

The Evolution of Cholecystitis: A Global Productivity and Publication Trends: Bibliometric Analysis of Cholecystitis

Murat Baki Yıldırım¹, Murat Bulut Özkan^{1*}

¹ Hitit University, Faculty of Medicine, Department of Surgery, Çorum, TR

* Corresponding Author: Murat Bulut Özkan E-mail: bulutozkan@gmail.com

ABSTRACT

Objective: There is still no bibliometric study on Cholecystitis, although the literature has an increasing number of global studies. This study aims to analyse the scientific articles published on Cholecystitis between 1980 and 2020 using statistical methods.

Material and Methods: Articles on Cholecystitis published between 1980 and 2020 were downloaded using the Web of Science (WoS) database and analysed using statistical and bibliometric methods. Spearman correlation coefficient was used for correlation analyses. Non-linear (exponential model) regression analysis was used to predict the number of publications in the coming years. Keyword network visualisation maps were used to identify trend topics.

Results: A total of 5052 publications were found. 3174 (62.8%) of these publications, were articles. The top 2 countries that contributed most to the literature were the USA (788, 24.8%) and Japan (303, 9.5%). The most active top 3 institutions were Teikyo University (n=35), Washington University (35), and Seoul National University (27). The top 3 journals with the highest number of publications were Khirurgiya (n=124), American Surgeon (71), and Vestnik Khirurgii Imeni II Grekova (69). According to the average number of citations per article, the most influential journals were Annals of Surgery (Citation: 87), Radiology (61.6), and Journal of Hepato-Biliary-Pancreatic Surgery (56.9), respectively.

Conclusion: This comprehensive study on Cholecystitis, which has increased the number of articles in recent years, presented summary information of 3174 articles. Results can be said that the trend topics in cholecystitis studies in recent years are Tokyo guidelines, C-reactive protein, gallbladder drainage, emergency surgery, emergency cholecystectomy, cystic duct, choledocholithiasis, inflammation, acute cholecystitis, delayed laparoscopic cholecystectomy, and percutaneous transhepatic gallbladder drainage/aspiration. This article may be a useful resource for clinicians and scientists on global outputs of cholecystitis.

Keywords: Bibliometric analysis, Cholecystitis, cholecystectomy, gallbladder drainage, trends

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INTRODUCTION

Acute Cholecystitis is an acute inflammatory disease of the gallbladder. It can often be attributed to gallstones; however, many associated factors including ischemia, motility disorders, direct chemical injury, infections with microorganisms, protozoa, and parasites, collagen disease, and allergic reaction (1). One of the important conditions causing abdominal pain complaints is acute Cholecystitis, accounting for 3-10% of all patients with abdominal pain. In most cases, gallstones are the cause of acute Cholecystitis. While, Cholecystolithiasis accounts for 90-95% of all causes of acute Cholecystitis, acalculous Cholecystitis accounts for the remaining 5-10% (1).

An International Consensus Meeting on the Management of Acute Cholecystitis and Cholangitis was held, and the first guideline TG07 was published in 2007 (1,2). Afterward, TG07 was revised, and Tokyo 2013 (TG13) and Tokyo 2018 (TG18) guidelines were published in order to use a common language for the diagnosis and treatment of Cholecystitis (3,5).

The TG18/TG13 guideline defined 3 main titles of diagnostic criteria for acute Cholecystitis as follows: local signs of inflammation (Murphy's sign, Right upper quadrant mass/pain/tenderness), systemic signs of inflammation (Fever, elevated CRP, elevated WBC count), and imaging findings (3,5). The generally accepted imaging findings of acute Cholecystitis include increased gallbladder wall thickness (≥ 4 mm), gallbladder enlargement (long axis ≥ 8 cm, short axis ≥ 4 cm), gallstones or biliary sludge (debris), fluid accumulation around the gallbladder, and linear shadows in the adipose tissue around the gallbladder (6). One item in the local signs of inflammation and one item in the systemic signs of inflammation indicate a suspicious diagnosis, while one item in the local signs of inflammation, systemic signs of inflammation, and imaging findings indicate the definitive diagnosis (3,5).

While the mortality rate is 0-10% in patients with acute Cholecystitis, it is as high as 23-40% in patients with postoperative Cholecystitis and Cholecystitis without stones (1). Elderly patients (75 years and older) tend to have a higher mortality rate than younger patients, and the presence of a comorbid disease such as diabetes mellitus may increase the risk of death (7,8).

Bibliometric analysis is the analysis of scientific outputs using statistical methods (9). In parallel with the increasing number of publications in the literature, studies on many important medical subjects have been carried out based on statistical and bibliometric analyses, especially in recent years (9-14). Thanks to bibliometric research, researchers can dominate the literature by reading the abstract results obtained as a result of the analysis of many studies on a subject in a short time (10,11). Moreover, these studies, which were revealed using comprehensive statistical methods, also offer researchers ideas about new studies that they can design by showing past and current trends (12,13). Bibliometric studies can also demonstrate the general research trend of a subject in the world by revealing international collaborations. Thanks to bibliometric research, the most active authors, institutions, journals, and the most cited influential studies on a subject are revealed (9-14). Although the number of global studies on Cholecystitis, which has an important place among patients presenting to the emergency department, has increased in recent years, there is still no bibliometric study in the literature. The aim of this study was to analyse scientific articles published on Cholecystitis between 1980 and 2020 using statistical and bibliometric methods. As a result of the analyses, it was aimed to identify the most influential studies, authors, journals, institutions, and countries on Cholecystitis, to reveal cooperation between countries, to reveal past and current trend issues, and to summarise Cholecystitis in a holistic manner.

MATERIAL and METHODS

Web of Science (WoS) database (by Clarivate Analytics) was used for literature review. In WoS, Cholecystitis was used as the search keyword. The publication search was done only in the "title" section of the studies. All articles with Cholecystitis in the title were obtained by this search method and these articles were downloaded from the WoS database. The search process was determined as 1980-2020 (access date: 15.05.2021). Reproducibility codes for researchers to access similar documents (search findings may vary depending on different access dates): (title: (Cholecystitis) Timespan: 1980-2020. Indexes: SCI-Expanded, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI).

VOSviewer (Version 1.6.16, Leiden University's Center for Science and Technology Studies) package program was used for bibliometric network visualisations (15). The website (<https://app.datawrapper.de>) was used for world map drawing.

Statistical analyses were performed with the SPSS (Version 22.0, SPSS Inc., Chicago, IL, USA, License: Hitit University) program. The normal distribution of data was tested with the Kolmogorov-Smirnov and Shapiro-Wilk tests. In order to determine whether there is an effect of economic power on world publication productivity on Cholecystitis, the Spearman correlation coefficient was calculated in accordance with the data normal distribution between the number of articles produced by world countries and some economic development indicators (Gross Domestic Product (GDP), Gross Domestic Product per capita (GDP per capita)) of world countries (data obtained from the world bank: 16). Nonlinear regression analysis (exponential model) was used to estimate the number of publications in the coming years. R2 value was used to evaluate model success in regression analysis. The statistically significant difference limit was accepted as $P < 0.05$.

RESULTS

As a result of the literature review, total 5052 publications on Cholecystitis were published between 1980 and 2020 (WoS database). The distribution of publications; article (3174, 62.8%), meeting abstract (815, 16.1%), letter (372, 7.3%), editorial material (277, 5.4%), review (180, 3.5%), note (137, 2.7%), proceedings paper (131, 2.5%), and the remaining were in other publication types (discussion, correction, early access, book chapter, news item, correction addition, reprint, retraction). Bibliometric analyses were carried out with 3174 articles out of a total of 5052 publications. Of these articles, 79.8% (2534) were English, 10% (349) were Russian, 3.2% (104) were German, 2.9% (95) were French, 2.1% (67) were

Spanish, and the remaining were published in other languages (Turkish Italian, Korean, Portuguese, Hungarian, Chinese, Dutch, Icelandic, Japanese, Slovenian, and Ukrainian). The h-index of the 3174 articles was 83, with an average citation per article of 13.66 and a sum of times cited of 43362 (without self-citations: 26587).

Evolution and Future Trend of Publications

The distribution of the number of published articles by years is shown in **Figure 1** together with a line chart. The results of nonlinear exponential model regression analysis used to estimate the number of articles that can be published in 2021 and later are also shown in **Figure 1**. The compatibility of the exponential model with the data ($R^2=99.7$) was quite successful with 99.7%. Based on the exponential model results, it was estimated that 191 (Confidence Interval%: 164-217) articles would be published in 2021 and 244 (CI%: 189-300) articles would be published in 2025 (**Figure 1**).

Active Countries on Cholecystitis

The distribution of the number of articles by world countries is shown in **Figure 2**. According to the number of articles, the first 20 countries with the highest number of articles were the USA (788, 24.8%), Japan (303, 9.5%), Russia+USSR (292, 9.2%), South Korea (142, 4.4%), Germany+German Federal Republic (142, 4.4%), UK (140, 4.4%), China (134, 4.2%), France (124, 3.9%), Turkey (115, 3.6%), Spain (105, 3.3%), Italy (94, 2.9%), India (91, 2.8%), Taiwan (90, 2.8%), Australia (70, 2.2%), Israel (70, 2.2%), Canada (54, 1.7%), Sweden (54, 1.7%), Netherlands (47, 1.4%), Greece (40, 1.2%), and Belgium (38, 1.1%).

Cluster analysis was performed among 38 countries that produced at least 5 articles from 96 countries that produced publications on Cholecystitis and had international cooperation among their authors, and 7 different clusters related to international cooperation were created based on the results of the analysis (Cluster 1: Canada, Denmark, England, Germany, Ireland, Italy, Portugal, Romania, Spain, Switzerland, Cluster 2: Argentina, New Zealand, China, Philippines, Singapore, South Korea, Thailand, Cluster 3: Brazil, Chile, Finland, Israel, Pakistan, Turkey, USA, Cluster 4: Egypt, India, Japan, Saudi Arabia, Scotland, Cluster 5: Greece, Malaysia, South Africa, Taiwan, Cluster 6: Belgium, France, Netherlands, Cluster 7: Australia, Jordan).

Correlation Analysis on Cholecystitis

There was a statistically positive and highly significant correlation between the number of articles produced by countries on Cholecystitis and GDP, and GDP per capita ($r=0.735$, $p<0.001$; $r=0.703$, $p<0.001$).

Active Authors on Cholecystitis

The 13 most active authors who produced more than 15 articles on Cholecystitis were Yoshida M. (34), Takada T. (33), Miura F. (29), Mayumi T. (27), Pitt HA. (23), Strasberg SM. (23), Gouma DJ. (19), Itoi T. (19), Yamashita Y. (19), Fan ST. (18), Gomi H. (18), Yokoe M. (17), and Higuchi R. (16), respectively.

Active Institutions on Cholecystitis

The 20 most active universities that produced more than 15 articles on Cholecystitis were Teikyo University (35), Washington University (35), Seoul National University (27), University Ulsan (26), Harvard University (23), University Texas (23), Tokyo Womens Medical University (22), University California San Francisco (22), University of Southern California (22), Tel Aviv University (19), University Hong Kong (19), Yonsei University (19), Chinese University Hong Kong (18), International University of Health and Welfare (18), Massachusetts Gen Hospital (18), University of Occupational & Environmental Health (18), Sechenov First Moscow State Medical University (17), Toho University (17), Ogaki Municipal Hospital (16), and University Tokyo (16).

Active Journals on Cholecystitis

A total of 3174 articles on Cholecystitis were published in 787 different journals. Among these journals, the first 66 most active journals producing 10 or more articles, the total number of citations received by the journals, and the average number of citations per article are presented in **Table 1**. The citation network visualisation map for these journals is presented in **Figure 3**.

Citation Analysis on Cholecystitis

Among the 3174 articles published between 1980 and 2020, the top 20 most cited articles (articles with more than 160 citations) according to the total number of citations are presented in **Table 2**. The last column of Table 2 shows the average number of citations per year.

Co-citation Analysis on Cholecystitis

There were 25015 studies cited in the references section of all 3174 articles analysed. Among these studies, the top 8 studies that received the highest number of co-citations (more than 100 citations) were the studies of Lo et al. (1998) (Number of co-citations, NC: 185), Lai et al. (1998) (NC: 145), Hirota et al. (2007) (NC: 140), Yokoe et al. (2013) (NC: 125), Kiviluoto et al. (1998) (NC: 117), Rattner et al. (1993) (NC: 115), Gurusamy et al. (2010) (NC: 111), and Strasberg et al. (2008) (NC: 104) (2,4,17-22).

Trend topics on Cholecystitis

In all 3174 articles published on Cholecystitis, 2497 different keywords were used. Among these keywords, 83 different keywords used in at least 8 different articles are shown in **Table 3**.

The trend visualisation network map performed to reveal trend topics among these keywords is shown in **Figure 4.a** and the keyword citation network visualisation map performed to reveal the most cited topics is shown in **Figure 4.b**.

Table 1. 66 most active journals with more than 10 articles on cholecystitis

Journals	RC	C	AC	Journals	RC	C	AC
Khirurgiya	124	77	0.6	Journal of Clinical Ultrasound	17	282	16.6
American Surgeon	71	1450	20.4	Scandinavian Journal Of Gastroenterology	17	296	17.4
Vestnik Khirurgii Imeni II Grekova	69	7	0.1	Surgery Today	17	241	14.2
Surgical Endoscopy and Other Interventional Techniques	65	1793	27.6	Zentralblatt Fur Chirurgie	17	41	2.4
American Journal of Surgery	62	2428	39.2	Journal of Surgical Case Reports	16	11	0.7
American Journal of Roentgenology	52	1893	36.4	Medicine	16	72	4.5
Hepato-Gastroenterology	49	764	15.6	Acta Chirurgica Belgica	15	79	5.3
Journal of Hepato-Biliary-Pancreatic Sciences	48	2057	42.9	Clinical Radiology	15	198	13.2
Vrachebnoe Delo	47	10	0.2	Digestive Surgery	15	146	9.7
World Journal of Surgery	38	1214	31.9	HPB	15	262	17.5
Journal of Gastrointestinal Surgery	36	688	19.1	Abdominal Imaging	14	234	16.7
Surgical Laparoscopy Endoscopy & Percutaneous Techniques	35	478	13.7	ANZ Journal of Surgery	14	170	12.1
Klinicheskaya Meditsina	34	2	0.1	Revista Espanola De Las Enfermedades Del Aparato Digestivo	14	10	0.7
World Journal of Gastroenterology	32	514	16.1	Surgical Endoscopy-Ultrasound and Interventional Techniques	13	469	36.1
British Journal of Surgery	31	1647	53.1	Internal Medicine	13	47	3.6
Clinical Nuclear Medicine	30	202	6.7	Acta Chirurgica Scandinavica	12	142	11.8
Sovetskaya Meditsina	30	10	0.3	Australian and New Zealand Journal of Surgery	12	101	8.4
Terapevticheskii Arkhiv	30	7	0.2	BMC Gastroenterology	12	134	11.2
Radiology	29	1786	61.6	Clinical Imaging	12	100	8.3
American Journal of Gastroenterology	25	504	20.2	Endoscopy	12	454	37.8
Gastrointestinal Endoscopy	24	625	26.0	Gastrointestinal Radiology	12	202	16.8
Cureus	23	20	0.9	Southern Medical Journal	12	159	13.3
Annals of Surgery	22	1915	87.0	Surgery Gynecology & Obstetrics	12	383	31.9
Archives of Surgery	22	1093	49.7	American Journal of Emergency Medicine	11	112	10.2
Revista Espanola de Enfermedades Digestivas	22	48	2.2	Journal de Chirurgie	11	29	2.6
International Surgery	22	218	9.9	Journal of Laparoendoscopic & Advanced Surgical Techniques	11	63	5.7
Chirurg	21	121	5.8	Journal of the American College of Surgeons	11	477	43.4
Journal of Surgical Research	21	280	13.3	International Journal of Surgery	11	229	20.8
Surgery	21	763	36.3	Asian Journal of Endoscopic Surgery	10	24	2.4
Digestive Diseases and Sciences	18	330	18.3	Journal of Clinical Gastroenterology	10	285	28.5
Journal of Evolution of Medical and Dental Sciences-JEMDS	18	1	0.1	Journal of Nuclear Medicine	10	273	27.3
Journal of Hepato-Biliary-Pancreatic Surgery	18	1025	56.9	Journal of Trauma and Acute Care Surgery	10	143	14.3
International Journal of Surgery Case Reports	18	26	1.4	Pakistan Journal of Medical & Health Sciences	10	3	0.3

RC: Record Count, C: Number of Citation, AC: Average Citation Per Document

Table 2. Top 20 most cited articles according to total citations on cholecystitis

Journals	RC	C	AC	Journals	RC	C	AC
Khirurgiya	124	77	0.6	Journal of Clinical Ultrasound	17	282	16.6
American Surgeon	71	1450	20.4	Scandinavian Journal Of Gastroenterology	17	296	17.4
Vestnik Khirurgii Imeni II Grekova	69	7	0.1	Surgery Today	17	241	14.2
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Klinicheskaya Meditsina	34	2	0.1	Revista Espanola De Las Enfermedades Del Aparato Digestivo	14	10	0.7
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International Journal of Surgery Case Reports	18	26	1.4	Pakistan Journal of Medical & Health Sciences	10	3	0.3

RC: Record Count, C: Number of Citation, AC: Average Citation Per Document

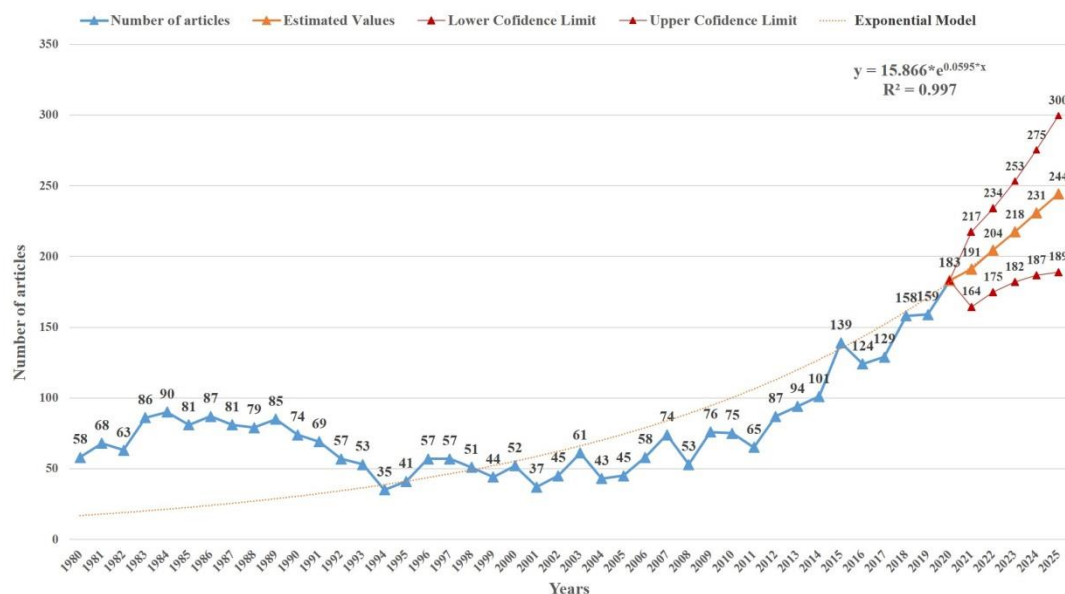


Figure 1: Number of articles published on Cholecystitis by years and estimation of the number of articles that can be published in the future with the exponential model

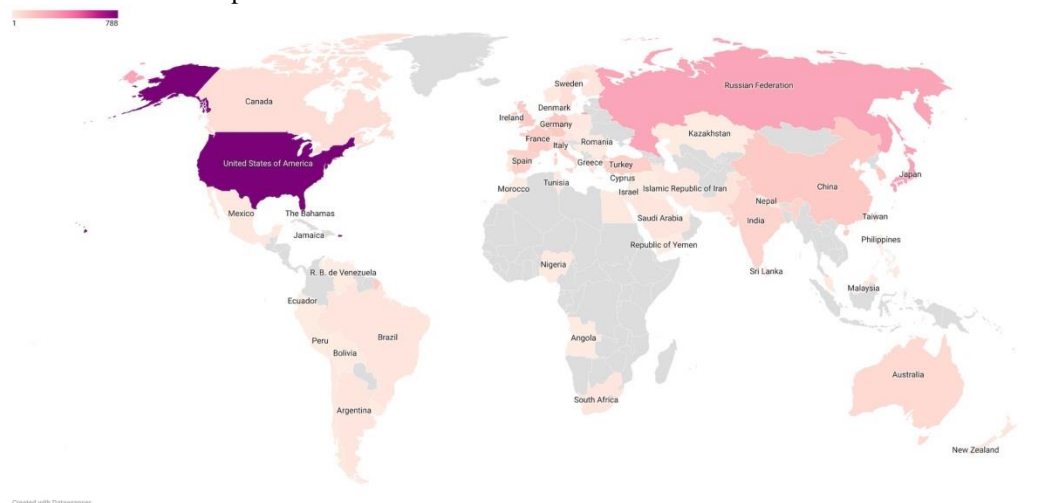


Figure 2: World map for the distribution of articles by country on Cholecystitis. Footnote: In the indicator given at the top left of the figure (article productivity increases from light to dark)

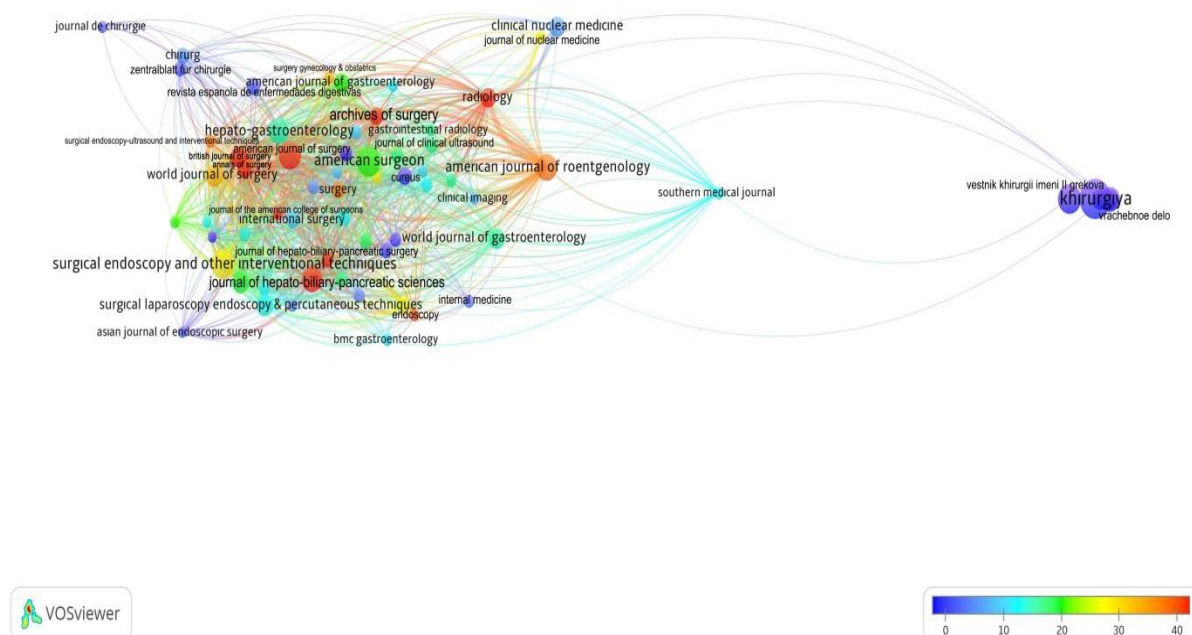
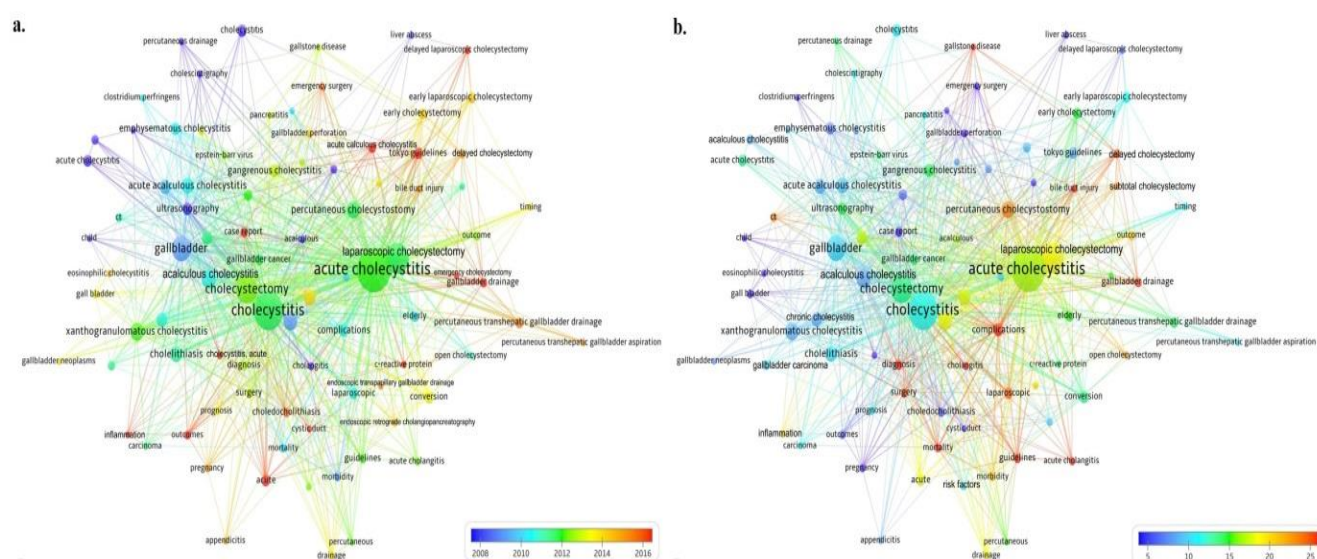


Figure 3: Network svvisualisation map for citation analysis of active journals on Cholecystitis.

Table 3. The most frequently used keywords on cholecystitis

Keywords	Number of uses	Keywords	Number of uses	Keywords	Number of uses
Acute cholecystitis	591	Elderly	23	Eosinophilic cholecystitis	10
Cholecystitis	430	Early laparoscopic cholecystectomy	22	Epstein-barr virus	10
Laparoscopic cholecystectomy	237	Acute calculous cholecystitis	21	Hemorrhagic cholecystitis	10
Cholecystectomy	201	Diagnosis	20	Open cholecystectomy	10
Gallbladder	169	Case report	18	Percutaneous drainage	10
Acalculous cholecystitis	97	Choledocholithiasis	18	Subtotal cholecystectomy	10
Laparoscopy	76	Guidelines	18	Abdominal pain	9
Xanthogranulomatous cholecystitis	66	Gallbladder carcinoma	17	Appendicitis	9
Percutaneous cholecystostomy	61	Gallbladder drainage	17	Cholecystitis, acute	9
Cholecystostomy	58	Surgery	17	Endoscopic transpapillary gallbladder drainage	9
Acute acalculous cholecystitis	54	CT	15	Liver abscess	9
Cholelithiasis	54	Delayed cholecystectomy	15	Pancreatitis	9
Gallstone (s)	50	Hemobilia	15	Pseudoaneurysm	9
Ultrasound	47	Drainage	14	Risk factors	9
Chronic cholecystitis	43	Morbidity	14	Timing	9
Gangrenous cholecystitis	35	Mortality	14	Carcinoma	8
Complications	34	Endoscopic retrograde cholangiopancreatography	12	Child	8
Ultrasonography	31	Pregnancy	12	Cholecystolithiasis	8
Emphysematous cholecystitis	30	Acalculous	11	Clostridium perfringens	8
Outcome (s)	30	Acute cholangitis	11	Cystic duct	8
Conversion	29	Bile duct injury	11	Emergency cholecystectomy	8
Tokyo guidelines	27	Cholangitis	11	Gallbladder neoplasms	8
Acute	25	Delayed laparoscopic cholecystectomy	11	Gallstone disease	8
Laparoscopic	25	Gallbladder perforation	11	Inflammation	8
Computed tomography	24	Prognosis	11	Percutaneous	8
Gallbladder cancer	24	Cholescintigraphy	10	Percutaneous transhepatic gallbladder aspiration	8
Percutaneous transhepatic gallbladder drainage	24	C-reactive protein	10	Sonography	8
Early cholecystectomy	23	Emergency surgery	10		

**Figure 4: a.** Network visualization map for trends on Cholecystitis. Footnote: Indicator shows current publications from blue to red (blue-green-yellow-red). The size of the circle indicates the size of the number of articles published on that topic.**b.** Network visualization map of the most frequently cited topics on Cholecystitis. Footnote: The number of citations from blue to red increases. The size of the circle indicates the size of the number of articles published on that topic.

DISCUSSION

Our results demonstrated that 0-100 articles on Cholecystitis were initially produced between 1980 and 2013, and the average number of articles published between these years was 63. The number of articles published in 2014 exceeded 100, and there has been a remarkable increase in the number of articles in recent years, and 183 articles were published in 2020. The average number of articles published between 2014 and 2020 was 142. In recent years, there has been an increase in the number of articles with an exponential trend. The evaluation of the nonlinear regression analysis results showed that the number of articles will continue with an increasing exponential trend.

The analysis of the publication distribution of the world countries revealed that 16 of the most active 20 countries in the production of articles on Cholecystitis were developed countries, while the other 4 (Russia, China, Turkey, India) were developing countries. However, although these four countries were developing countries, they had large economies. The results of the correlation analysis in our study showed that the highly significant correlation between article productivity and economic development indicators shows that the economic development level of countries is effective in the productivity of publications on Cholecystitis. Bibliometric studies on many different medical subjects in the literature have shown that economic power is effective in publication productivity (12,14). The evaluation of the density map created according to the total cooperation score between the countries revealed that the countries with the most intensive cooperation were Japan, South Korea, Taiwan, Singapore, Argentina, Greece, and New Zealand, respectively. The analysis of the co-authorship cooperation of countries on Cholecystitis showed that cooperation based on geographical countries did not have a significant effect on article production.

The journals that published the highest number of articles on Cholecystitis were determined as *Khirurgiya*, *American Surgeon*, *Vestnik Khirurgii Imeni II Grekova*, *Surgical Endoscopy and Other Interventional Techniques*, *American Journal of Surgery*, *American Journal of Roentgenology*, *Hepato-Gastroenterology*, *Journal of Hepato-Biliary-Pancreatic Sciences*, *Vrachebnoe Delo*, and *World Journal of Surgery*, respectively. We can recommend that authors who want to publish on Cholecystitis first consider these journals. The evaluation of the citation analyses of the journals revealed the most influential journals according to the average number of citations per article they published were *Annals of Surgery*, *Radiology*, *Journal of Hepato-Biliary-Pancreatic Surgery*, *British Journal of Surgery*, *Archives of Surgery*, *Journal of the American College of Surgeons*, *Journal of Hepato-Biliary-Pancreatic*

Sciences, *American Journal of Surgery*, *Endoscopy*, *American Journal of Roentgenology*, *Surgery*, and *Surgical Endoscopy-Ultrasound and Interventional Techniques*, respectively. We can recommend that researchers who want their articles to be cited more should consider these journals first.

The evaluation of the analysed articles by the total number of citations they received revealed that the most cited study was published in *Gastroenterology* by Fox et al. (1998) titled "Hepatic *Helicobacter* species identified in bile and gallbladder tissue from Chileans with chronic cholecystitis" (23). The second most influential study was the study of Lo, CM. et al. (1998) published in *Annals of Surgery* with the title of "Prospective randomised study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis" (17). The third most influential study was the study of Kiviluoto, T. et al. (1998) published in the *Lancet* with the title of "Randomised trial of laparoscopic versus open cholecystectomy for acute and gangrenous cholecystitis" (19). The fourth and fifth most influential studies were the studies of Lai, et al. (1998) and Hirota, et al. (2007) (18, 2). The evaluation of the studies according to the average number of citations per year showed that the most influential first article was the study of Yokoe, M. et al. (2018) published in the *Journal of Hepato-Biliary-Pancreatic Sciences* with the title of "Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute cholecystitis (with videos)" (5). The second most influential article was the study of Okamoto et al. (2018) published in the *Journal of Hepato-Biliary-Pancreatic Sciences* with the title of "Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis" (24). The third most influential study was the study of Yokoe et al. (2013) published in the *Journal of Hepato-Biliary-Pancreatic Sciences* with the title of "TG13 diagnostic criteria and severity grading of acute cholecystitis (with videos)" (4). The fourth most influential study was the study of Guttet al. (2013) published in *Annals of Surgery* with the title of "Acute Cholecystitis Early Versus Delayed Cholecystectomy, A Multicenter Randomized Trial (ACDC Study, NCT00447304)" (25). According to the co-citation numbers of all analysed articles, the studies of Lo et al. (1998), Lai et al. (1998), Hirota et al. (2007), Yokoe et al. (2013), Kiviluoto et al. (1998), Rattner et al. (1993), Gurusamy et al. (2010), Strasberg et al. were determined to be the most influential studies (2,4,17-22). We can recommend that clinicians and researchers interested in this subject read these publications first.

The evaluation of the keyword analysis results showed that the subjects of Cholecystitis formed clusters in 9 different colours as a result of the cluster analysis. The most cited keywords were guidelines, complications, diagnosis, cholangitis, acute cholangitis, mortality, gallbladder drainage, Bile duct injury, surgery, CT,

delayed cholecystectomy, subtotal cholecystectomy, gallstone disease, percutaneous Cholecystostomy, and open cholecystectomy. The results of the analysis conducted to determine the trend topics revealed that the keywords studied in recent years were Tokyo guidelines, C-reactive protein, gallbladder drainage, acute calculous Cholecystitis, emergency surgery, emergency cholecystectomy, cystic duct, choledocholithiasis, inflammation, acute Cholecystitis, delayed laparoscopic cholecystectomy, percutaneous transhepatic gallbladder drainage, and percutaneous transhepatic gallbladder aspiration. Based on the results of the trend subject analysis, it can be speculated that non-invasive methods have come to the fore more in recent years. We believe that this may be due to the fact that surgeons avoid surgery and head towards percutaneous methods, especially due to the COVID-19 pandemic after 2020.

As a result of the literature review on Cholecystitis, we could not find any bibliometric study. It can be said that our comprehensive study on this subject is the first bibliometric research. In the study, we used only the WoS database for literature review, which can be a limitation in our study. We did not use the Pubmed and Scopus indexes in our study since citation and co-citation analyses cannot be performed in the Pubmed database. The Scopus database also includes studies with low impact levels. The WoS database indexes articles published in more influential journals compared to other databases (12,14). In recent years, WoS has been more widely preferred for bibliometric analyses (9-14).

CONCLUSION

This comprehensive bibliometric study on Cholecystitis, which has an increasing trend in the number of articles in recent years, shared summary information of 3174 articles published between 1980 and 2020. It can be said that the trend topics in cholecystitis studies conducted in recent years are Tokyo guidelines, C-reactive protein, gallbladder drainage, acute calculous Cholecystitis, emergency surgery, emergency cholecystectomy, cystic duct, choledocholithiasis, inflammation, acute Cholecystitis, delayed laparoscopic cholecystectomy, percutaneous transhepatic gallbladder drainage, and percutaneous transhepatic gallbladder aspiration. This article may be a useful resource for clinicians and scientists on global outputs of Cholecystitis.

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