ISSN 1007-9327 (print)
ISSN 2219-2840 (online)

World Journal of *Gastroenterology*

World J Gastroenterol 2024 March 14; 30(10): 1261-1469

Published by Baishideng Publishing Group Inc

World Journal of Gastroenterology

Contents

Weekly Volume 30 Number 10 March 14, 2024

EDITORIAL

REVIEW

ORIGINAL ARTICLE

Retrospective Cohort Study

World Journal of Gastroenterology

Weekly Volume 30 Number 10 March 14, 2024

Contents

Contents

ABOUT COVER

Editorial Board Member of *World Journal of Gastroenterology*, Toru Mizuguchi, MD, PhD, Professor, Surgeon, Department of Nursing, Division of Surgical Science, Sapporo Medical University Postgraduate School of Health Science, Sapporo, Hokkaido 0608556, Japan. tmizu@sapmed.ac.jp

AIMS AND SCOPE

The primary aim of *World Journal of Gastroenterology* (*WJG*, *World J Gastroenterol*) is to provide scholars and readers from various fields of gastroenterology and hepatology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online. *WJG* mainly publishes articles reporting research results and findings obtained in the field of gastroenterology and hepatology and covering a wide range of topics including gastroenterology, hepatology, gastrointestinal endoscopy, gastrointestinal surgery, gastrointestinal oncology, and pediatric gastroenterology.

INDEXING/ABSTRACTING

The *WJG* is now abstracted and indexed in Science Citation Index Expanded (SCIE), MEDLINE, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China Science and Technology Journal Database, and Superstar Journals Database. The 2023 edition of Journal Citation Reports® cites the 2022 impact factor (IF) for *WJG* as 4.3; Quartile category: Q2. The *WJG*'s CiteScore for 2021 is 8.3.

RESPONSIBLE EDITORS FOR THIS ISSUE

NAME OF JOURNAL
World Journal of Gastroenterology

ISSN
ISSN 1007-9327 (print) ISSN 2219-2840 (online)

LAUNCH DATE
October 1, 1995

FREQUENCY
Weekly

PUBLICATION DATE
March 14, 2024

PUBLISHING PARTNER
Shanghai Pancreatic Cancer Institute and Pancreatic Cancer Institute, Fudan University
Biliary Tract Disease Institute, Fudan University

INSTRUCTIONS TO AUTHORS
https://www.wjgnet.com/bpg/gerinfo/204

GUIDELINES FOR ETHICS DOCUMENTS
https://www.wjgnet.com/bpg/GerInfo/287

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH
https://www.wjgnet.com/bpg/gerinfo/240

PUBLICATION ETHICS
https://www.wjgnet.com/bpg/GerInfo/288

PUBLICATION MISCONDUCT
https://www.wjgnet.com/bpg/gerinfo/208

POLICY OF CO-AUTHORS
https://www.wjgnet.com/bpg/GerInfo/310

ARTICLE PROCESSING CHARGE
https://www.wjgnet.com/bpg/gerinfo/242

STEPS FOR SUBMITTING MANUSCRIPTS
https://www.wjgnet.com/bpg/GerInfo/239

ONLINE SUBMISSION
https://www.f6publishing.com

PUBLISHING PARTNER's OFFICIAL WEBSITE
https://www.shca.org.cn
https://www.zs-hospital.sh.cn

World Journal of Gastroenterology

Submit a Manuscript: https://www.f6publishing.com

World J Gastroenterol 2024 March 14; 30(10): 1261-1265

DOI: 10.3748/wjg.v30.i10.1261

ISSN 1007-9327 (print) ISSN 2219-2840 (online)

EDITORIAL

Bridging the gap: Unveiling the crisis of physical inactivity in inflammatory bowel diseases

Remus Stafie, Ana-Maria Singeap, Adrian Rotaru, Carol Stanciu, Anca Trifan

Specialty type: Gastroenterology and hepatology

Provenance and peer review: Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): A
Grade B (Very good): 0
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Tsujinaka S, Japan

Received: November 18, 2023
Peer-review started: November 18, 2023
First decision: January 5, 2024
Revised: January 17, 2024
Accepted: February 20, 2024
Article in press: February 20, 2024
Published online: March 14, 2024

Remus Stafie, Ana-Maria Singeap, Adrian Rotaru, Carol Stanciu, Anca Trifan, Department of Gastroenterology, Faculty of Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Iasi 700115, Romania

Remus Stafie, Ana-Maria Singeap, Adrian Rotaru, Carol Stanciu, Anca Trifan, Institute of Gastroenterology and Hepatology, "St. Spiridon" University Hospital, Iasi 700111, Romania

Corresponding author: Ana-Maria Singeap, MD, PhD, Associate Professor, Department of Gastroenterology, Faculty of Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, No. 16 Universitatii Street, Iasi 700115, Romania. singeapanamaria@gmail.com

Abstract

In this editorial we comment on the article titled "Inflammatory bowel diseases patients suffer from significant low levels and barriers to physical activity: The BE-FIT-IBD study" published in a recent issue of the *World Journal of Gastroenterology* 2023; 29 (41): 5668-5682. Inflammatory bowel diseases (IBD) are emerging as a significant global health concern as their incidence continues to rise on a global scale, with detrimental impacts on quality of life. While many advances have been made regarding the management of the disease, physical inactivity in these patients represents an underexplored issue that may hold the key for further and better understanding the ramifications of IBD. Chronic pain, fatigue, and fear of exacerbating symptoms promotes physical inactivity among IBD patients, while the lack of clear guidelines on safe exercise regimens contributes to a norm of physical inactivity. Physical activity (PA) is accepted to have a positive effect on disease outcomes and quality of life, while inactivity exacerbates comorbidities like cardiovascular disease and mental health disorders. The "BE-FIT-IBD" study, focusing on PA levels and barriers in IBD patients of Southern Italy, revealed that a significant proportion (42.9%) were physically inactive. This lack of PA is attributed to barriers such as fear of flare-ups and misconceptions about exercise exacerbating the disease. The study also highlighted the need for better communication between healthcare providers and patients regarding the benefits of PA and safe incorporation into lifestyles. Moreover, physical inactivity may also contribute to disability in IBD patients, having a great impact on employment status. Of note is the fact that IBD also comes with an important psychological burden with relevant evidence suggesting that regular PA can improve mood, reduce anxiety, and enhance mental health. The "BE-FIT-IBD" study advocated for the integration of PA into IBD management, emphasizing the bidirectional link between PA and IBD. Regular exercise can influence the course of IBD, potentially

reducing symptom severity and prolonging remission periods. As such, it is mandatory that healthcare providers actively educate patients, dispel misconceptions, and tailor exercise recommendations to improve the quality of life and reduce IBD-related complications.

Key Words: Inflammatory bowel disease; Physical activity; Disability; Psychological burden; Body composition; Quality of life

Core Tip: Physical inactivity is emerging as a widely acknowledged matter among inflammatory bowel disease (IBD) patients. The lack of physical activity (PA) can be attributed to concerns over the potential exacerbation of symptoms and misguided beliefs around the impact of exercise on IBD, thus increasing the susceptibility to comorbidities such as cardiovascular disease and mental health issues. This editorial argues in favor of including PA into the management of IBD, highlighting the reciprocal relationship between PA and the condition as well as the importance of healthcare providers educating patients, correcting misunderstandings, and customizing exercise regimens.

Citation: Stafie R, Singeap AM, Rotaru A, Stanciu C, Trifan A. Bridging the gap: Unveiling the crisis of physical inactivity in inflammatory bowel diseases. *World J Gastroenterol* 2024; 30(10): 1261-1265
URL: https://www.wjgnet.com/1007-9327/full/v30/i10/1261.htm
DOI: https://dx.doi.org/10.3748/wjg.v30.i10.1261

INTRODUCTION

Inflammatory bowel diseases (IBD), including Crohn's disease (CD) and ulcerative colitis (UC), represent a growing global health issue, with their prevalence steadily increasing worldwide. These chronic conditions mainly affect the gastrointestinal tract, but their impact extends beyond simply physical symptoms. They also significantly influence the overall physical, psychosocial, and emotional well-being of individuals. The medical and research communities have made significant progress in developing pharmacological and surgical interventions to manage these diseases effectively. However, there is an aspect of IBD patient care that is often overlooked and largely unaddressed: The issue of physical inactivity[1,2]. Thus, it is mandatory to bring this critical issue to the forefront to have a holistic approach in the management of patients with IBD.

The issue of physical inactivity among individuals with IBD is multifaceted and is influenced by several factors including chronic pain, fatigue, and exacerbation of symptoms[3]. The erratic occurrence of IBD flare-ups and the episodic nature of the disease instills a fear of exercise and presents a challenge in maintaining a regular regimen of physical activity (PA), leading to a cycle of sedentary behavior. This fear is compounded by the lack of clear guidelines on safe exercise regimens for IBD patients, creating an environment where physical inactivity becomes a norm rather than an exception[3,4]. Despite the various obstacles encountered, there is a growing recognition of the significance of PA in the management of IBD. This acknowledgment is supported by research indicating the positive impact of PA on disease outcomes and the overall enhancement of quality of life[5]. The implications of a sedentary lifestyle for IBD patients are profound. Physical inactivity is known to exacerbate comorbidities such as cardiovascular disease, osteoporosis, and mental health disorders, which are already increased in IBD patients[6,7].

The "BE-FIT-IBD" study, published in the *World Journal of Gastroenterology*, delves into the PA levels and barriers faced by patients with IBD in Southern Italy. This cross-sectional observational study aimed to assess PA levels using the International Physical Activity Questionnaire (IPAQ) and identify barriers to regular PA among IBD patients[8]. The findings of this study aligned with the regular pattern observed in relation to PA, indicating that a notable proportion (42.9%) of individuals with IBD were physically inactive. In comparison, just 4.1% of individuals met the criteria for engaging in health-enhancing PA. Gravina *et al*[9] identified several barriers that contributed to this lack of PA, such as the fear of flare-ups and a general distrust in exercise post-diagnosis. These findings are in line with the existing literature that suggests IBD patients often have misconceptions about exercise exacerbating their condition, leading to avoidance of physical exertion[5].

The study also highlighted that a patient's social networks often encourage PA, yet many patients feel uninformed about exercise in the context of IBD. This suggests a gap in communication between healthcare providers and patients about the benefits of PA and how it can be safely incorporated into their lifestyle considering their disease status[9].

SYNERGY AND STRUGGLE: BODY COMPOSITION, IBD, AND PA

IBD often leads to alterations in body composition, characterized by a reduction in muscle mass and an increase in fat mass. This phenomenon, known as sarcopenia, is prevalent among IBD patients and is linked to poor outcomes, including increased disability, lower quality of life, and higher rates of surgery[10]. Sarcopenia in IBD can result from

various factors, including chronic inflammation, malnutrition, and reduced PA. Additionally, IBD patients often experience body composition changes due to the catabolic state induced by the chronic inflammation and the side effects of treatments like corticosteroids[11].

While the direct effects of implementing an exercise regimen in individuals with sarcopenia and IBD remain inconclusive, it is advisable to promote PA among patients. Based on research related to other medical conditions, it is probable that the integration of resistance training and aerobic exercise will result in favorable outcomes. The management of the underlying IBD is anticipated to have a positive impact on muscle health. However, additional research is necessary to have a more comprehensive understanding of this association[12].

There exists a correlation between obesity and a decreased occurrence of clinical remission as well as elevated levels of depression, anxiety, fatigue, and pain in individuals with IBD as compared to non-obese people. Furthermore, it was observed that patients with obesity and IBD experienced a significantly greater annual burden and higher expenses associated with hospitalization when compared to their non-obese counterparts. In addition to general obesity, visceral adiposity has demonstrated a more consistent correlation with poor outcomes in individuals with IBD. Patients with CD who had a high volume of visceral adipose tissue had an increased risk of penetrating or stricturing complications and required a shorter time interval to undergo surgery[13].

Moderate-intensity aerobic exercise, in addition to resistance training, can help reduce fat mass and improve cardiovascular health in IBD patients. This type of exercise is beneficial for managing body weight and reducing the risk of comorbid conditions[14]. Ng *et al*[15] demonstrated that low-intensity exercise improved the quality of life in patients with CD, suggesting that even mild forms of PA can have beneficial effects on body composition and overall well-being of IBD patients.

The "BE-FIT-IBD" study does not specifically detail the intensity of PA in terms of light, moderate, or intense categories. However, it does mention the use of the IPAQ to assess PA levels among IBD patients. The IPAQ classifies PA into different types: Intense activities (like running); moderate activities (such as carrying light weights); and mild activities (like walking for at least 10 min). Of note, it is indicated that patients with UC had a negative correlation between their disease activity and the intense activity scores from the IPAQ. This suggests that patients engaging in more intense activities might have lower disease activity scores, although this relationship was not significant[8].

PHYSICAL INACTIVITY AND DISABILITY: UNDERSTANDING THE COMPLEX INTERACTION

The finding that a large percentage of IBD patients are physically inactive unveils a potential disability aspect in these individuals. Physical inactivity is often both a consequence and a cause of disability. This phenomenon may be caused by a variety of factors in patients with IBD, including pain, fatigue, gastrointestinal symptoms, and psychological distress [3]. These elements can limit a patient's ability to engage in regular PA, leading to a vicious cycle where inactivity further exacerbates disease symptoms and quality of life. The "BE-FIT-IBD" study reports a high unemployment rate among IBD patients especially among patients suffering from CD. It seems that the impact of physical inactivity extends beyond the medical sphere, increased fatigue, and decreased stamina due to lower physical fitness making it challenging for some patients to meet the physical demands of many jobs[8].

Other studies have shown that IBD can significantly impact employment status. A higher rate of unemployment is noted among IBD patients compared to the general population, and those who are employed often report difficulties in fulfilling their job responsibilities[15]. IBD patients often face unique challenges in the workplace due to the unpredictability of their symptoms. Flare-ups can lead to frequent bathroom breaks, fatigue, and pain, which can lower job performance and attendance. These challenges can lead to decreased productivity, absenteeism, and even job loss, contributing to the psychological burden of the disease. The economic implications of IBD-related workplace disability are significant. The costs associated with low productivity and unemployment can be substantial, adding to the costs of care of these patients[16-18].

INTERPLAY BETWEEN PSYCHOLOGICAL BURDEN OF IBD AND PA

IBD is often associated with a considerable psychological burden. Patients frequently experience anxiety, depression, and reduced quality of life due to the chronic and unpredictable nature of the disease. The psychological impact is exacerbated by symptoms such as pain and fatigue, resulting in a negative cycle that affects both mental and physical health. Depression in these patients may be further compounded by the social stigma and isolation associated with the disease[19,20]. Stress and anxiety can also exacerbate IBD symptoms, creating a complex interplay between psychological state and disease activity[21].

Engaging in PA has been recognized as a beneficial coping mechanism for IBD patients. Regular PA leads to improvements in mood, reduces anxiety levels, and enhances overall mental health in IBD patients. This can be attributed to the release of endorphins during exercise, which are natural mood lifters[22].

Group exercises or sports activities not only provide the physical benefits associated with exercise but also offer a crucial social dimension. This social interaction can hold therapeutic effects for IBD patients, who often struggle with feelings of isolation due to the chronic nature of their condition. The social support derived from group activities can significantly enhance the mental health of IBD patients. Participating in group exercises allows individuals to connect with others who may share similar experiences and challenges, fostering a sense of community and belonging. This can be incredibly valuable in reducing feelings of loneliness and isolation that often accompany chronic illnesses like IBD.

Moreover, the shared experiences in group settings can lead to the exchange of coping strategies, tips on disease management, and general emotional support. Such interactions can improve overall mental well-being as they feel understood and supported not just by medical professionals but also by peers who truly empathize with their daily experiences[23,24].

IMPACT OF PA AND IBD: A BIDIRECTIONAL LINK

PA has been recognized for its potential role in influencing the course of IBD. Regular exercise can contribute to a reduction in the severity of symptoms and may even play a role in prolonging periods of remission, particularly in CD. Studies have shown that moderate, consistent PA can lead to a decrease in inflammatory markers commonly associated with IBD, suggesting a potential anti-inflammatory effect of exercise. This reduction may be mediated through several mechanisms, including the downregulation of proinflammatory cytokines and the enhancement of anti-inflammatory mediators[3,5,25]. Regular PA is thought to contribute to a reduction in the frequency of IBD flare-ups. This is particularly significant given the unpredictable nature of these diseases. For CD patients, some studies have indicated that those who engage in consistent moderate exercise experience longer periods of remission and fewer episodes of acute exacerbation [26,27].

The "BE-FIT-IBD" study did not find significant difference in PA levels, as measured by the IPAQ total score, in relation to the PRO-2 measured IBD activity. The data related to the frequency of symptoms in patients with CD and UC exhibited diversity, with no significant alterations seen. It is noteworthy that individuals with CD who were in a state of remission and participated in consistent PA acquired better disease activity scores compared to those who engaged in less PA. However, this observation was not valid in patients with UC. The study also draws attention to how treatments, particularly biologics, influence PA levels. Patients on biologic therapy showed better IPAQ scores in moderate PA. This suggests that effective medical management of IBD can potentially reduce disability by enabling patients to increase their PA levels, thus breaking the cycle of inactivity[8].

CONCLUSION

The "BE-FIT-IBD" study serves as a wake-up call, bringing attention to the complex relationship between PA and IBD, revealing concerning levels of inactivity among these patients that contributes to numerous health conditions. The study's findings underscore the necessity of addressing physical inactivity in IBD management, emphasizing the need for comprehensive care strategies that integrate PA. Healthcare providers should proactively engage in patient education, dispelling misconceptions about exercise and IBD, and tailor exercise recommendations to individual patient needs. This approach can enhance patient well-being, reduce IBD-related complications, and improve overall quality of life. The importance of PA in managing IBD is becoming more and more clear as research is conducted, and the incorporation of PA into standard care practice is becoming mandatory.

FOOTNOTES

Author contributions: Trifan A designed the editorial; Stafie R and Rotaru A wrote the paper; Singeap AM and Stanciu C revised the paper.

Conflict-of-interest statement: The authors declare having no conflicts of interest.

Country/Territory of origin: Romania

ORCID number: Remus Stafie 0000-0003-1460-6559; Ana-Maria Singeap 0000-0001-5621-548X; Adrian Rotaru 0000-0002-6459-6996; Carol Stanciu 0000-0002-6427-4049; Anca Trifan 0000-0001-9144-5520.

S-Editor: Chen YL
L-Editor: A
P-Editor: Yuan YY

REFERENCES

1 **Ananthakrishnan AN**, Kaplan GG, Ng SC. Changing Global Epidemiology of Inflammatory Bowel Diseases: Sustaining Health Care

Delivery Into the 21st Century. *Clin Gastroenterol Hepatol* 2020; **18**: 1252-1260 [PMID: 32007542 DOI: 10.1016/j.cgh.2020.01.028]
2 **Ananthakrishnan AN**. Epidemiology and risk factors for IBD. *Nat Rev Gastroenterol Hepatol* 2015; **12**: 205-217 [PMID: 25732745 DOI: 10.1038/nrgastro.2015.34]
3 **Davis SP**, Crane PB, Bolin LP, Johnson LA. An integrative review of physical activity in adults with inflammatory bowel disease. *Intest Res* 2022; **20**: 43-52 [PMID: 33472342 DOI: 10.5217/ir.2020.00049]
4 **Mareschal J**, Douissard J, Genton L. Physical activity in inflammatory bowel disease: benefits, challenges and perspectives. *Curr Opin Clin Nutr Metab Care* 2022; **25**: 159-166 [PMID: 35238803 DOI: 10.1097/MCO.0000000000000829]
5 **DeFilippis EM**, Tabani S, Warren RU, Christos PJ, Bosworth BP, Scherl EJ. Exercise and Self-Reported Limitations in Patients with Inflammatory Bowel Disease. *Dig Dis Sci* 2016; **61**: 215-220 [PMID: 26254773 DOI: 10.1007/s10620-015-3832-4]
6 **Bilski J**, Brzozowski B, Mazur-Bialy A, Sliwowski Z, Brzozowski T. The role of physical exercise in inflammatory bowel disease. *Biomed Res Int* 2014; **2014**: 429031 [PMID: 24877092 DOI: 10.1155/2014/429031]
7 **García-Mateo S**, Martínez-Domínguez SJ, Gargallo-Puyuelo CJ, Arroyo Villarino MT, Laredo De La Torre V, Gallego B, Alfambra E, Gomollón F. Lifestyle Can Exert a Significant Impact on the Development of Metabolic Complications and Quality Life in Patients with Inflammatory Bowel Disease. *Nutrients* 2023; **15** [PMID: 37764769 DOI: 10.3390/nu15183983]
8 **Sajadinejad MS**, Asgari K, Molavi H, Kalantari M, Adibi P. Psychological issues in inflammatory bowel disease: an overview. *Gastroenterol Res Pract* 2012; **2012**: 106502 [PMID: 22778720 DOI: 10.1155/2012/106502]
9 **Gravina AG**, Pellegrino R, Durante T, Palladino G, D'Onofrio R, Mammone S, Arboretto G, Auletta S, Imperio G, Ventura A, Romeo M, Federico A. Inflammatory bowel diseases patients suffer from significant low levels and barriers to physical activity: The "BE-FIT-IBD" study. *World J Gastroenterol* 2023; **29**: 5668-5682 [PMID: 38077160 DOI: 10.3748/wjg.v29.i41.5668]
10 **Ryan E**, McNicholas D, Creavin B, Kelly ME, Walsh T, Beddy D. Sarcopenia and Inflammatory Bowel Disease: A Systematic Review. *Inflamm Bowel Dis* 2019; **25**: 67-73 [PMID: 29889230 DOI: 10.1093/ibd/izy212]
11 **Beaudart C**, Dawson A, Shaw SC, Harvey NC, Kanis JA, Binkley N, Reginster JY, Chapurlat R, Chan DC, Bruyère O, Rizzoli R, Cooper C, Dennison EM; IOF-ESCEO Sarcopenia Working Group. Nutrition and physical activity in the prevention and treatment of sarcopenia: systematic review. *Osteoporos Int* 2017; **28**: 1817-1833 [PMID: 28251287 DOI: 10.1007/s00198-017-3980-9]
12 **Gold SL**, Raman M, Sands BE, Ungaro R, Sabino J. Review article: Putting some muscle into sarcopenia-the pathogenesis, assessment and clinical impact of muscle loss in patients with inflammatory bowel disease. *Aliment Pharmacol Ther* 2023; **57**: 1216-1230 [PMID: 37051722 DOI: 10.1111/apt.17498]
13 **Rozich JJ**, Holmer A, Singh S. Effect of Lifestyle Factors on Outcomes in Patients With Inflammatory Bowel Diseases. *Am J Gastroenterol* 2020; **115**: 832-840 [PMID: 32224703 DOI: 10.14309/ajg.0000000000000608]
14 **Metsios GS**, Moe RH, Kitas GD. Exercise and inflammation. *Best Pract Res Clin Rheumatol* 2020; **34**: 101504 [PMID: 32249021 DOI: 10.1016/j.berh.2020.101504]
15 **Ng V**, Millard W, Lebrun C, Howard J. Low-intensity exercise improves quality of life in patients with Crohn's disease. *Clin J Sport Med* 2007; **17**: 384-388 [PMID: 17873551 DOI: 10.1097/JSM.0b013e31802b4fda]
16 **Büsch K**, da Silva SA, Holton M, Rabacow FM, Khalili H, Ludvigsson JF. Sick leave and disability pension in inflammatory bowel disease: a systematic review. *J Crohns Colitis* 2014; **8**: 1362-1377 [PMID: 25001582 DOI: 10.1016/j.crohns.2014.06.006]
17 **van der Valk ME**, Mangen MJ, Leenders M, Dijkstra G, van Bodegraven AA, Fidder HH, de Jong DJ, Pierik M, van der Woude CJ, Romberg-Camps MJ, Clemens CH, Jansen JM, Mahmmod N, van de Meeberg PC, van der Meulen-de Jong AE, Ponsioen CY, Bolwerk CJ, Vermeijden JR, Siersema PD, van Oijen MG, Oldenburg B; COIN study group; Dutch Initiative on Crohn and Colitis. Risk factors of work disability in patients with inflammatory bowel disease--a Dutch nationwide web-based survey: work disability in inflammatory bowel disease. *J Crohns Colitis* 2014; **8**: 590-597 [PMID: 24351733 DOI: 10.1016/j.crohns.2013.11.019]
18 **Lönnfors S**, Vermeire S, Greco M, Hommes D, Bell C, Avedano L. IBD and health-related quality of life -- discovering the true impact. *J Crohns Colitis* 2014; **8**: 1281-1286 [PMID: 24662394 DOI: 10.1016/j.crohns.2014.03.005]
19 **Ding Z**, Muser E, Izanec J, Lukanova R, Kershaw J, Roughley A. Work-Related Productivity Loss and Associated Indirect Costs in Patients With Crohn's Disease or Ulcerative Colitis in the United States. *Crohns Colitis 360* 2022; **4**: otac023 [PMID: 36777416 DOI: 10.1093/crocol/otac023]
20 **Byrne G**, Rosenfeld G, Leung Y, Qian H, Raudzus J, Nunez C, Bressler B. Prevalence of Anxiety and Depression in Patients with Inflammatory Bowel Disease. *Can J Gastroenterol Hepatol* 2017; **2017**: 6496727 [PMID: 29181373 DOI: 10.1155/2017/6496727]
21 **Eugenicos MP**, Ferreira NB. Psychological factors associated with inflammatory bowel disease. *Br Med Bull* 2021; **138**: 16-28 [PMID: 34057462 DOI: 10.1093/bmb/ldab010]
22 **Mawdsley JE**, Rampton DS. Psychological stress in IBD: new insights into pathogenic and therapeutic implications. *Gut* 2005; **54**: 1481-1491 [PMID: 16162953 DOI: 10.1136/gut.2005.064261]
23 **Mikkelsen K**, Stojanovska L, Polenakovic M, Bosevski M, Apostolopoulos V. Exercise and mental health. *Maturitas* 2017; **106**: 48-56 [PMID: 29150166 DOI: 10.1016/j.maturitas.2017.09.003]
24 **Sebastião E**, Mirda D. Group-based physical activity as a means to reduce social isolation and loneliness among older adults. *Aging Clin Exp Res* 2021; **33**: 2003-2006 [PMID: 33387363 DOI: 10.1007/s40520-020-01722-w]
25 **Mählmann L**, Gerber M, Furlano RI, Legeret C, Kalak N, Holsboer-Trachsler E, Brand S. Psychological wellbeing and physical activity in children and adolescents with inflammatory bowel disease compared to healthy controls. *BMC Gastroenterol* 2017; **17**: 160 [PMID: 29233119 DOI: 10.1186/s12876-017-0721-7]
26 **Strober W**, Zhang F, Kitani A, Fuss I, Fichtner-Feigl S. Proinflammatory cytokines underlying the inflammation of Crohn's disease. *Curr Opin Gastroenterol* 2010; **26**: 310-317 [PMID: 20473158 DOI: 10.1097/MOG.0b013e328339d099]
27 **Neal WN**, Jones CD, Pekmezi D, Motl RW. Physical Activity in Adults With Crohn's Disease: A Scoping Review. *Crohns Colitis 360* 2022; **4**: otac022 [PMID: 36777047 DOI: 10.1093/crocol/otac022]

Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: office@baishideng.com
Help Desk: https://www.f6publishing.com/helpdesk
https://www.wjgnet.com