thereby ensuring that patients are afforded the necessary and appropriate support they require for optimal health outcomes(20). Nevertheless, The role of diet management is vital in the overall care plan for individuals experiencing IBS, with particular dietary patterns like the low FODMAP diet revealing beneficial impacts on symptom relief and gastrointestinal wellness.

In this context, registered nurses play an instrumental role by assisting patients in the meticulous process of identifying specific dietary triggers that exacerbate their condition, as well as in the formulation and implementation of effective meal planning strategies, which are critically essential for achieving significant relief from the debilitating symptoms associated with this gastrointestinal disorder(21). Additionally, the elaborate and complex realm of medication oversight appears as yet another key factor in the all-encompassing care delivered by nursing experts, where nurses fulfill the crucial obligation of sharing insights with patients about the wide selection of drugs available, including antispasmodics used to ease muscle contractions and antidepressants prescribed to lessen depressive symptoms, while also clarifying the concrete therapeutic intentions, the countless benefits associated with these treatments, as well as the possible adverse reactions that may ensue, all with the primary aim of promoting adherence to prescribed courses and ensuring the safety of the patients they oversee. Yet, the complex mental factors tied to IBS are critically important and must be acknowledged, particularly given that emotional conditions such as stress and anxiety often escalate and aggravate the symptoms of this digestive disorder. Consequently, it is essential for nursing professionals to attain a thorough comprehension of these psychological determinants and to actively recommend suitable pathways for psychological intervention and support, which may include a range of effective coping mechanisms, such as mindfulness techniques and various approaches aimed at stress reduction, ultimately fostering the improvement of patients' overall psychological and physical health.

Conclusion

The overall success of IBS treatment techniques is fundamentally associated with the relationship between the doctor and the patient, reinforcing the critical importance of providing individualized care responsive to each patient's unique needs and situations. Different treatment protocols might incorporate multiple forms of intervention like modifications in eating habits intended to control symptoms, methods for handling stress that are meant to mitigate psychological strain, and specific therapies that address and ease distinct symptoms related to IBS. Furthermore, Dynamic Psychotherapy and group therapy represent additional therapeutic avenues that can substantially support individuals suffering from IBS, as Dynamic Psychotherapy provides a unique opportunity for individuals to delve deeply into the emotional conflicts that may significantly influence their physical symptoms. Simultaneously, group therapy fosters an environment where patients can freely exchange their personal stories, thoughts, and methods for coping, thus enhancing their healing process and cultivating a communal bond among individuals encountering analogous difficulties. Finally, it is worth noting that increasing the consumption of vegetables constitutes another advantageous modification to dietary habits, given that numerous patients diagnosed with IBS often express concerns regarding the perceived inadequacy of their vegetable intake. The overall success of these treatment techniques is fundamentally associated with the relationship developed between the doctor and the

patient, thereby reinforcing the critical importance of providing individualized care that is responsive to each patient's unique needs and situations.

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Conflict of Interest

The authors declare they don't have any conflict of interest in the form of finance or other things.

Author contributions

Data gathering, text editing, review, and the creation of tables and figures were all completed by the co-authors. The first author created the initial draft of the manuscript, the supervisor cross-reviewed it, and all authors approved its submission to the journal for publication.

Ethical Approval

Not Applicable

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