IMPACTO CIENTÍFICO EDITORA

THE INFLUENCE OF GASTROINTESTINAL MICROBIOTA DYSREGULATION ON ANXIETY AND DEPRESSION AND THE CORRELATION WITH INFLAMMATORY BOWEL DISEASES: MICROBIOTA-BRAIN-GUT AXIS

A INFLUÊNCIA DA DESREGULAÇÃO DA MICROBIOTA GASTROINTESTINAL NA ANSIEDADE E DEPRESSÃO E A CORRELAÇÃO COM DOENÇAS INFLAMATÓRIAS INTESTINAIS: EIXO MICROBIOTA-CÉREBRO-INTESTINO

LA INFLUENCIA DE LA DISREGULACIÓN DE LA MICROBIOTA GASTROINTESTINAL EN LA ANSIEDAD Y LA DEPRESIÓN Y LA CORRELACIÓN CON LAS ENFERMEDADES INFLAMATORIAS INTESTINALES: EJE MICROBIOTA-CEREBRO-INTESTINO

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ABSTRACT

The Gastrointestinal Tract (GIT) has an important role in the brain-intestine axis and some factors can influence the dysregulation of its microbiota. Dysbiosis consists of an imbalance in its composition, which can alter immunological responses, causing inflammation and compromising immune functions. Many diseases are associated with this change in the microbiome, such as neurological and mood disorders and Inflammatory Bowel Diseases (IBD). Furthermore, the relationship between the gastrointestinal microbiota and the Central Nervous System (CNS) is relevant in modulating the brain-intestine axis, being crucial in balancing body homeostasis. In this context, the consumption of probiotics is of great importance in regulating the microbiome and immunity. The present study constituted a research that was carried out through a bibliographical survey using an integrative review method, with evidence from the scientific literature. In this research, we managed to find data on the consequences of dysbiosis in psychological disorders and intestinal inflammation, and the use of probiotics with positive and negative results. It was possible to identify that there is a relationship between dysregulation of the gastrointestinal microbiota with anxiety and depression, and that it correlates with IBD. In summary, it was conceivable that dysbiosis has a great impact on the development of these disorders, altering CNS homeostasis and inducing the development of inflammatory pathological processes, thus relating the microbiota-brain- intestine axis with IBD. Research also provides promising results for probiotics in regulating the gastrointestinal microbiota and treating anxiety and depression, however it is necessary to consider carrying out more studies and research to be better established.

Keywords: Gastrointestinal Tract. Dysbiosis. Probiotics. Intestinal Inflammation.

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RESUMO

O Trato Gastrointestinal (TGI) tem um papel importante no eixo cérebro-intestino e alguns fatores podem influenciar na desregulação da sua microbiota. A disbiose consiste em um desequilíbrio na composição da mesma, que pode alterar as respostas imunológicas, causando inflamações e comprometendo suas funções imunes, muitas doenças são associadas a esta alteração do microbioma, como, distúrbios neurológicos e do humor e Doenças Inflamatórias Intestinais (DII). Além disto, a relação da microbiota gastrointestinal com o Sistema Nervoso Central (SNC) mostra relevância na modulação do eixo cérebro-intestino, sendo crucial no equilíbrio da homeostase corporal. Neste contexto, é de grande importância o consumo dos probióticos na regulação do microbioma e da imunidade. O presente estudo configurou uma pesquisa que foi realizada por meio de levantamento bibliográfico em método de revisão integrativa, com evidências da literatura científica. Nesta pesquisa, conseguiu-se evidenciar dados sobre consequências da disbiose nos transtornos psicológicos e na inflamação intestinal, e o uso dos probióticos com resultados positivos e negativos. Foi possível identificar que existe relação entre a desregulação da microbiota gastrointestinal com a ansiedade e depressão, e que correlaciona com as DII, em síntese, foi concebível que a disbiose tem grande impacto no desenvolvimento destes transtornos, alterando a homeostase do SNC e induzindo ao desenvolvimento de processos patológicos inflamatórios, relacionando então, o eixo microbiota-cérebro-intestino com as DIIs. A pesquisa também proporciona resultados promissores dos probióticos na regulação da microbiota gastrointestinal e tratamento para ansiedade e depressão, porém é necessário considerar a realização de mais estudos e pesquisas para ser melhor estabelecido.

Palavras-chave: Trato Gastrointestinal. Disbiose. Probióticos. Inflamação Intestinal.

RESUMEN

El tracto gastrointestinal (TGI) desempeña un papel importante en el eje cerebro-intestino, y algunos factores pueden influir en la desregulación de su microbiota. La disbiosis consiste en un desequilibrio en su composición, que puede alterar la respuesta inmunitaria, causando inflamación y comprometiendo las funciones inmunitarias. Muchas enfermedades se asocian con esta alteración del microbioma, como los trastornos neurológicos y del estado de ánimo, y la enfermedad inflamatoria intestinal (EII). Además, la relación entre la microbiota gastrointestinal y el sistema nervioso central (SNC) muestra relevancia en la modulación del eje cerebro-intestino, siendo crucial para equilibrar la homeostasis corporal. En este contexto, el consumo de probióticos es fundamental para la regulación del microbioma y la inmunidad. Este estudio se realizó mediante una revisión bibliográfica con un método de revisión integrativa, utilizando evidencia de la literatura científica. Esta investigación reveló datos sobre las consecuencias de la disbiosis en los trastornos psicológicos y la inflamación intestinal, y los efectos positivos y negativos del uso de probióticos. Se identificó una relación entre la desregulación de la microbiota gastrointestinal y la ansiedad y la depresión, así como una correlación con la EII. En resumen, es posible que la disbiosis tenga un impacto significativo en el desarrollo de estos trastornos, alterando la homeostasis del SNC e induciendo el desarrollo de procesos patológicos inflamatorios, vinculando así el eje microbiota-cerebro-intestino con la EII. La investigación también ofrece resultados prometedores sobre los probióticos en la regulación de la microbiota gastrointestinal y el tratamiento de la ansiedad y la depresión, pero se requieren más estudios e investigaciones para determinarlo con mayor precisión.

Palabras clave: Tracto Gastrointestinal. Disbiosis. Probióticos. Inflamación Intestinal.

1 INTRODUCTION

The gastrointestinal microbiota plays an important role in the brain-gut axis and some factors can influence its dysregulation, such as a high level of stress related to eating habits, genetic and environmental factors, causing the appearance of pathological and inflammatory processes such as Irritable Bowel Syndrome (IBS), Crohn's Disease (CD), in addition to psychological disorders such as anxiety and depression, This is because our body translates stress signals into the release of a wide range of neurotransmitters, impacting our gastrointestinal microbiota. (Milk et al., 2020; Foster et al., 2013; Qin et al., 2014; Bravo et al., 2012).

Gastrointestinal microbiota is defined as a set of microorganisms that inhabit our digestive tract, composed of several bacteria, which will perform different functions, such as nutrient absorption, protection against diseases, and changes in the immune and neurological system (Moraes et al., 2014). The anaerobic bacteria that stand out in the integration of the gastrointestinal tract are the bacteroid genera: Bifidobacterium, Eubacterium, Clostridium, Peptococcus, Peptostreptococcus, Ruminococcus and Fusobacterium. The alteration of the gastrointestinal microbiota can happen due to several internal and external factors that modulate its composition, such as the indiscriminate use of antibiotics, poor digestion, use of laxatives, consumption of raw and poorly washed foods, alcoholism and direct exposure to environmental toxins, which can generate physiological and mental consequences in a human being. The composition of the microbiota will determine whether the influence will be negative, causing dysfunctions, or positive, promoting health for the body (Paixão et al., 2016).

Dysbiosis consists of an imbalance in this composition, which can alter immune responses, causing inflammation and compromising their immune functions (Biasibetti, 2022). Many diseases are associated with this alteration of the microbiome, such as neurological and mood disorders, gastrointestinal inflammatory diseases, diabetes, obesity and others. It should be noted that the condition can be caused by some diseases and vice versa, and is also the cause of other diseases. Dysbiosis can lead to changes in immune responses, intestinal permeability and motility, and modification in metabolism, causing inflammation (Pantoja et al., 2019).

Inflammatory Bowel Diseases (IBD) are related to an abnormal immune response of the microbiota, leading to a chronic inflammatory process. DC is

Classified as one of these inflammatory processes, and can affect any part of the digestive tract, but mainly affects the small intestine and colon, the cause of the disease is multifactorial, but the intestinal microbiota has a great influence on its occurrence, and other inflammatory pathological processes (Papacosta et al., 2017). The clinical picture of IBD includes chronic diarrhea, abdominal pain, fever, and rectal bleeding (Zaltman, 2007).

In addition, the relationship between the gastrointestinal microbiota and the Central Nervous System (CNS) is relevant in the modulation of the brain-gut axis, being crucial in the balance of body homeostasis (Costa et al., 2020). Through this axis, the existence of a signal exchange system between the gut and the brain by the Enteric Nervous System (ENS) was proven, as a "two-way street" with a direct connection. This type of connection influences the regulation of stress responses, later bringing consequences associated with anxiety and depression (Valiengo et al., 2022).

In this context, the consumption of probiotics in the regulation of the microbiome and immunity is of great importance, facilitating the absorption of nutrients and emerging as an alternative solution, with the aim of treating and improving psychological symptoms related to stress, bringing benefits to mental health and preventing inflammatory diseases of the gastrointestinal tract (GIT) (Minayo et al., 2021).

The aim of this study was based on defining the influence of microbiota imbalance as an important factor in an individual's health, recognizing the physiological and mental impacts caused, relating the process of dysbiosis with the cause of inflammatory diseases, correlating the alteration of the microbiota with the impact on the brain-gut axis in psychological conditions such as anxiety and depression, and to highlight the use of probiotics as an adjuvant for the regulation and treatment of dysbiosis.

2 METHODOLOGY

The present study was a research that was carried out through a bibliographic survey in an integrative review method, with evidence from the scientific literature, which provides the synthesis of knowledge and the incorporation of the applicability of the results of significant studies (Souza et al., 2010).

For the elaboration of this review, articles with specific subjects related to the brain-gut axis and its interactions with inflammatory and neurological processes were selected. The publication period of the studies used was a maximum of 10 years (2013-2023) with the following descriptors validated in DeCS – Health Sciences Descriptors:

Gastrointestinal microbiota, gut inflammation, dysbiosis, brain-gut axis and probiotics.

In this context, the articles were chosen according to searches in the online databases Scielo (Scientific Electronic Library Online), PubMed (National Library of Medicine), and MedLine (MS Virtual Health Library), from March to November 2023, bringing relevant information to the topic, being essential in the construction of this article. Articles published outside the stipulated period and that were not related to the chosen theme were excluded.

3 FINDINGS

In this research, a total of 104 publications were found, meeting the criteria established in methodology, such as descriptors and publication time of a maximum of 10 years. Upon further reading, 93 articles were discarded, and the search ended with 11 articles included, 3 from the PubMed database, 4 from Scielo and 4 from MedLine.

Of the 11 articles selected on the subject addressed, it was observed in this integrative review that 1 of the selected articles is from the year 2014; 1 of the year 2015; 1 of the year 2016; 1 of the year 2017; 1 of the year 2018; 1 of the year 2019; 3 articles from the year 2020; 1 from the year 2021 and finally, 1 article used from the year 2023. In 2022, no article was selected for this study.

Among the articles eligible for this review, in relation to their specific approach to the established topic, five discussed intestinal inflammation, four articles discussed the microbiota of the gastrointestinal tract and its composition, seven pointed out the importance of probiotics, three articles addressed dysbiosis, and six related the gut microbiota with the brain-gut axis.

The main points evaluated for the choice of articles were: The composition of the microbiota and its relationship with diseases; The factors for the occurrence of dysbiosis and its influence on the cause of diseases; The use of probiotics as an alternative treatment option and its benefits; Intestinal inflammation as a response to this dysregulation, as well as inflammatory bowel diseases and the relationship between the brain and the intestine in psychological disorders.

The following table (Table 1) was prepared for a better understanding of the articles included in this research and presents the distribution of each of them in which they were part of the study. The data were presented in a table containing the following details: author and year, title of the article, study design, objective of the study and main results.

Table 1: Results related to the studies selected for the integrative review on the topic of gastrointestinal microbiota and its correlation with anxiety and depression, as well as inflammatory diseases.

Table 1

Results related to the studies selected for the integrative review on the topic of gastrointestinal microbiota and its correlation with anxiety and depression, as well as inflammatory diseases

Author and Year	Article Title	Type of study	Objective of the study	Main findings
Souzedo, *et al*. 2020	The gut-brain axis and depressive symptoms: a systematic review of randomized clinical trials with probiotics	Systematic review of clinical trials	The objective of this study was to analyze the effects of consumption from probiotics on depressive symptoms and major depression.	The results between studies are controversial and indicate that the causal relationship between probiotic consumption and relief of depressive symptoms has not yet been established.
Vandenplas, *et al*. 2015	Probiotics: Updated information	Article review	The authors aimed to analyze the latest literature on probiotics, definitions and to clinical benefits with an emphasis on children.	Despite from the As regulation increases, stricter definitions are still needed. Evidence of clinical benefits are increasing, although still absent in several areas. Inappropriate use and use of unvalidated products constitutes possible disadvantages.
Nishida, *et al.* 2017	Gut microbiota in the pathogenesis of inflammatory bowel disease	Article clinical review	This review focuses on the physiological function of the gut microbiota and the association between thegut microbiota and pathogenesis in IBD.	Recent advances in technology from Sequencing Next generation identified changes in the composition and function of the gut microbiota, known as dysbiosis, in IBD. Clinical and experimental data suggest that dysbiosis may play a key role in the pathogenesis of IBD.
Alarcón, *et al*. 2016	The role of the gut microbiota in regulating the immune response	Article review	The objective of this study was to explain the composition of the microbiota and its function in the immune system.	The importance of the gut microbiota in regulating the system immune Lies mainly in homeostasis – or equilibrium positive. Thus, many diseases are a consequence of deficient

				interactions or loss of balance.
Minayo, *et al*. 2021	Systematic review on the effects of probiotics	Article systematic review	To know and analyze the effects of Probiotics in depression, anxiety and stress psychological.	All clinical trials consisted of in the administration of bacterial species diners, which can be with the use of only one strain or mixture from Probiotic strains. Healthy The following genera of the microorganisms administered: Lactobacilli (L.), Bifidobacterias (B.), Streptococcus (S.) and/or Lactococcus. The most used were Lactobacilli and there was no strain most used. Two studies do not specify the strains of bacterial species used.
Gambaro, *et al.*, 2020	"Gut-brain axis": review of the role of probiotics in anxiety and depressive disorders	Article review	Explore the current literature on the impact of probiotics on anxiety and depressive symptoms.	Probiotics positively affected depressive symptomatology and anxiety symptoms according to 53.83% and 43.75% Of selected studies, respectively. Among the studies than evaluated inflammatory biomarkers, 58.31% found thanthey were decreased after administration from probiotics.
Costa, *et al.* 2020	Repercussion of the gut microbiota on the modulation of the central nervous system and its relationship with neurological diseases	Article integrative review	To identify the role of the gut microbiota in the health and disease process of the human host, which is indispensable to the study of infections and disorders of the enteric nervous	It was found that the gut microbiota exerts an influence on cognition, or behavior and also about neural development. In addition, the loss of homeostasis of the gut-brain axis can contribute to the emergence of mental illnesses.

			system and Your relationship with neurological pathologies.	
Moraes, *et al.* 2019	Supplementation With probiotics and depression: therapeutic strategy?	Article fr om revision of clinical studies	To compile data from the scientific literature on the impact of the use of probiotics as a therapeutic strategy in the outcomes depression and sympto ms Depressive in humans.	The evidence compiled in this review indicates that the supplementation with probiotics Shows promising potential as a therapy adjuvant in the treatment of symptoms associated with Major Depression disorder and, especially, as an action. Preventive of depressive conditions in healthy individuals or those with mild depression. The state of the art points to the potential psychobiotic effect of certain cultures, such as theSpecies *Lactobacillus acidophilus, LactobacillusLactobacillus helveticus, Bifi dobacterium actis, Bifidobacterium longum and Bifidobacterium bifidum.*
Bobato, S. 2023	Impact of executive functions on the perception of stress in the activity of inflammatory bowel diseases	Descriptive quantitative research and analytical, cross-sectional and correlational.	Investigating the impact of FE upon the perception of stress in th activity inflammator y bowel diseases.	The mean age was 43.6 years, with a predominance of women, colour white, grade disadvantaged socioeconomic status and professional activity. Unattended. Commitment was evidenced mild in EF, establishing a phenotypic profile with greater neurocognitive impairments in Crohn's disease, in activity, using corticosteroids, with mood disorders and history of suicidal ideation, older age and time of diagnosis. The losses occurred both in the automatic processes of speed processing, as in processes controlled, attention Selectiv and alternate,memory work and flexibility

				Cognitive. The analysis of regression showed that impairment in EF is a predictor of stress in IBD, with financial stress as the first predictor; and the second, family stress. In the total sample, impairment in EF explained 18% of the variance in the perception of the impact of stress on health; in active patients, it explained 24% of the stress variance and 47% of the stress variance Coping Problem Solving. This strategy was more used by people with a very high perception of success in relieving stress. Levels of perceived stress were moderate to elevated in more than a quarter of the sample, with no significant differences in remission and activity; and the strategies from coping explained 62% of the variance in the perception of the impact of the social support received.
Passos, *et al*. 2017	Gut microbiota digestive diseases	Article Review	Explore the formation of the complex gut ecosystem andY our impact in Incidence from Diseases such as obesity, steatohepatitisnon-alcoholic, irritable bowel syndrome, inflammatory bowel disease,Celiac disease and neoplasms Digestive. Argue or Potential Role of Psychological Stress in the pathogenesis of IBS and provide approaches.	Changes in the composition and function of the gastrointestinal microbiota (dysbiosis) have a direct impact on human health and appear to play an important role in the pathogenesis of several gastrointestinal diseases, whether they are inflammatory, metabolic or neoplastic.Comorbidity of IBS and psychological distress is common, and the prevalence of at least one psychiatric disorder typically ranges from 40% to 60% and has been reported in up to 80%. One.
Qin, Et al. 2014	Impact of the stress Psychological in irritable bowel syndrome	Clinical research review	Argue or Potential Role of Psychological Stress in the pathogenesis of IBS and provide.	Comorbidity of IBS and psychological distress is common, and the prevalence of at least one psychiatric disorder typically ranges from 40% to 60% and has been

			Comprehensive in clinical treatment.	strong correlation can also be observed between the severity of IBS and its comorbid psychiatric disorders, especially depression and anxiety.

Note: FE - Executive Functions. Source: authorship.

4 DISCUSSION

The research made it possible to identify the objectives initially proposed on the topic of gastrointestinal microbiota and its impact on health. In this study, it was possible to highlight data on the consequences of dysbiosis on psychological disorders and Inflammatory Bowel Diseases (IBD), and the use of probiotics with positive and negative results. The results of the research supported the construction of this review.

In an integrative review article on the repercussion of the gut microbiota on the modulation of the Central Nervous System (CNS), the influence of the gut microbiota on the enteric nervous system (ENS), its cognition, behavior, and neural development, as well as the loss of homeostasis of the gut-brain axis, contributing to the development of psychological disorders, was found. The role of the intestinal microbiota in maintaining CNS homeostasis and its involvement in various dysfunctions, affecting the nervous system and intestines, is evident. This mechanism is carried out through a complex system of pathways involving the various components of the nervous, endocrine and immune systems. (Costa et al.; 2020).

In a descriptive and analytical research, with a cross-sectional and correlational cut, a quantitative neuropsychological evaluation of 52 patients from an Interdisciplinary IBD Outpatient Care Clinic was outlined. The mean age was 43.6 years, with a predominance of women, white color, disadvantaged socioeconomic class and autonomous professional activity, where it was evidenced mild impairments in Executive Functions (EF) in activity, using corticosteroids, with mood disorders and history of suicidal ideation, older age and time of diagnosis, with neurocognitive impairments in CD. Impairment was a predictor of stress in IBD, in the total sample, impairment in EF explained 18% of the variance in the perception of the impact of stress on health; in the active patients, it explained 24% of the stress variance and 47% of the variance of the Coping Problem Solving. This strategy was more used by people with a very high perception of success in relieving stress. Perceived stress levels were moderate to high in more than a quarter of the sample, with no significant differences in remission and activity, and coping strategies explained 62% of the variance in the perception of the impact of the social support received. The results made it possible to know mechanisms associated with the overloads inherent to the adaptive process with IBD, suggesting that patients are at high risk of executive dysfunction over time and susceptibility to stress. On the

other hand, stress interferes with the performance of EF, feeding back into this psychoneuroimmunological circuit. (Bobato, 2023)

In a clinical research review study, the impact of stress on Irritable Bowel Syndrome (IBS) in comorbidity with anxiety and depression was evidenced. A significant increase in stressor score was reported just prior to progression from non-IBS patient to IBS patient. Major life traumas were often reported 38 weeks before the onset of IBS symptoms. In patients, the occurrence of IBS is typically associated with a total trauma score early in life and has an impact on health-related quality of life. The study clearly suggests that psychological or psychosocial stressors determine the development of IBS. (Qin, et al.; 2014).

The review article on the gut microbiota and digestive diseases proves that changes in the composition and function of the gastrointestinal microbiota (dysbiosis) have a direct impact on human health, resulting in the development of various gastrointestinal diseases, whether inflammatory, metabolic or neoplastic. Evidence shows that a permanent alteration in the composition or function of the microbiota can alter immune responses, metabolism, intestinal permeability, and digestive motility, thus promoting a pro-inflammatory state. (PASSOS, et al.; 2017). Another study proved that the decrease in bacteria with anti-inflammatory capacity and the increase in bacteria with inflammatory capacity are observed in patients with IBD when compared to healthy individuals. (Nishida, et al.; 2017).

Another study explained the importance of the gut microbiota in regulating the immune system, which resides mainly in homeostasis. Thus, many diseases are a consequence of deficient interactions or loss of this balance, the article explains that the challenge faced by the mucosal immune system is to discriminate between pathogens and benign organisms, stimulating protective immunity, without generating an excessive inflammatory response that can alter the integrity of the gastrointestinal mucosa. The study shows that the composition of the microbiota helps maintain immune homeostasis. The intestinal immune system has used several strategies to respond to the microbial environment in a way that benefits the health of the host, these strategies are diverse, multifunctional and interconnected, and act in a specific way to prevent epithelial damage caused by the alteration of the immune system. (Alarcón, et al.; 2016).

Regarding the use of probiotics in the treatment and prevention of dysbiosis, as well as in the aid of psychological disorders, in a study of the effects of probiotics on depression and anxiety, with clinical trials of the administration of bacteria. It is concluded that the use of probiotics to relieve symptoms of these disorders is promising, mainly due to their potential anti-inflammatory effect. They observed that after eight weeks of intervention, patients with depression and anxiety who received probiotic supplements containing L. I married, L

acidophilus and B. Bifidum, indicated significant overall improvement in symptoms. (Minayo, et al.; 2021).

Positive results of probiotics in depression and anxiety were reported in the study on probiotic supplementation as a therapeutic strategy, which showed promising results for psychological disorders and as a prevention of depressive conditions. The species L. acidophilus, L. casei, L. helveticus, B. lactis, B. longum and B. bifidum were the most used in this study, with measurable effects from the fourth week of supplementation. However, the article makes it clear that the effect of continued supplementation with probiotics still needs to be better established. (Moraes, et al.; 2019).

An article that explored the current literature on the impact of probiotics on anxiety and depressive symptoms, explained that probiotics positively affected depressive symptomatology and anxiety symptoms according to 53.83% and 43.75% of the studies selected in the article. Among the studies that evaluated inflammatory biomarkers, 58.31% found that they were decreased after probiotic administration. The study also points out that the results on probiotic supplementation for the treatment of depression are encouraging, but more research is needed, considering the scarcity of clinical trials on this topic and the heterogeneity of the samples analyzed. (Gambaro, et al.; 2020).

On the other hand, there are also questionable results, a systematic review of clinical trials pointed out that the results between studies are controversial and indicate that the causal relationship between the consumption of probiotics and the relief of depressive symptoms has not yet been established. The conclusion was that more randomized double-blind or triple-blind, placebo-controlled trials controlling for potential confounders (e.g., diet, antibiotic use) are needed to consistently verify the causal relationship between probiotic consumption and relief of depressive symptoms (Souzedo, et al.; 2020). In another study, the authors aimed to analyze the literature on probiotics, from definitions to clinical benefits with an emphasis on children, with an emphasis on the regulation of probiotics dysbiosis. The conclusion of the study was that although regulation is increasing, stricter definitions are still needed. Evidence of clinical benefit is growing, although still absent in several areas. Inappropriate use and the use of non-validated products are possible disadvantages to the body (Vandenplas, et al.; 2015).

5 CONCLUSION

In view of this study, it was possible to identify that there is a relationship between the dysregulation of the gastrointestinal microbiota and psychological disorders such as anxiety and depression, and that it correlates with inflammatory bowel diseases. In summary, it was

conceivable that dysbiosis has a great impact on the development of psychological disorders, altering CNS homeostasis, as well as traumatic and stressful factors that cause the alteration of the gastrointestinal microbiota, inducing the development of IBD, since stress acts as a predictor of IBS and CD, thus correlating the microbiota-brain-gut axis with IBDs. Intestinal inflammation as a result of dysbiosis is due to a decrease in anti-inflammatory bacteria and an increase in inflammatory bacteria, also damaging the immune system.

In addition, the research provides promising results for probiotics in the regulation of the gastrointestinal microbiota and treatment for anxiety and depression, but it is necessary to consider carrying out more studies and research to be better established and obtain more and more positive and updated results on the proposed topic, contributing to the health and well-being of an individual.

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