World Journal of

Gastrointestinal Surgery

World Journal of Gastrointestinal Surgery

Contents

Contents

Contents

ABOUT COVER

Editorial Board Member of *World Journal of Gastrointestinal Surgery*, Chong-Chi Chiu, MD, Attending Doctor, Professor, Surgeon, Department of General Surgery, E-Da Cancer Hospital, Kaohsiung 82445, Taiwan. chiuchongchi@yahoo.com.tw

AIMS AND SCOPE

The primary aim of *World Journal of Gastrointestinal Surgery* (*WJGS*, *World J Gastrointest Surg*) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

   WJGS mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, *etc*.

INDEXING/ABSTRACTING

The *WJGS* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Current Contents/Clinical Medicine, Journal Citation Reports/Science Edition, PubMed, and PubMed Central. The 2021 edition of Journal Citation Reports® cites the 2020 impact factor (IF) for *WJGS* as 2.582; IF without journal self cites: 2.564; 5-year IF: 3.378; Journal Citation Indicator: 0.53; Ranking: 97 among 212 journals in surgery; Quartile category: Q2; Ranking: 73 among 92 journals in gastroenterology and hepatology; and Quartile category: Q4.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Rui-Rui Wu*; **Production Department Director:** *Xiang Li*; **Editorial Office Director:** *Ya-Juan Ma*.

Global research production pertaining to gastrointestinal involvement in COVID-19: A bibliometric and visualised study

Sa'ed H Zyoud, Samah W Al-Jabi, Moyad Jamal Shahwan, Ammar Abdulrahman Jairoun

Sa'ed H Zyoud, Samah W Al-Jabi, Department of Clinical and Community Pharmacy, College of Medicine and Health Sciences, An-Najah National University, Nablus 44839, Palestine

Sa'ed H Zyoud, Poison Control and Drug Information Center, College of Medicine and Health Sciences, An-Najah National University, Nablus 44839, Palestine

Sa'ed H Zyoud, Clinical Research Centre, An-Najah National University Hospital, Nablus 44839, Palestine

Moyad Jamal Shahwan, Department of Clinical Sciences, College of Pharmacy and Health Sciences, Ajman University, Ajman 346, United Arab Emirates

Moyad Jamal Shahwan, Centre of Medical and Bio-allied Health Sciences Research, Ajman University, Ajman 346, United Arab Emirates

Ammar Abdulrahman Jairoun, Department of Health and Safety, Dubai Municipality, Dubai 67, United Arab Emirates

Corresponding author: Sa'ed H Zyoud, PhD, Associate Professor, Director, Department of Clinical and Community Pharmacy, College of Medicine and Health Sciences, An-Najah National University, Academic Street, Nablus 44839, Palestine. saedzyoud@yahoo.com

Abstract

BACKGROUND
Coronavirus disease 2019 (COVID-19) is a global pandemic that can cause diarrhoea, nausea/vomiting, and abdominal pain, among other gastrointestinal (GI) symptoms.

AIM
To perform a bibliometric analysis of the global research production pertaining to GI involvement in COVID-19.

METHODS
The Scopus database was used to search the global literature on GI involvement in COVID-19 during 2020. A bibliometric review of these publications was also performed using VOSviewer.

RESULTS
Scopus had published 95615 documents on COVID-19 in all areas of research at the time of data collection. In total, 1267 publications on the topic of GI and

COVID-19 were identified. Research articles (*n* = 606; 47.83%), letters (293; 23.13%), and reviews (186; 14.68%) were the most popular types of documents. The most productive countries and institutions in this field were the United States and Huazhong University of Science and Technology. The most cited paper was Xiao *et al*, which was published in *Gastroenterology* as a brief communication, with 798 citations. This paper provides evidence for GI infection of COVID-19 and its possible faecal–oral transmission route. In the term cluster analysis, there were two frontiers in this field: GI manifestations among COVID-19 patients and the implications of COVID-19 for the gastroenterologist.

CONCLUSION
GI manifestations among COVID-19 patients and implications of COVID-19 for gastroenterologists were of interest, especially in the early stages of the pandemic.

Key Words: COVID-19; Gastrointestinal; Symptoms; Bibliometric; Scopus

Core Tip: This bibliometric analysis provides the first concise summary of global gastrointestinal (GI) publications related to coronavirus disease 2019 (COVID-19). It highlights the benefits of bibliometric analysis in a systematic and structured way to measure the productivity of studies. GI manifestations among COVID-19 patients and the implications of COVID-19 for gastroenterologists were of interest, especially in the early stage of the pandemic. The results will form the basis for future research and guide decision-making in research related to GI symptoms and treatments in COVID-19.

INTRODUCTION

In December 2019, coronavirus disease (coronavirus disease 2019, COVID-19) outbreak caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) spread quickly from China to nearly every country in the world, and is now considered the world's most significant public health threat, causing a massive crisis for global health[1-3]. The 2019 new coronavirus was named SARS-CoV-2 by the World Health Organization (WHO), with COVID-19 being given as the disease name[4]. As of March 13, 2021, there were over 118 million confirmed cases worldwide, with more than 2.6 million associated global deaths, according to a WHO report[5].

In most studies, patients with COVID-19 have gastrointestinal (GI) manifestations, such as diarrhoea, nausea, anorexia, vomiting, abdominal pain, and GI bleeding[6-11], in addition to fever and common respiratory symptoms including cough, and shortness of breath[3,12]. However, some patients have developed various fatal complications including severe pneumonia, pulmonary oedema, acute respiratory distress syndrome, septic shock, and organ failure[13-15]. Several studies have shown that SARS-CoV-2 can interact with angiotensin-converting enzyme 2 (ACE2) receptors on ileal enterocytes and colon epithelial cells, implying a trophism for the GI tract[7]. The pathophysiology of GI symptoms is unclear, but it appears that SARS-CoV-2 binds to ACE2, which regulates amino acid homeostasis and microbiome balance in the intestine, causing a change in physiological function that leads to GI symptoms[16-18].

Several systematic reviews and meta-analyses have indicated that during the pandemic, there was an increase in the number of publications discussing the impact of COVID-19 on the GI system in several countries[6,9-11,19-27]. To date, there has not been a global bibliometric review of research related to GI and COVID-19. Bibliometrics aims to determine the depth of information in a given field[28]. In other areas of COVID-19, this approach has been used to quantify and categorise research output, allowing for mapping the area in question based on the most involved authors, institutions, countries, citations, journals, and hot topics in this field[29-32]. Therefore, the purpose of this study was to report a bibliometric analysis of the global research production pertaining to GI involvement in COVID-19 to determine the most widely cited papers and most prolific countries, institutions, and journals related to this topic. Our results will help to guide priority setting and policy formulation for long-term strategies to improve the outcomes of COVID-19 patients with GI manifestations.

MATERIALS AND METHODS

Data sources

The publications were retrieved on the same day from the Scopus on March 20, 2021, to prevent bias due to the daily database updates. Since Scopus is the most commonly accepted and regularly used database for analysing scientific articles in the field of bibliometrics, it was chosen as the search engine. Although we recognise the existence of other databases, we acted in accordance with the methodological approach of previous research[33,34].

Search strategies

The search was restricted to publications between January 1 and December 31, 2020. The following search strategy was used in this bibliometric study to retrieve data.

Step 1: To achieve the goals of this bibliometric review, the terms related to COVID-19 entered into the Scopus engine were chosen from the literature related to COVID-19[35-38]. All of the following terms were used as Article Title/Abstract/Keyword: "COVID 19" OR "2019 novel coronavirus" OR "coronavirus 2019" OR "SARS-CoV-2" OR "SARS-CoV 2" or "coronavirus disease 2019" OR "2019-novel CoV" OR "2019 ncov" OR "COVID 2019" OR "corona virus 2019" OR "nCoV-2019" OR nCoV2019 OR "nCoV 2019" OR 2019-ncov OR COVID-19 OR "Severe acute respiratory syndrome coronavirus 2" OR Novel Coronavirus.

Step 2: We confined the publications that we obtained in Step 1 to those with the terms gastrointestinal and related words in their title. The terms relevant to GI that were entered into the Scopus engine were selected from previous GI meta-analyses[6,39]. All of the following terms were entered as Article Title: gastrointestinal OR "GI tract" OR gastr* OR Diarrh* OR Constipation OR Vomiting OR *intestin* OR dysphagia OR "Abdominal pain" OR Nausea OR heartburn OR Bowel OR Gut OR digest* OR stomach OR duodenal OR colon OR colorectal anorectum. The asterisk (*) was used as a truncator or wildcard to capture all of the term variants that shared a core.

Bibliometric analysis

The data collected included the following bibliometric parameters: type of documents, number of publications, citation count, country, institution, and journals. The impact index per article is presented for the top ten most-cited papers as determined by *Reference Citation Analysis* (RCA). Baishideng Publishing Group Inc. owns RCA, an open, multidisciplinary citation analysis database (Pleasanton, CA, United States) (https://www.referencecitationanalysis.com/).

Visualise analysis

VOSviewer version 1.6.16 (Leiden University, Leiden, The Netherlands) was used for bibliometric visualisation[40]. In this study, VOSviewer was used for collaborative patterns between countries and term co-occurrence analysis. As a result, we decided to build and visualise the network terms used in the title/abstract of publications to define the hot topics in this field. The relationship between terms is based on the number of publications in which they appear together, according to co-occurrence analysis [40]. Therefore, the aim of this study was to identify research areas as hot topics, and it is a valuable indicator for tracking scientific progress[41].

RESULTS

Volume and types of publications

Scopus had published 95615 documents on COVID-19 in all areas of research at the time of data collection. In total, 1267 publications on the topic of GI and COVID-19 were identified during the period of study (January 1 to December 31, 2020). A total of 1267 documents (1.33%) were used in this study. Research articles (*n* = 606; 47.83%), letters (293; 23.13%), and reviews (186; 14.68%) were the most popular types of documents.

Active countries and international research collaboration

The United States was the leader in this field, with 278 publications (21.94%). Other top countries were China (222, 17.52%), Italy (184, 14.52%), and the United Kingdom (159, 12.55%) (Table 1). Several studies reported the symptoms of GI to be present in 2.6% and 75% patients with COVID 19 infection (Table 1). There were 33 countries included (the minimum number of publications for each country was 10), and their network collaboration maps were visualised by VOSviewer (Figure 1). The top four countries by centrality were the United States, China, Italy, and the United Kingdom. According to their centrality, these countries showed close collaboration with each other and a strong research influence with other countries.

Table 1 List of the top 10 countries pertaining to gastrointestinal publications involvement in coronavirus disease 2019

Ranking	Country	No. of documents	%	Study population	Sample size	Prevalence of GI symptoms (%)	Common GI symptoms
1st	United States	278	21.94	Multicentre Cohort Study [48]	318	61.3	Loss of appetite, diarrhoea, and nausea
2nd	China	222	17.52	Retrospective study[51]	1320	14.5	Diarrhoea, anorexia, and nausea and vomiting
3rd	Italy	184	14.52	Prospective case-control study[47]	34	8.8	Diarrhoea, abdominal pain, and nausea
4th	United Kingdom	159	12.55	Prospective observational cohort study[42]	20, 133	23	Diarrhoea, nausea/vomiting, and abdominal pain
5th	Spain	61	4.81	Retrospective study[49]	76	75	Diarrhoea, nausea/vomiting, and abdominal pain
6th	France	59	4.66	Retrospective study[45]	114	2.6	Diarrhoea
7th	Germany	56	4.42	Retrospective study[43]	50	> 16	Diarrhoea, nausea/vomiting
8th	India	51	4.03	Prospective study[44]	252	10.3	anorexia, nausea, vomiting, abdominal pain
9th	Australia	37	2.92	Epidemiological study[50]	295	> 16	Diarrhoea, nausea/vomiting, and abdominal pain
10th	Iran	33	2.60	Retrospective study[46]	611	25.4	Nausea/vomiting, diarrhoea, and abdominal pain

GI: Gastrointestinal.
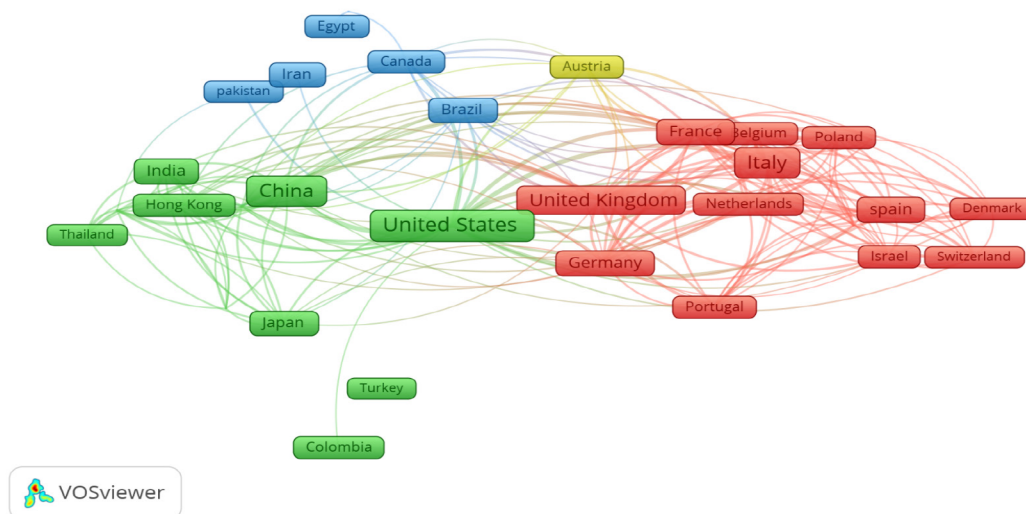
DOI: 10.4240/wjgs.v14.i5.494 **Copyright** ©The Author(s) 2022.

Figure 1 Network visualisation map of international research collaborations among the top 33 active countries with at least 10 articles published each.

Active institutions/organisations

Table 2 shows the top 10 institutions in terms of publication numbers. The Huazhong University of Science and Technology, China (*n* = 33 publications), Humanitas Research Hospital, Italy (*n* = 23 publications), the Humanitas University, Italy (*n* = 30 publications), and the Tongji Medical College, China (*n* = 29 publications) were the top four productive and influential institutions, indicating that they have achieved significant scientific achievements and research capability.

Active journals

Regarding journals, *Gastroenterology* ranked first with 457 publications (4.50%), followed by *American Journal of Gastroenterology* (*n* = 34; 2.68%), *Inflammatory Bowel Diseases* (*n* = 34; 2.68%), and *Lancet Gastroenterology and Hepatology* (*n* = 34; 2.68%). Table 3 presents the top 10 most popular journals with

Table 2 List of the top 10 institutions pertaining to gastrointestinal publication involvement in coronavirus disease 2019

Ranking	Institution	Country	n	%
1st	Huazhong University of Science and Technology	China	33	2.60
2nd	Humanitas Research Hospital	Italy	32	2.53
3rd	Humanitas University	Italy	30	2.37
4th	Tongji Medical College	China	29	2.29
5th	INSERM	France	27	2.13
6th	Chinese University of Hong Kong	China	26	2.05
7th	Fondazione Policlinico Universitario Agostino Gemelli IRCCS Università Cattolica del Sacro Cuore	Italy	25	1.97
8th	Università degli Studi di Roma La Sapienza	Italy	22	1.74
9th	Università degli Studi di Milano	Italy	21	1.66
10th	Università degli Studi di Padova	Italy	20	1.58
10th	University Hospitals Birmingham NHS Foundation Trust	United Kingdom	20	1.58

Table 3 List of the top 10 journals pertaining to gastrointestinal publications involvement in coronavirus disease 2019

Ranking	Journal	n	%	Impact factors
1st	*Gastroenterology*	57	4.50	17.373
2nd	*American Journal of Gastroenterology*	34	2.68	10.171
2nd	*Inflammatory Bowel Diseases*	34	2.68	4.261
2nd	*Lancet Gastroenterology and Hepatology*	34	2.68	14.789
5th	*Digestive and Liver Disease*	33	2.60	3.570
6th	*British Journal of Surgery*	29	2.29	5.676
7th	*Alimentary Pharmacology and Therapeutics*	25	1.97	7.515
8th	*Clinical Gastroenterology and Hepatology*	21	1.66	8.549
9th	*Colorectal Disease*	20	1.58	2.769
10th	*Journal of Gastroenterology and Hepatology*	18	1.42	3.437

Impact factors were retrieved from the 2019 Journal Citation Reports (Clarivate Analytics).

the highest number of global research productions pertaining to GI involvement in COVID-19.

Top cited documents

The number of citations is an important measure of the impact and recognition that a paper has received from the scientific community. Table 4 presents the 10 most cited studies found in the Scopus database. The top 10 most cited publications had citation counts ranging from 269 to 798. Furthermore, the ten most cited articles have an impact index per article of 189 to 617.5 (Table 4).

Most frequent terms (research themes)

Using VOSviewer, we examined the term occurrence from 1267 publications. As seen in Figure 2, 270 words were identified and grouped into two clusters based on the number of times they appeared in the titles and abstracts of all publications. The red cluster involved GI manifestations including terms such as "gastrointestinal", "symptoms"; "nausea", "vomiting", and "diarrhoea". The green cluster involved implications of COVID-19 for the gastroenterologist including terms such as "recommendations", "procedure", "impact", "surgery", "endoscopy", "strategy", "practice", and "prevention".

DISCUSSION

The use of bibliometric analysis to review the patterns and development of various fields and areas of

Table 4 List of the top 10 cited articles for gastrointestinal publications involvement in coronavirus disease 2019

Ranking	Ref.	Title	Source title	Cited by	Impact index per article[1]
1st	Xiao *et al* [58], 2020	"Evidence for Gastrointestinal Infection of SARS-CoV-2"	*Gastroenterology*	798	617.5
2nd	Xu *et al*[59], 2020	"Characteristics of pediatric SARS-CoV-2 infection and potential evidence for persistent fecal viral shedding"	*Nature Medicine*	525	384.0
3rd	Gu *et al*[52], 2020	"COVID-19: Gastrointestinal Manifestations and Potential Fecal–Oral Transmission"	*Gastroenterology*	507	342.5
4th	Pan *et al*[55], 2020	"Clinical characteristics of COVID-19 patients with digestive symptoms in Hubei, China: A descriptive, cross-sectional, multicenter study"	*American Journal of Gastroenterology*	464	352.5
5th	Wu *et al*[57], 2020	"Prolonged presence of SARS-CoV-2 viral RNA in faecal samples"	*Lancet Gastroenterology and Hepatology*	451	374.5
6th	Jin *et al*[53], 2020	"Epidemiological, clinical and virological characteristics of 74 cases of coronavirus-infected disease 2019 (COVID-19) with gastrointestinal symptoms"	*Gut*	362	277.0
7th	Cheung *et al* [10], 2020	"Gastrointestinal Manifestations of SARS-CoV-2 Infection and Virus Load in Fecal Samples From a Hong Kong Cohort: Systematic Review and Meta-analysis"	*Gastroenterology*	356	269.5
8th	Lamers *et al* [54], 2020	"SARS-CoV-2 productively infects human gut enterocytes"	*Science*	338	317.5
9th	Yeo *et al*[60], 2020	"Enteric involvement of coronaviruses: is faecal–oral transmission of SARS-CoV-2 possible?"	*Lancet Gastroenterology and Hepatology*	323	202.0
10th	Tian *et al* [56], 2020	"Gastrointestinal features in COVID-19 and the possibility of faecal transmission"	*Alimentary Pharmacology and Therapeutics*	269	189.0

[1]The impact index per article is presented based on *Reference Citation Analysis* [source: Baishideng Publishing Group Inc. (Pleasanton, CA 94566, United States)].
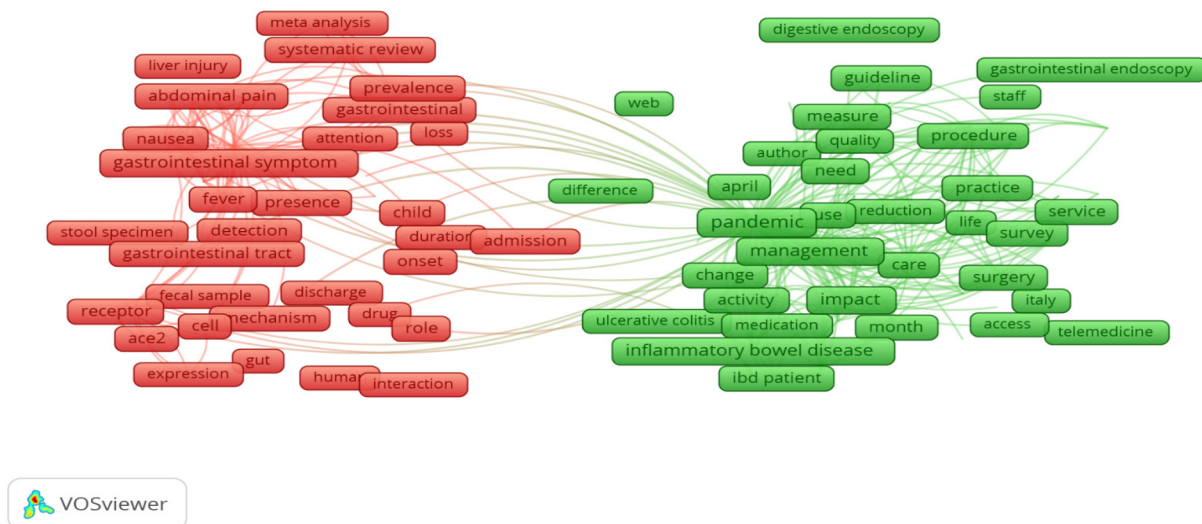
DOI: 10.4240/wjgs.v14.i5.494 **Copyright** ©The Author(s) 2022.

Figure 2 Network visualisation map of the most frequent terms in titles/abstracts of the retrieved literature pertaining to gastrointestinal publications involvement in coronavirus disease 2019. The terms were divided into two clusters based on the various colours created by default, namely, gastrointestinal manifestations coronavirus disease 2019 (COVID-19) patients (red), and implications of COVID-19 for gastroenterologists (green). The large icon indicates the terms that appeared at a high frequency. Among the 13932 terms, only 270 (defined as terms that occurred > 15 times) appeared in titles and abstracts in all publications.

research is becoming more common. The current data analysis reflects various facets of GI publication involvement in COVID-19, including the top countries, institutions, cited articles, journals generating COVID-19 publications, and hot topics in this field. It is critical to determine scientific output through bibliometric analysis to guide researchers on what has already been developed and what is currently

being researched so that future research can resolve information gaps.

Following the COVID-19 pandemic, high-income countries such as the United States, China, Italy, the United Kingdom, Spain, France and Germany are the world leaders in GI publications in COVID-19. A potential reason for these findings is the high prevalence of COVID-19 in countries that experienced the initial outbreak[61-66]. In the most recent studies, nearly 60% of the COVID-19 publications in the Web of Science come from the United States, China, Italy and the United Kingdom[67]. According to the research, the United States contributed the most scientific papers published during the COVID-19 pandemic. This is due to the fact that it has the most academic journals on the search sites in use, as well as being a country where researchers from all over the world want to publish their findings[68]. China was second in the ranking. This is demonstrated by the fact that China has over 3.61 million licensed doctors[13]. Furthermore, Chinese institutions contributed various papers to the COVID-19 research initiative and played a crucial role in the pandemic response[69].

This study found that many publications focused on GI manifestations among COVID-19 patients and implications of COVID-19 for gastroenterologists. So far, COVID-19-related research has involved disease transmission, virology and immunology, epidemiology, clinical characteristics, nonpharma-ceutical interventions, detection and diagnosis, treatment, vaccines, and other categories including the psychological status of the medical staff and public during the pandemic[67,70].

The current study used a bibliometric review to discuss the top 10 cited publications about GI involvement in COVID-19. Just three articles addressed GI intervention in COVID-19 patients, while the rest of the widely cited literature centred on GI characteristics and disease features in COVID-19 patients. The most-cited paper was Xiao *et al*[58], which was published in *Gastroenterology* as a brief communication, with 798 citations. This paper provides evidence for GI infection in COVID-19 and its possible faecal-oral transmission route. The second most-cited paper was by Xu *et al*[59] from *Nature Medicine* as a brief communication. According to the results of that study, rectal swab testing may be more helpful than nasopharyngeal swab testing in assessing the efficacy of management and timing of quarantine termination. However, replication-competent virus in faecal swabs was not demonstrated in the study, and this is necessary to confirm the possibility of faecal-oral transmission. The third most-cited paper was by Gu *et al*[52] in *Gastroenterology* as a commentary, which stated that COVID-19 could be present in the oral cavity and faeces of infected people. Moreover, that study recommended that the initial digestive symptoms of COVID-19 should be an alert for early isolation, detection, diagnosis and intervention.

Therefore, our study provides an understanding of the research on GI symptoms in COVID-19, and citation rates can indicate important research topics, development trends in COVID-19 and GI-related research, and provide a reference for research cooperation. However, the mechanism of intestinal infection, its relationship to cytokine release syndrome, and the probability of faecal-oral transmission all require further research in larger populations, especially prospective validation studies with well-designed questions.

This bibliometric analysis provides the first concise summary of global GI publications related to COVID-19. It highlights the benefits of bibliometric analysis in a systematic and structured way to measure the productivity of studies. However, no search strategy is flawless, and the dropout of false-positive or false-negative results is also expected. We attempted to be as comprehensive as possible, using all terms related to GI and COVID-19 listed in the literature. However, there was a possibility of missing some terms. Therefore, we did our best to retrieve all GI publications concerning COVID-19 and sought to verify their study approach using techniques introduced in previously published bibliometric studies. Furthermore, the number of citations will fluctuate over time due to the rapidly changing existence of COVID-19 science. The final limitation is that the authors did not search all scientific databases; however, this limitation is present in almost all bibliometric studies.

CONCLUSION

This research offers a detailed overview of the position of GI publications in COVID-19 research evolution during the early stages of the outbreak. In a short timespan (1 year) following the start of the COVID-19 pandemic, high-income countries such as the United States, China, Italy, the United Kingdom, Spain, France and Germany became the global leaders of GI-related publications, and were responsible for the bulk of the literature written in this field. This study has found that many public-ations focused on GI manifestations among COVID-19 patients and the implications of COVID-19 for gastroenterologists. While GI symptoms play an important role in COVID-19, there are still many knowledge gaps about their pathophysiology and prognostic value. Prospective studies with well-designed questions can be used to perform further research. The results of this bibliometric study will act as a basis for future research and guide decision-makers for research related to GI symptoms and treatment in COVID-19.

ARTICLE HIGHLIGHTS

Research background

Fever and respiratory symptoms are common in coronavirus disease 2019 (COVID-19) patients. Gastrointestinal (GI) symptoms such as diarrhoea, vomiting, and stomach pain may also occur in some patients.

Research motivation

There was an increase in the number of publications addressing the effect of COVID-19 on the GI system in a variety of countries during the outbreak, according to several systematic reviews and meta-analyses. There has not been a comprehensive bibliometric analysis of research on GI and COVID-19. The aim of bibliometrics is to determine the depth of knowledge in a given area.

Research objectives

The purpose of this study was to report a bibliometric analysis of the global research pertaining to GI involvement in COVID-19 to determine the most widely cited papers and most prolific countries, institutions, and journals related to this topic.

Research methods

We searched Scopus for publications during 2020, and selected articles focused on GI and COVID-19.

Research results

The current data analysis reflects various facets of GI-related publications in COVID-19, including the top countries, institutions, cited articles, journals generating COVID-19 publications, and hot topics in this field. It is critical to determine scientific output through bibliometric analysis to guide researchers on what has already been developed and what is currently being researched so that future research can resolve information gaps.

Research conclusions

COVID-19 GI manifestations and implications for gastroenterologists were of increasing concern, especially in the early stages of the pandemic. As a result, it is suggested that research on this subject be focused on the connection between GI manifestations and potential COVID-19 outcomes.

Research perspectives

Our results will help to guide priority setting and policy formulation for long-term strategies to improve the outcomes of COVID-19 patients with GI manifestations.

FOOTNOTES

ORCID number: Sa'ed H Zyoud 0000-0002-7369-2058; Samah W Al-Jabi 0000-0002-4414-9427; Moyad Jamal Shahwan 0000-0001-8367-4841; Ammar Abdulrahman Jairoun 0000-0002-4471-0878.

REFERENCES

1 **Huang C**, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z, Yu T, Xia J, Wei Y, Wu W, Xie X, Yin W, Li H, Liu M, Xiao Y, Gao H, Guo L, Xie J, Wang G, Jiang R, Gao Z, Jin Q, Wang J, Cao B. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020; **395**: 497-506 [PMID: 31986264 DOI: 10.1016/S0140-6736(20)30183-5]

2 **Zhu N**, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R, Niu P, Zhan F, Ma X, Wang D, Xu W, Wu G, Gao GF, Tan W; China Novel Coronavirus Investigating and Research Team. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med* 2020; **382**: 727-733 [PMID: 31978945 DOI: 10.1056/NEJMoa2001017]

3 **Adhikari SP**, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, Sun C, Sylvia S, Rozelle S, Raat H, Zhou H. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infect Dis Poverty* 2020; **9**: 29 [PMID: 32183901 DOI: 10.1186/s40249-020-00646-x]

4 **World Health Organization**. WHO Director-General's Remarks at the Media Briefing on 2019-nCoV on 11 February 2020. [cited 13 March 2021]. In: World Health Organization [Internet]. Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-remarks-at-the-media-briefing-on-2019-ncov-on-11-february-2020

5 **World Health Organization**. Coronavirus disease (COVID-19) outbreak situation. [cited 13 March 2021]. In: World Health Organization [Internet]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019

6 **Rokkas T**. Gastrointestinal involvement in COVID-19: a systematic review and meta-analysis. *Ann Gastroenterol* 2020; **33**: 355-365 [PMID: 32624655 DOI: 10.20524/aog.2020.0506]

7 **Cha MH**, Regueiro M, Sandhu DS. Gastrointestinal and hepatic manifestations of COVID-19: A comprehensive review. *World J Gastroenterol* 2020; **26**: 2323-2332 [PMID: 32476796 DOI: 10.3748/wjg.v26.i19.2323]

8 **Galanopoulos M**, Gkeros F, Doukatas A, Karianakis G, Pontas C, Tsoukalas N, Viazis N, Liatsos C, Mantzaris GJ. COVID-19 pandemic: Pathophysiology and manifestations from the gastrointestinal tract. *World J Gastroenterol* 2020; **26**: 4579-4588 [PMID: 32884218 DOI: 10.3748/wjg.v26.i31.4579]

9 **Parasa S**, Desai M, Thoguluva Chandrasekar V, Patel HK, Kennedy KF, Roesch T, Spadaccini M, Colombo M, Gabbiadini R, Artifon ELA, Repici A, Sharma P. Prevalence of Gastrointestinal Symptoms and Fecal Viral Shedding in Patients With Coronavirus Disease 2019: A Systematic Review and Meta-analysis. *JAMA Netw Open* 2020; **3**: e2011335 [PMID: 32525549 DOI: 10.1001/jamanetworkopen.2020.11335]

10 **Cheung KS**, Hung IFN, Chan PPY, Lung KC, Tso E, Liu R, Ng YY, Chu MY, Chung TWH, Tam AR, Yip CCY, Leung KH, Fung AY, Zhang RR, Lin Y, Cheng HM, Zhang AJX, To KKW, Chan KH, Yuen KY, Leung WK. Gastrointestinal Manifestations of SARS-CoV-2 Infection and Virus Load in Fecal Samples From a Hong Kong Cohort: Systematic Review and Meta-analysis. *Gastroenterology* 2020; **159**: 81-95 [PMID: 32251668 DOI: 10.1053/j.gastro.2020.03.065]

11 **Zarifian A**, Zamiri Bidary M, Arekhi S, Rafiee M, Gholamalizadeh H, Amiriani A, Ghaderi MS, Khadem-Rezaiyan M, Amini M, Ganji A. Gastrointestinal and hepatic abnormalities in patients with confirmed COVID-19: A systematic review and meta-analysis. *J Med Virol* 2021; **93**: 336-350 [PMID: 32681674 DOI: 10.1002/jmv.26314]

12 **Zhou P**, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, Si HR, Zhu Y, Li B, Huang CL, Chen HD, Chen J, Luo Y, Guo H, Jiang RD, Liu MQ, Chen Y, Shen XR, Wang X, Zheng XS, Zhao K, Chen QJ, Deng F, Liu LL, Yan B, Zhan FX, Wang YY, Xiao GF, Shi ZL. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature* 2020; **579**: 270-273 [PMID: 32015507 DOI: 10.1038/s41586-020-2012-7]

13 **Chen N**, Zhou M, Dong X, Qu J, Gong F, Han Y, Qiu Y, Wang J, Liu Y, Wei Y, Xia J, Yu T, Zhang X, Zhang L. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 2020; **395**: 507-513 [PMID: 32007143 DOI: 10.1016/S0140-6736(20)30211-7]

14 **Zaim S**, Chong JH, Sankaranarayanan V, Harky A. COVID-19 and Multiorgan Response. *Curr Probl Cardiol* 2020; **45**: 100618 [PMID: 32439197 DOI: 10.1016/j.cpcardiol.2020.100618]

15 **Wu Z**, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA* 2020; **323**: 1239-1242 [PMID: 32091533 DOI: 10.1001/jama.2020.2648]

16 **Ye Q**, Wang B, Zhang T, Xu J, Shang S. The mechanism and treatment of gastrointestinal symptoms in patients with COVID-19. *Am J Physiol Gastrointest Liver Physiol* 2020; **319**: G245-G252 [PMID: 32639848 DOI: 10.1152/ajpgi.00148.2020]

17 **Troisi J**, Venutolo G, Pujolassos Tanyà M, Delli Carri M, Landolfi A, Fasano A. COVID-19 and the gastrointestinal tract: Source of infection or merely a target of the inflammatory process following SARS-CoV-2 infection? *World J Gastroenterol* 2021; **27**: 1406-1418 [PMID: 33911464 DOI: 10.3748/wjg.v27.i14.1406]

18 **Zhang J**, Garrett S, Sun J. Gastrointestinal symptoms, pathophysiology, and treatment in COVID-19. *Genes Dis* 2021; **8**: 385-400 [PMID: 33521210 DOI: 10.1016/j.gendis.2020.08.013]

19 **Aziz M**, Haghbin H, Lee-Smith W, Goyal H, Nawras A, Adler DG. Gastrointestinal predictors of severe COVID-19: systematic review and meta-analysis. *Ann Gastroenterol* 2020; **33**: 615-630 [PMID: 33162738 DOI: 10.20524/aog.2020.0527]

20 **Wang H**, Qiu P, Liu J, Wang F, Zhao Q. The liver injury and gastrointestinal symptoms in patients with Coronavirus Disease 19: A systematic review and meta-analysis. *Clin Res Hepatol Gastroenterol* 2020; **44**: 653-661 [PMID: 32418852 DOI: 10.1016/j.clinre.2020.04.012]

21 **Dong ZY**, Xiang BJ, Jiang M, Sun MJ, Dai C. The Prevalence of Gastrointestinal Symptoms, Abnormal Liver Function, Digestive System Disease and Liver Disease in COVID-19 Infection: A Systematic Review and Meta-Analysis. *J Clin Gastroenterol* 2021; **55**: 67-76 [PMID: 33116063 DOI: 10.1097/MCG.0000000000001424]

22   **Dorrell RD**, Dougherty MK, Barash EL, Lichtig AE, Clayton SB, Jensen ET. Gastrointestinal and hepatic manifestations of COVID-19: A systematic review and meta-analysis. *JGH Open* 2020 [PMID: 33363257 DOI: 10.1002/jgh3.12456]

23   **Gul F**, Lo KB, Peterson J, McCullough PA, Goyal A, Rangaswami J. Meta-analysis of outcomes of patients with COVID-19 infection with *vs* without gastrointestinal symptoms. *Proc (Bayl Univ Med Cent)* 2020; **33**: 366-369 [PMID: 32669979 DOI: 10.1080/08998280.2020.1771164]

24   **Kumar A**, Arora A, Sharma P, Anikhindi SA, Bansal N, Singla V, Khare S, Srivastava A. Gastrointestinal and hepatic manifestations of Corona Virus Disease-19 and their relationship to severe clinical course: A systematic review and meta-analysis. *Indian J Gastroenterol* 2020; **39**: 268-284 [PMID: 32749643 DOI: 10.1007/s12664-020-01058-3]

25   **Mao R**, Qiu Y, He JS, Tan JY, Li XH, Liang J, Shen J, Zhu LR, Chen Y, Iacucci M, Ng SC, Ghosh S, Chen MH. Manifestations and prognosis of gastrointestinal and liver involvement in patients with COVID-19: a systematic review and meta-analysis. *Lancet Gastroenterol Hepatol* 2020; **5**: 667-678 [PMID: 32405603 DOI: 10.1016/S2468-1253(20)30126-6]

26   **Suresh Kumar VC**, Mukherjee S, Harne PS, Subedi A, Ganapathy MK, Patthipati VS, Sapkota B. Novelty in the gut: a systematic review and meta-analysis of the gastrointestinal manifestations of COVID-19. *BMJ Open Gastroenterol* 2020; **7** [PMID: 32457035 DOI: 10.1136/bmjgast-2020-000417]

27   **Tariq R**, Saha S, Furqan F, Hassett L, Pardi D, Khanna S. Prevalence and Mortality of COVID-19 Patients With Gastrointestinal Symptoms: A Systematic Review and Meta-analysis. *Mayo Clin Proc* 2020; **95**: 1632-1648 [PMID: 32753138 DOI: 10.1016/j.mayocp.2020.06.003]

28   **Hicks D**, Wouters P, Waltman L, de Rijcke S, Rafols I. Bibliometrics: The Leiden Manifesto for research metrics. *Nature* 2015; **520**: 429-431 [PMID: 25903611 DOI: 10.1038/520429a]

29   **Chahrour M**, Assi S, Bejjani M, Nasrallah AA, Salhab H, Fares M, Khachfe HH. A Bibliometric Analysis of COVID-19 Research Activity: A Call for Increased Output. *Cureus* 2020; **12**: e7357 [PMID: 32328369 DOI: 10.7759/cureus.7357]

30   **DE Felice F**, Polimeni A. Coronavirus Disease (COVID-19): A Machine Learning Bibliometric Analysis. *In Vivo* 2020; **34**: 1613-1617 [PMID: 32503819 DOI: 10.21873/invivo.11951]

31   **Gong Y**, Ma TC, Xu YY, Yang R, Gao LJ, Wu SH, Li J, Yue ML, Liang HG, He X, Yun T. Early Research on COVID-19: A Bibliometric Analysis. *Innovation (N Y)* 2020; **1**: 100027 [PMID: 32914141 DOI: 10.1016/j.xinn.2020.100027]

32   **Yu Y**, Li Y, Zhang Z, Gu Z, Zhong H, Zha Q, Yang L, Zhu C, Chen E. A bibliometric analysis using VOSviewer of publications on COVID-19. *Ann Transl Med* 2020; **8**: 816 [PMID: 32793661 DOI: 10.21037/atm-20-4235]

33   **Sweileh WM**. Bibliometric analysis of peer-reviewed literature on antimicrobial stewardship from 1990 to 2019. *Global Health* 2021; **17**: 1 [PMID: 33397377 DOI: 10.1186/s12992-020-00651-7]

34   **Dehghanbanadaki H**, Aazami H, Keshavarz Azizi Raftar S, Ashrafian F, Ejtahed HS, Hashemi E, Hoseini Tavassol Z, Ahmadi Badi S, Siadat SD. Global scientific output trend for Akkermansia muciniphila research: a bibliometric and scientometric analysis. *BMC Med Inform Decis Mak* 2020; **20**: 291 [PMID: 33167984 DOI: 10.1186/s12911-020-01312-w]

35   **Andersen N**, Bramness JG, Lund IO. The emerging COVID-19 research: dynamic and regularly updated science maps and analyses. *BMC Med Inform Decis Mak* 2020; **20**: 309 [PMID: 33256719 DOI: 10.1186/s12911-020-01321-9]

36   **Aristovnik A**, Ravšelj D, Umek L. A Bibliometric Analysis of COVID-19 across Science and Social Science Research Landscape. *Sustainability* 2020; **12**: 9132 [DOI: 10.3390/su12219132]

37   **Furstenau LB**, Rabaioli B, Sott MK, Cossul D, Bender MS, Farina EMJM, Filho FNB, Severo PP, Dohan MS, Bragazzi NL. A Bibliometric Network Analysis of Coronavirus during the First Eight Months of COVID-19 in 2020. *Int J Environ Res Public Health* 2021; **18** [PMID: 33499127 DOI: 10.3390/ijerph18030952]

38   **Borku Uysal B**, Islamoglu MS, Koc S, Karadag M, Dokur M. Most notable 100 articles of COVID-19: an Altmetric study based on bibliometric analysis. *Ir J Med Sci* 2021; **190**: 1335-1341 [PMID: 33459942 DOI: 10.1007/s11845-020-02460-8]

39   **Huang ZD**, Gu HY, Zhu J, Luo J, Shen XF, Deng QF, Zhang C, Li YB. The application of enhanced recovery after surgery for upper gastrointestinal surgery: Meta-analysis. *BMC Surg* 2020; **20**: 3 [PMID: 31900149 DOI: 10.1186/s12893-019-0669-3]

40   **van Eck NJ**, Waltman L. Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics* 2010; **84**: 523-538 [PMID: 20585380 DOI: 10.1007/s11192-009-0146-3]

41   **Wang K**, Xing D, Dong S, Lin J. The global state of research in nonsurgical treatment of knee osteoarthritis: a bibliometric and visualized study. *BMC Musculoskelet Disord* 2019; **20**: 407 [PMID: 31484517 DOI: 10.1186/s12891-019-2804-9]

42   **Docherty AB**, Harrison EM, Green CA, Hardwick HE, Pius R, Norman L, Holden KA, Read JM, Dondelinger F, Carson G, Merson L, Lee J, Plotkin D, Sigfrid L, Halpin S, Jackson C, Gamble C, Horby PW, Nguyen-Van-Tam JS, Ho A, Russell CD, Dunning J, Openshaw PJ, Baillie JK, Semple MG; ISARIC4C investigators. Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: prospective observational cohort study. *BMJ* 2020; **369**: m1985 [PMID: 32444460 DOI: 10.1136/bmj.m1985]

43   **Dreher M**, Kersten A, Bickenbach J, Balfanz P, Hartmann B, Cornelissen C, Daher A, Stöhr R, Kleines M, Lemmen SW, Brokmann JC, Müller T, Müller-Wieland D, Marx G, Marx N. The Characteristics of 50 Hospitalized COVID-19 Patients With and Without ARDS. *Dtsch Arztebl Int* 2020; **117**: 271-278 [PMID: 32519944 DOI: 10.3238/arztebl.2020.0271]

44   **Ghoshal UC**, Ghoshal U, Mathur A, Singh RK, Nath A, Garg A, Singh D, Singh S, Singh J, Pandey A, Rai S, Vasanth S, Dhiman RK. The Spectrum of Gastrointestinal Symptoms in Patients With Coronavirus Disease-19: Predictors, Relationship With Disease Severity, and Outcome. *Clin Transl Gastroenterol* 2020; **11**: e00259 [PMID: 33463978 DOI: 10.14309/ctg.0000000000000259]

45   **Klopfenstein T**, Kadiane-Oussou NJ, Royer PY, Toko L, Gendrin V, Zayet S. Diarrhea: An underestimated symptom in Coronavirus disease 2019. *Clin Res Hepatol Gastroenterol* 2020; **44**: 282-283 [PMID: 32371006 DOI: 10.1016/j.clinre.2020.04.002]

46   **Montazeri M**, Maghbouli N, Jamali R, Sharifi A, Pazoki M, Salimzadeh A, Barzegari B, Rafiei N, Mansouri ES, Hadadi A. Clinical Characteristics of COVID-19 Patients with Gastrointestinal Symptoms. *Arch Iran Med* 2021; **24**: 131-138 [PMID: 33636982 DOI: 10.34172/aim.2021.21]

47   **Papa A**, Covino M, Pizzolante F, Miele L, Lopetuso LR, Bove V, Iorio R, Simeoni B, Vetrone LM, Tricoli L, Mignini I, Schepis T, D'Alessandro A, Coppola G, Nicoletti T, Visconti E, Rapaccini G. Gastrointestinal symptoms and digestive

comorbidities in an Italian cohort of patients with COVID-19. *Eur Rev Med Pharmacol Sci* 2020; **24**: 7506-7511 [PMID: 32706091 DOI: 10.26355/eurrev_202007_21923]

48   **Redd WD**, Zhou JC, Hathorn KE, McCarty TR, Bazarbashi AN, Thompson CC, Shen L, Chan WW. Prevalence and Characteristics of Gastrointestinal Symptoms in Patients With Severe Acute Respiratory Syndrome Coronavirus 2 Infection in the United States: A Multicenter Cohort Study. *Gastroenterology* 2020; **159**: 765-767.e2 [PMID: 32333911 DOI: 10.1053/j.gastro.2020.04.045]

49   **Rivera-Izquierdo M**, Valero-Ubierna MDC, Martínez-Diz S, Fernández-García MÁ, Martín-Romero DT, Maldonado-Rodríguez F, Sánchez-Pérez MR, Martín-delosReyes LM, Martínez-Ruiz V, Lardelli-Claret P, Jiménez-Mejías E. Clinical Factors, Preventive Behaviours and Temporal Outcomes Associated with COVID-19 Infection in Health Professionals at a Spanish Hospital. *Int J Environ Res Public Health* 2020; **17** [PMID: 32560180 DOI: 10.3390/ijerph17124305]

50   **COVID-19 National Incident Room Surveillance Team**. COVID-19, Australia: Epidemiology Report 7 (Reporting week ending 19:00 AEDT 14 March 2020). *Commun Dis Intell (2018)* 2020; **44** [PMID: 32192424 DOI: 10.33321/cdi.2020.44.23]

51   **Zheng T**, Yang C, Wang HY, Chen X, Yu L, Wu ZL, Sun H. Clinical characteristics and outcomes of COVID-19 patients with gastrointestinal symptoms admitted to Jianghan Fangcang Shelter Hospital in Wuhan, China. *J Med Virol* 2020; **92**: 2735-2741 [PMID: 32510173 DOI: 10.1002/jmv.26146]

52   **Gu J**, Han B, Wang J. COVID-19: Gastrointestinal Manifestations and Potential Fecal-Oral Transmission. *Gastroenterology* 2020; **158**: 1518-1519 [PMID: 32142785 DOI: 10.1053/j.gastro.2020.02.054]

53   **Jin X**, Lian JS, Hu JH, Gao J, Zheng L, Zhang YM, Hao SR, Jia HY, Cai H, Zhang XL, Yu GD, Xu KJ, Wang XY, Gu JQ, Zhang SY, Ye CY, Jin CL, Lu YF, Yu X, Yu XP, Huang JR, Xu KL, Ni Q, Yu CB, Zhu B, Li YT, Liu J, Zhao H, Zhang X, Yu L, Guo YZ, Su JW, Tao JJ, Lang GJ, Wu XX, Wu WR, Qv TT, Xiang DR, Yi P, Shi D, Chen Y, Ren Y, Qiu YQ, Li LJ, Sheng J, Yang Y. Epidemiological, clinical and virological characteristics of 74 cases of coronavirus-infected disease 2019 (COVID-19) with gastrointestinal symptoms. *Gut* 2020; **69**: 1002-1009 [PMID: 32213556 DOI: 10.1136/gutjnl-2020-320926]

54   **Lamers MM**, Beumer J, van der Vaart J, Knoops K, Puschhof J, Breugem TI, Ravelli RBG, Paul van Schayck J, Mykytyn AZ, Duimel HQ, van Donselaar E, Riesebosch S, Kuijpers HJH, Schipper D, van de Wetering WJ, de Graaf M, Koopmans M, Cuppen E, Peters PJ, Haagmans BL, Clevers H. SARS-CoV-2 productively infects human gut enterocytes. *Science* 2020; **369**: 50-54 [PMID: 32358202 DOI: 10.1126/science.abc1669]

55   **Pan L**, Mu M, Yang P, Sun Y, Wang R, Yan J, Li P, Hu B, Wang J, Hu C, Jin Y, Niu X, Ping R, Du Y, Li T, Xu G, Hu Q, Tu L. Clinical Characteristics of COVID-19 Patients With Digestive Symptoms in Hubei, China: A Descriptive, Cross-Sectional, Multicenter Study. *Am J Gastroenterol* 2020; **115**: 766-773 [PMID: 32287140 DOI: 10.14309/ajg.0000000000000620]

56   **Tian Y**, Rong L, Nian W, He Y. Review article: gastrointestinal features in COVID-19 and the possibility of faecal transmission. *Aliment Pharmacol Ther* 2020; **51**: 843-851 [PMID: 32222988 DOI: 10.1111/apt.15731]

57   **Wu Y**, Guo C, Tang L, Hong Z, Zhou J, Dong X, Yin H, Xiao Q, Tang Y, Qu X, Kuang L, Fang X, Mishra N, Lu J, Shan H, Jiang G, Huang X. Prolonged presence of SARS-CoV-2 viral RNA in faecal samples. *Lancet Gastroenterol Hepatol* 2020; **5**: 434-435 [PMID: 32199469 DOI: 10.1016/S2468-1253(20)30083-2]

58   **Xiao F**, Tang M, Zheng X, Liu Y, Li X, Shan H. Evidence for Gastrointestinal Infection of SARS-CoV-2. *Gastroenterology* 2020; **158**: 1831-1833.e3 [PMID: 32142773 DOI: 10.1053/j.gastro.2020.02.055]

59   **Xu Y**, Li X, Zhu B, Liang H, Fang C, Gong Y, Guo Q, Sun X, Zhao D, Shen J, Zhang H, Liu H, Xia H, Tang J, Zhang K, Gong S. Characteristics of pediatric SARS-CoV-2 infection and potential evidence for persistent fecal viral shedding. *Nat Med* 2020; **26**: 502-505 [PMID: 32284613 DOI: 10.1038/s41591-020-0817-4]

60   **Yeo C**, Kaushal S, Yeo D. Enteric involvement of coronaviruses: is faecal-oral transmission of SARS-CoV-2 possible? *Lancet Gastroenterol Hepatol* 2020; **5**: 335-337 [PMID: 32087098 DOI: 10.1016/S2468-1253(20)30048-0]

61   **Bernard Stoecklin S**, Rolland P, Silue Y, Mailles A, Campese C, Simondon A, Mechain M, Meurice L, Nguyen M, Bassi C, Yamani E, Behillil S, Ismael S, Nguyen D, Malvy D, Lescure FX, Georges S, Lazarus C, Tabaï A, Stempfelet M, Enouf V, Coignard B, Levy-Bruhl D; Investigation Team. First cases of coronavirus disease 2019 (COVID-19) in France: surveillance, investigations and control measures, January 2020. *Euro Surveill* 2020; **25** [PMID: 32070465 DOI: 10.2807/1560-7917.ES.2020.25.6.2000094]

62   **Marchand-Senécal X**, Kozak R, Mubareka S, Salt N, Gubbay JB, Eshaghi A, Allen V, Li Y, Bastien N, Gilmour M, Ozaldin O, Leis JA. Diagnosis and Management of First Case of COVID-19 in Canada: Lessons Applied From SARS-CoV-1. *Clin Infect Dis* 2020; **71**: 2207-2210 [PMID: 32147731 DOI: 10.1093/cid/ciaa227]

63   **Wells CR**, Sah P, Moghadas SM, Pandey A, Shoukat A, Wang Y, Wang Z, Meyers LA, Singer BH, Galvani AP. Impact of international travel and border control measures on the global spread of the novel 2019 coronavirus outbreak. *Proc Natl Acad Sci U S A* 2020; **117**: 7504-7509 [PMID: 32170017 DOI: 10.1073/pnas.2002616117]

64   **Livingston E**, Bucher K. Coronavirus Disease 2019 (COVID-19) in Italy. *JAMA* 2020; **323**: 1335 [PMID: 32181795 DOI: 10.1001/jama.2020.4344]

65   **Spiteri G**, Fielding J, Diercke M, Campese C, Enouf V, Gaymard A, Bella A, Sognamiglio P, Sierra Moros MJ, Riutort AN, Demina YV, Mahieu R, Broas M, Bengnér M, Buda S, Schilling J, Filleul L, Lepoutre A, Saura C, Mailles A, Levy-Bruhl D, Coignard B, Bernard-Stoecklin S, Behillil S, van der Werf S, Valette M, Lina B, Riccardo F, Nicastri E, Casas I, Larrauri A, Salom Castell M, Pozo F, Maksyutov RA, Martin C, Van Ranst M, Bossuyt N, Siira L, Sane J, Tegmark-Wisell K, Palmérus M, Broberg EK, Beauté J, Jorgensen P, Bundle N, Pereyaslov D, Adlhoch C, Pukkila J, Pebody R, Olsen S, Ciancio BC. First cases of coronavirus disease 2019 (COVID-19) in the WHO European Region, 24 January to 21 February 2020. *Euro Surveill* 2020; **25** [PMID: 32156327 DOI: 10.2807/1560-7917.ES.2020.25.9.2000178]

66   **Sjölander-Lindqvist A**, Larsson S, Fava N, Gillberg N, Marcianò C, Cinque S. Communicating About COVID-19 in Four European Countries: Similarities and Differences in National Discourses in Germany, Italy, Spain, and Sweden. *Front Commun* 2020; **5**: 593325 [DOI: 10.3389/fcomm.2020.593325]

67   **Wang P**, Tian D. Bibliometric analysis of global scientific research on COVID-19. *J Biosaf Biosecur* 2021; **3**: 4-9 [PMID: 33521590 DOI: 10.1016/j.jobb.2020.12.002]

68   **Oliveira EMN**, Carvalho ARB, Silva JSE, Sousa Neto AR, Moura MEB, Freitas DRJ. Analysis of scientific production on the new coronavirus (COVID-19): a bibliometric analysis. *Sao Paulo Med J* 2021; **139**: 3-9 [PMID: 33656129 DOI: 10.1590/1516-3180.2020.0449.R1.01102020]

69   **Xiang YT**, Li W, Zhang Q, Jin Y, Rao WW, Zeng LN, Lok GKI, Chow IHI, Cheung T, Hall BJ. Timely research papers about COVID-19 in China. *Lancet* 2020; **395**: 684-685 [PMID: 32078803 DOI: 10.1016/S0140-6736(20)30375-5]

70   **Pfefferbaum B**, North CS. Mental Health and the Covid-19 Pandemic. *N Engl J Med* 2020; **383**: 510-512 [PMID: 32283003 DOI: 10.1056/NEJMp2008017]

Baishideng®