



Top 100 Cited Articles On Geriatric Hip Fractures İn Orthopaedics: A Bibliometric And Visualised Analysis

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Abstract

Objective: Hip fracture is one of the most critical health problems which the orthopaedic surgeons faced in the elderly population. Geriatric hip fractures are common, leading to high mortality and morbidity. The aim of the study is to analyze the current status of hip fractures, global trends, and clinical research status.

Methods: Top hundred articles related to the geriatric hip fractures were taken from the Web of Science Core Collection. Basic information including number of citations, of publication, the authors, title, country, and year journal was extracted. The keywords were visualized using the VOSviewer.

Results: After the application of the study criteria, it was observed that there were 591 articles published between 1980-2020. Among the 100 articles, there were totally 7,376 citations. There were averagely 73.76 citations per article. A total of 419 authors, 168 institutes and 23 nations and regions published relevant articles. The most used keywords were hip fracture, mortality, and elderly.

Conclusion: In this study, the first 100 articles summarised can help researchers characterise outstanding literature in this field, figure out the history of hip fracture research in the elderly, and plan future research. Geriatric hip fractures result in situations extending far beyond orthopedics that concern many disciplines such as preventive medicine, epidemiology, endocrinology, internal medicine, gerontology, and critical care. Research, interest, and publications continue to grow.

Keywords: hip fracture, geriatric, bibliometrics, citations

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Ortopedide Geriatrik Kalça Kırıkları Üzerine En Çok Atıf Alan 100 Makale: Bibliyometrik ve Görselleştirilmiş Bir Analiz

Öz

Giriş: Kalça kırığı, yaşlı popülasyonda ortopedi cerrahlarının karşılaştığı en kritik sağlık sorunlarından biridir. Geriatrik kalça kırıkları sık görülür ve yüksek mortalite ve morbiditeye yol açar. Çalışmanın amacı, kalça kırıklarının mevcut durumunu, küresel eğilimleri ve klinik araştırma durumunu analiz etmektir.

Yöntemler: Geriatri kalça kırığı ile ilgili ilk yüz makale Web of Science Core Collection'dan alınmıştır. Atıf sayısı, yayın, yazarlar, başlık, ülke ve dergi yılı gibi temel bilgiler çıkarıldı. Anahtar kelimeler VOSviewer kullanılarak görselleştirildi.

Bulgular: Çalışma kriterleri uygulandıktan sonra 1980-2020 yılları arasında yayınlanmış 591 makalenin olduğu gözlemlendi. 100 makaleden toplam 7.376 alıntı yapıldı. Makale başına ortalama 73.76 alıntı yapıldı. Toplam 419 yazar, 168 enstitü ve 23 ülke ve bölgede ilgili makaleler yayınlandı. En çok kullanılan anahtar kelimeler kalça kırığı, mortalite ve yaşlılardı.

Sonuç: Bu çalışmada, özetlenen ilk 100 makale, araştırmacıların bu alandaki seçkin literatürü karakterize etmelerine, yaşlılarda kalça kırığı araştırmalarının tarihini anlamalarına ve gelecekteki araştırmaları planlamalarına yardımcı olabilir. Geriatrik kalça kırıkları, koruyucu hekimlik, epidemiyoloji, endokrinoloji, dahiliye, gerontoloji, yoğun bakım gibi birçok disiplini ilgilendiren ortopedinin çok ötesine geçen durumlarla sonuçlanır. Araştırma, ilgi ve yayınlar artmaktadır

Anahtar kelimeler: Kalça kırığı, yaşlı, bibliyometrik, alıntılar.

INTRODUCTION

Hip fracture is one of the most critical health problems, which orthopaedic surgeons faced in the elderly population. With steadily increasing the life expectancy of the elderly population, hip fracture incidence will significantly increase, which is expected to double by 2040¹. The number of hip fractures will increase from 1.26 million in 1990 to 4.5 million by 2050. Despite the gradually decreasing standardised rate in several countries, the increasing number of older adults outpaces it².

Hip fracture has the highest mortality and morbidity rate of all osteoporotic fractures³. Any cause mortality and mortality after hip fracture are higher than age-appropriate controls, even after 20 years of follow-up⁴. Patients recovering from the fracture experience significantly lower independence, mobility, and overall quality of life and health⁵. Despite this, global trends in hip fractures in elderly patients have not been adequately analysed.

Bibliometrics is the quantitative analysis of publications, aiming to measure each article's academic influence and characteristics in related fields⁶. Citation analysis is the most traditional type of bibliometric analysis, determining the strength of publications⁷. Various medical and orthopaedic analysis studies have been published to provide references for the most frequently cited studies^{8,9}. The research most commonly cited by peers may reveal the most relevant, relevant, meaningful, controversial or controversial results in a given subject area or field¹⁰. In addition, a large number of citations in a study indicate that colleagues have used them so that they can be used as indicators of academic influence. Articles which were published in journals (i. e., impact factor (IF) reflects the average number of citations during the year, IF five years reflects the average number of citations within five years) 11; IF is the most valid method used to evaluate a journal's reputation¹¹.

Although there is research evaluating orthopaedic surgeons' most common injuries in

daily practice, they are limited. Therefore, this study aimed to assess the 100 most cited studies about elderly hip fractures bibliometrically.

METHODS

Although many databases meet the needs of global analysis¹², this study uses The Web of Science (WoS) Core Collection (Index: SCI-Expanded). These databases contain above 12,000 influential and quality international scientific journals and provide detailed data about publications¹³. In April 2021, the WoS scientific citation index (SCI) was accessed to determine the most impactful articles about geriatric hip fractures between 1975 and 2021.

We followed the methods of Peng et al.¹⁴. The specific search strategy was defined as follows: Title = ("fracture"), Title = ("hip"), and Title = ("geriatric*" OR "elderly"). The search results were sorted in downward order of the number of citations. If the total number of citations for multiple articles was the same, the most recently published article ranked higher. Fractures following any pathological fractures and hip arthroplasty due to bone tumours were excluded from the study. The orthopaedics section from the WoS categories and the article section from the document type section was selected.

All of the information for the identified publication, including publication year, author, title, participating country, journal, keywords, affiliation, and abstract, was uploaded. Two authors reviewed and extracted the data from related publications independently. We consulted with a third researcher to reach a consensus, if necessary. Based on the criteria for including and excluding articles, there was the initial selection by reading the title and abstract. If it was uncertain whether an article was included, the full text was obtained for further review. The primary function of the publications was the internal WoS function. The H index was defined as the value given by the

scientist who published the H article; in other studies, at a minimum, each document was cited by H¹⁵. Therefore, the H index could assess the impact of published research and authors' productivity by determining the number of publications and relevant citations for each researcher¹⁶.

bibliometric networks are created and visualised with VOSviewer program (Leiden, Leiden University, The Netherlands)¹⁷. This study used VOSviewer for co-authoring, co-occurrence, and co-citation analysis. VOSviewer provided various elements such as authors, countries, websites, keywords and institutions. The size of the node reflects the number or frequency of publications¹⁸. The nodes' colours reflected different groups or years, and the links between the nodes indicated relationships, including co-authorship or co-occurrence¹⁹. The link strength was designated as the total link strength (TLS). The co-author analysis revealed the relationship between the projects and the number of co-published articles, a powerful tool for evaluating cooperation trends and identifying leading researchers, countries and organisations²⁰. Coexistence analysis showed the relationship between keywords based on the number of coexisting publications²¹. The study explored hot topics and research areas. Therefore, it was a particularly significant indicator of progress in a specific research field.

We downloaded data of this study from a public database. To do this study, no ethical approval was necessary.

RESULTS

After scanning, a total of 19,395 articles about geriatric hip fractures were retrieved, 591 articles remained behind the Orthopaedics option from the Web of Science Categories section and the article option from the Document Types section. Based on the inclusion and exclusion criteria, we screened the first 100 articles and ranked them based on the frequency

and density of citation. While the oldest article in the study was published in 1980, the newest article was published in 2017. The first article by Ceder et al. Published in 1980²². The newly published article in the 100 most cited articles was published by Bohl et al. in December 2017²³. Most studies of publications were published in 2011 and 2015, with eight articles in each year published. Among the 100 articles, the total number of the citations was 7,904. After self-citations were removed, the citation count was 7,376. There were averagely 73.76 citations per article. The article which had the highest total number of citations was 289 which White et al., published in 1987²⁴. A total of 23 regions and nations published the related articles. Table 1 lists the countries with the highest contribution. The world map of hip fracture research distribution is shown in Figure 1. The H index and the total number of citations reflected the publications, quality and the country's academic influence²⁵. There was similar trend for the H index: Canada (6), USA (7), and England (2). Publications from Sweden had the highest average frequency of citation (97.5), followed by England (87.75), Scotland (76.33), USA (65.74), Canada (52.33) and Netherlands (51).

Table I: The countries that have contributed the most about geriatric hip fracture

Country	Citations	Documents
USA	2827	43
Sweeden	780	8
Canada	314	6
England	351	4
Netherlands	255	5
Japan	243	4
Scotland	229	3
Spain	222	2
Australia	214	2
Belgium	197	1
China	139	3
Austria	133	3
Finland	122	2
Norway	120	3
South Korea	68	1
France	66	1
Denmark	62	1
Germany	61	1
Serbia	41	1
Switzerland	41	1
Thailand	38	1
Israel	33	1

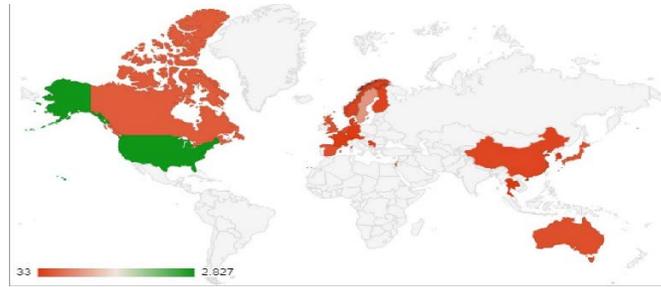


Figure 1: The hip fracture research distribution world map

The Journal of Orthopaedic Trauma published 16 articles, which outranked other journals, which were mostly published. Clinical Orthopaedics and Related Research was ranked second with 13 publications. The top five journals which were mostly published are given in Table 2. Orthopaedics was reflected most in all research orientations. Other accompanying categories included surgery, sport sciences, critical care medicine, emergency medicine, clinical neurology, rehabilitation and rheumatology.

Table II: The most important five journals with the most publications

Source	Publications	Citations
Journal of Orthopaedic Trauma	16	1339
Clinical Orthopaedics and Related Research	13	1118
Journal of Bone and Joint Surgery - American Volume	8	891
Archives of Orthopaedic and Trauma Surgery	8	388
Journal of Bone and Joint Surgery - British Volume	6	1059

There were 419 authors in 100 articles. J.D. Zuckerman of the USA had 11 articles, the most of all other researchers. He was followed by K.J. Koval with 10 articles, and G.B. Aharonoff with nine articles. All authors were included in the analysis, irrespective of their relative contributions (co-author, first author, or correspondence author).

There were publications from 168 institutes represented in the research. As presented in Table 3, the New York University Hospital for Joint Diseases had the most significant number of publications including six papers, followed by the Thomas Jefferson, the University of Kansas, and the University of Washington with four articles.

Table III: The institutes that have contributed the most about geriatric hip fracture

Institution	Publications	Citations
NYU hosp joint dis & med ctr	6	563
Thomas Jefferson University	4	242
University of Kansas	4	242
University of Washington	4	242
Stockholm Soder Hospital	3	494
University of Virginia	3	200
University of Toronto	3	167

Table 4 shows the top 10 most quoted articles about geriatric hip fracture. Rate Of Mortality For Elderly Patients After Fracture Of The Hip In The 1980s was the most highly quoted article, which was published by White et al. in the Journal Of Bone and Joint Surgery-American Volume 26, with 289 citations on the WoS.

Table IV: The top 10 most cited articles about geriatric hip fracture

	Title of the publication/publishing year/first author/publishing journal	Citations
1	Rate Of Mortality For Elderly Patients After Fracture Of The Hip In The 1980's/ White B.L./1987/ Journal Of Bone And Joint Surgery-American Volume	289
2	Gamma-Nails And Dynamic Hip Screws For Peritrochanteric Fractures - A Randomized Prospective-Study In Elderly Patients/Leung K.S./1992/Journal Of Bone And Joint Surgery-British Volume	253
3	A randomised controlled trial comparing bipolar hemiarthroplasty with total hip replacement for displaced intracapsular fractures of the femoral neck in elderly patients/Blomfeldt R./2007/Journal Of Bone And Joint Surgery-British Volume	223
4	Internal fixation compared with total hip replacement for displaced femoral neck fractures in the elderly - A randomised, controlled trial/Tidermark J./2003/ Journal Of Bone And Joint Surgery-British Volume	201
5	Hip fractures in the elderly: Predictors of one year mortality/Aharonoff G.B./1997/Journal Of Orthopaedic Trauma	200
6	Outcomes for older patients with hip fractures: The impact of orthopedic and geriatric medicine cocare/Fisher A.A./2006/ Journal Of Orthopaedic Trauma	176
7	Ambulatory Ability After Hip Fracture - A Prospective-Study In Geriatric-Patients/Koval K.J./1995/Clinical Orthopaedics And Related Research	164
8	Trochanteric Gamma nail and compression hip screw for trochanteric fractures - A randomized, prospective, comparative study in 210 elderly patients with a new design of the Gamma nail/Utrilla A.L./2005/ Journal Of Orthopaedic Trauma	159
9	Predictors of functional recovery after hip fracture in the elderly/Koval K.J./1998/ Clinical Orthopaedics And Related Research	158
10	Hemiarthroplasty versus internal fixation for displaced intracapsular hip fractures in the the elderly - A randomised trial of 455 patients/Parker M.J./2002/ Journal Of Bone And Joint Surgery-British Volume	150

Visualised Analysis

As shown in Figure 2, 419 authors who had at least one publication were analysed and identified. The top five authors who had the highest TLS were Zuckerman (TLS = 197), Koval (TLS = 182), Aharonoff (TLS = 166), Skovron (TLS = 149) and Butler (TLS = 56).

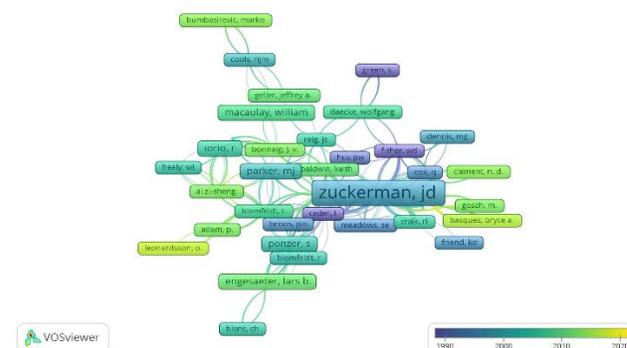


Figure 2: Coauthorship analysis in research on geriatric hip fracture, mapping of the co-authorship analysis among the identified authors

As shown in Figure 3, 54 regions and countries with at least five publications were identified. The top five regions and countries with the highest TLS were Sweden (TLS = 12), the USA (TLS = 34), Canada (TLS = 9), the UK (TLS = 8) and Netherlands (TLS = 7).

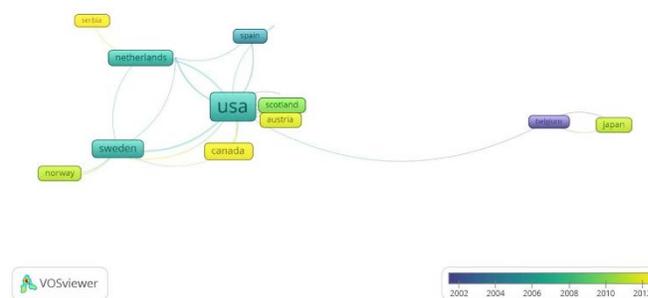


Figure 3: Coauthorship analysis in research on geriatric hip fracture, mapping of identified countries

Figure 4 shows that 168 institutions with at least one publication were included. They included the Thomas Jefferson University (TLS = 26), University of Kansas (TLS = 26), University of Washington (TLS = 26), University of Virginia (TLS = 25), and the NYU Hospital for

DISCUSSION

Bibliometrics is a collection of methods used to quantify academic literature^{8,9}. Commonly used bibliometric parameters include content analysis and citation analysis. Bibliometric analysis can be used as a standard for evaluating the academic performance of a country, institution, or individual²⁷. Research that focuses on specific diseases in a specific geographic area may help understand the demographics, treatment options, and disease dynamics in this area.

The incidence of hip fractures in the elderly is increasing with the increase in life expectancy worldwide. This study describes the global trends and present status of hip fracture research in the elderly. It was found the gradual increase in the number of publications over time. Institutions, countries, researchers, and their partnerships are identified, and key publications are highlighted with multiple citations.

Most of 100 most quoted articles were from pre-2010 because the previous studies naturally need longer time to collect citations than the articles recently published. Although 76% of the most cited 100 articles have been published after 2000, no articles were published after 2017 that were included in this list. This may be because the elapsed time after publication was too short; recently published articles are not as well cited as earlier published articles. After all, an article takes a lot of time to get many citations¹⁴. These early studies focused on patient mortality, fracture management, patient outcome and perioperative management; more recent published articles were primarily about fracture management.

The United States ranks first with 43 articles, more than any other country. This is consistent with the previous studies²⁸. There was the highest overall in the United States. In addition, most production organisations and writers are

based in the United States. In general, this information demonstrates that America has always been the most significant contributor to orthopaedics research. Our research showed that fewer developing countries were selected. Previous studies have shown that developing countries, especially China, have made substantial contributions to various biomedical fields²⁸. The studies in Asia, Africa, and South America had minimal contribution or no contribution in the articles most frequently cited, which is consistent with the previous reports related to low levels of scientific publication in countries located in these regions²⁹. Although many articles have been published in developing countries, the quality of many articles required more improvement. Therefore, the quality of their publications should be improved in the developing countries. Likewise, the articles published from our country, which is in the category of developing countries, are not among the articles with the most citation, and it is an indisputable fact that the quality of our scientific studies should increase in order to have more space in the international scientific arena.

Coexistence cluster analysis was used to present a co-occurrence relationships network map by analysing the keywords found in related studies. In addition, if we evaluated the keywords in the studies chronologically, the keywords rating scale, 60-day mortality and allogeneic transfusion were used in older publications. In contrast, the keywords dementia, complications and length of stay are used in more recent publications.

Although there have been studies on hip fractures in orthopaedics, as far as we know, this was the bibliometric analysis which first identified the 100 most cited articles focusing on geriatric hip fractures. Moreover, this study has helped researchers get along with scientific advances and encourage collaboration in this field.

Limitations

However, our work was not without limitations, as listed below.

- To assess the significance of the research, the citation time was not the “gold standard”. Different factors such as publication cycle and the peer-review process can easily influence citation times. More researchers recently have suggested optimising or even abandoning the impact factor based on citation times.
- The WoS database was used for bibliometric analysis. Still, because Scopus and Google Scholar were used frequently to conduct our bibliometric analysis, our study results may not be comprehensive.
- Despite the methods mentioned above, it cannot be guaranteed that all the articles obtained were entirely based on this topic, which was the inherent weakness of all bibliometric analyses.
- Only orthopaedic articles were evaluated because there are many cited articles in endocrinological, geriatric and rehabilitation journals.

Despite these limitations, we believe this study could help achieve the advances in geriatric hip fractures so common in orthopaedics and provide new insights into innovations in this area.

CONCLUSION

The first 100 articles summarised in this study can help the researchers understand the history of hip fracture research in the elderly, characterise outstanding literature in this field, and plan future research. Themes of the research plan and the cooperation between the country, institutions, and authors were determined, and scientific works were reviewed. This information can provide researchers with a vivid understanding of academic research on elderly hip fractures. Over time, a trend was identified that ranges

from osteoporosis treatment epidemiology, and prevention of fracture in the early 21st century to patient death, subsequent operation time, and national registry and controlled research in the last period. Such information can help stakeholders prioritise funding and optimise the management of geriatric hip fractures.

Ethics Committee Approval: We downloaded data of this study from a public database. To do this study, no ethical approval was necessary.

Conflict of Interest: The authors declared no conflicts of interest.

Financial Disclosure: The authors declared that this study has received no financial support.

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