

Correlation Between Quality of Evidence and Number of Citations in Top 100 Cited Hallux Valgus Articles

Vihank Panchmhavi*

The University of Texas Medical Branch Galveston, USA

Abstract

Purpose: An article's scientific impact has often been measured by the number of citations it receives. A citation analysis can help determine impactful works in medical specialties. The objective of this study is to describe the metrics and levels of evidence of articles on Hallux valgus.

Methods: This study reviewed the top 100 most cited articles available when searching for articles in an electronic database using the keywords "hallux valgus", and "bunion". Each article was examined for the number of citations, publication type, journal specialty, authorship, country of origin, year of publication, level of evidence, and total sample size.

Results: The number of citations ranged from 68 to 424. The 100 most cited articles were published in 24 journals, spanning from general to more specific subspecialty journals. 45% of articles were published by Foot and Ankle International. The most common level of evidence was V (34 out of 100 articles), and most articles were case series (n = 28) and expert opinion (n = 19). The median sample size in experimental studies was 44. Out of 100 articles, only 3 were randomized controlled trials.

Conclusions: The median year of most cited publications, 2003, suggests a need for newer studies reviewing Hallux valgus. The paucity of articles with an evidence level of 1 or 2 and a small median sample size suggests a lack of scientifically rigorous studies reviewing Hallux valgus. There is a weak positive correlation between strength of evidence and number of citations in the top 100 articles cited on Hallux valgus (r= 0.149).

Study design: Descriptive epidemiology study

Clinical relevance: The top 100 most-cited studies list will provide researchers, medical students, residents, and fellows with a foundational list of the most important and influential academic contributions to the hallux valgus disorders and their management.

What is known about this subject? : This is the only study of its kind addressing this aspect of current research on hallux valgus. Studies have examined the top 100 cited articles on other topics that follow a similar procedure. This is the only study of this kind assessing the correlation between the quality of evidence and number of citations in the top 100 articles pertaining to hallux valgus.

Level of clinical evidence: 5

Keywords: Hallux valgus; Bunion; Citation analysis; Bibliometric review; Level of evidence

Introduction

Hallux valgus is one of the most observed deformities of the foot and is characterized by abnormal angulations, deviations and rotations of the big toe [1]. Even though hallux valgus can be easily recognized, it is one of the diseases whose etiology has not been clarified yet [2]. It manifests itself as a deformity in the big toe, causing it to bend over towards other toes, and the joint tends to become red and painful. The prevalence of hallux valgus in the American population has been found as 58% in adult women and 25% in adult men [3]. Hallux valgus occurs in approximately 23% of adults aged 18 to 65 years and up 36% of adults older than 65 years. This deformity can cause several complications, including bursitis, second toe hammertoe deformity, degenerative disease of the metatarsal head, central metatarsalgia, and many other painful complications. Hallux valgus can cause a reduction in quality of life, and often requires surgery for correction [4].

The objective of this study is to describe the metrics and levels of evidence of the 100 most cited articles in Hallux valgus. With no clear exact cause of the disorder, management of Hallux valgus in the clinic is thoroughly influenced by research on the disorder. Therefore, the identification and general characterization of most cited papers

concerning Hallux valgus may provide clinicians insight into the general scientific review of this disorder.

Materials and Methods

An electronic database search on Scopus was conducted for the key words "Hallux valgus". The articles from this search were sorted from most-to-least citations, and the 100 articles with the most citations in the search were selected for review.

The metadata associated with each article on Scopus was then assessed.

***Corresponding author:** Vihank Panchmhavi, The University of Texas Medical Branch Galveston, USA, E-mail: vishpanchbhavi@gmail.com

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The articles were reviewed for the following information: number of citations, publication type, journal specialty, authorship, country of origin, year of publication, level of evidence, and total sample size. Studies were assigned a level of evidence based on its experimental design and methodology. Clinical practice guidelines, meta-analysis systematic reviews, and randomized controlled trials were assigned an evidence level of one. Cohort studies and case control studies were assigned an evidence level of two and three respectively. Case reports and case series were assigned an evidence level of four. Finally, narrative reviews, expert opinions, and editorials were assigned an evidence level of five. Importantly, articles assigned an evidence level of four or five did not display any experimental design. This method of assigning levels of evidence is based upon the guidelines outlined by the Oxford centre for evidence based medicine [5].

Results

The number of citations for the top 100 cited articles ranged from 68 to 424, with a standard deviation of 64.2 (Figure 1). There was a mean of 117 citations, and a median of 95 citations. The top 100 articles were published between 1974 and 2017, with a median publication year of 2003 (Figure 1).

The journal with the highest number of citations in the top 100 cited articles was Foot and Ankle International, with 45 articles represented, followed by Journal of Bone and Joint Surgery, with 14. The top cited article was “Prevalence of hallux valgus in the general population: A systematic review and meta-analysis,” published in the Journal of Foot and Ankle Research in 2010.

The top 100 articles cited were published in a variety of journals (n=24), including foot and ankle journals (n=5), orthopedics journals (n=8), podiatry journals (n=3), general topic journals (n=6), and surgery journals (n=2) (Figure 2). However, most of the top 100 cited articles were published in foot and ankle journals (n=61, 61%), surgery journals (n=22, 22%), and orthopedics journals (n=8, 8%) (Figure 3). The Journal Foot and Ankle International published the most top 100 cited articles in comparison to any other journal (n=46, 46%). The Journal of Bone and Joint Surgery published 14 of the top 100 articles cited. Most journals (n=30), in comparison, published 1 or 2 articles in the top 100 cited articles (Figures 2 & 3).

There were 22 different countries of origin for the highly cited articles. 70 of the articles were published from institutions located in the United States. Institutions within the United Kingdom published

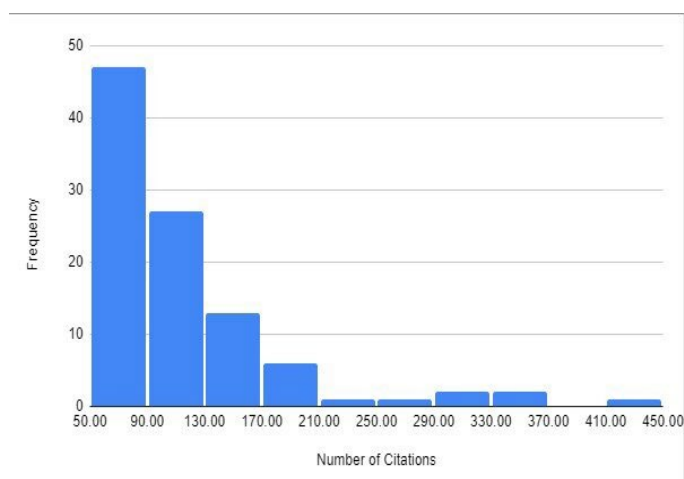


Figure 1: Frequency distribution of citations.

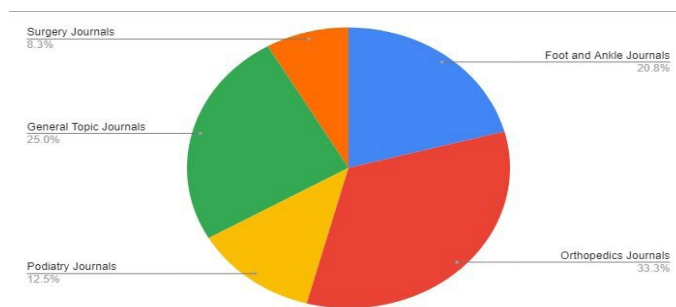


Figure 2: Specialty of journals in top 100 articles in Hallux valgus.

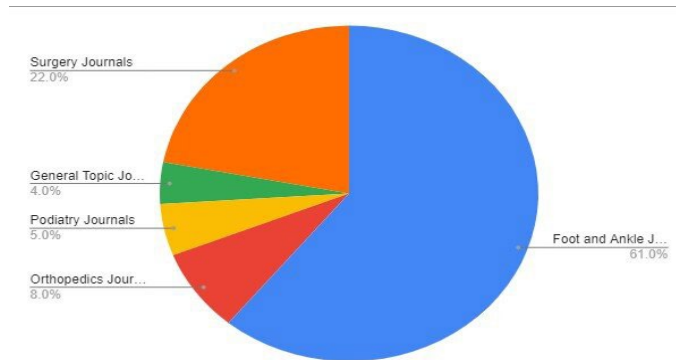


Figure 3: Specialty of articles in top 100 articles in Hallux valgus.

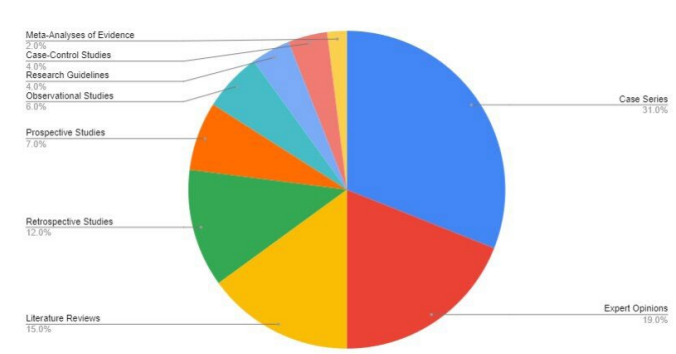


Figure 4: Types of research represented within top 100 articles in Hallux valgus.

a total of 8 articles, followed by 7 from Australia and 5 from Austria.

A plurality of articles, 31% of the sample, was case series. 19% were expert opinions, 15% were literature reviews, 12% were retrospective studies, 7% were prospective studies, 6% were observational studies, 4% were research guidelines, 4% were case-control studies, and 2% were meta-analyses of evidence (Figure 4).

Excluding articles with no experimental design, mean sample size for the top 100 articles cited is 111.3, while median sample size is 44.

34 out of 100 (34%) of these articles had an evidence level of 5, 29 articles with a level of 4 (29%), 15 with a level of 3 (15%), 13 with a level of 2 (13%), and 9 with a level of 1 (9%) (Figure 5). 23% of the top 100 articles cited lacked an experimental design (Figures 5& 6).

Discussion

Bibliometric analyses, including studies on the foot and ankle, have been conducted previously [6-8] [11,12]. However, this study is

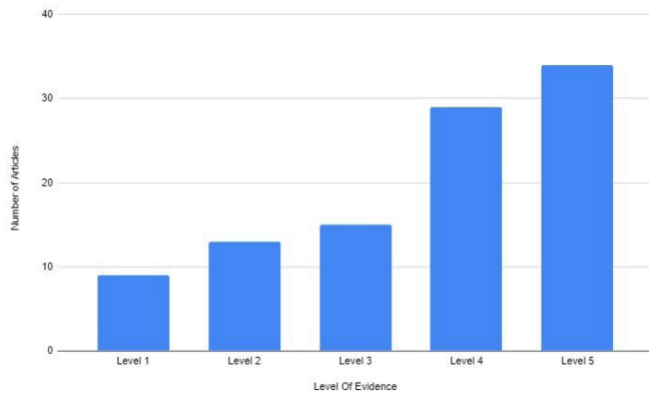


Figure 5: Evidence levels of top 100 articles in Hallux valgus.

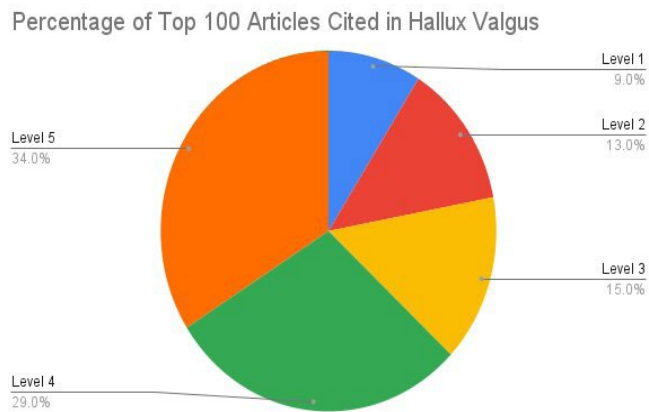


Figure 6: Evidence levels of top 100 articles in Hallux valgus.

the first bibliometric analysis of hallux valgus to correlate the level of evidence and number of citations in the top 100 cited articles.

There is a distinct contrast between the specialty of journals and articles within the top 100 articles cited. While there are various journals within the top 100, 4% of the journals published 45% of the articles. These journals were specialized, relating to orthopedics and/or surgery. Foot and Ankle International and The Journal of Bone and Joint Surgery published the greatest number of articles in the top 100.

Considering the countries of origin of the publications, institutions located in the United States of America published a vast majority of the articles in the top 100 articles cited. More than half of the articles on hallux valgus come from the United States of America. However, numerous other countries published articles in the top 100 articles cited. They have been published in countries such as the United Kingdom and Australia. However, the most cited article was the study of Sheree Nix et al., which was conducted in Australia and published in the Journal of Foot and Ankle Research.

When the studies' publication dates were analyzed, it was observed that the most cited articles were published between 2000 and 2010. Innovations in implant technology and a greater understanding of the condition and its management may be the reason behind this situation. Meanwhile, the rate of citing original articles is increasing in line with publications on surgical management and the number of manuscripts published. [9]

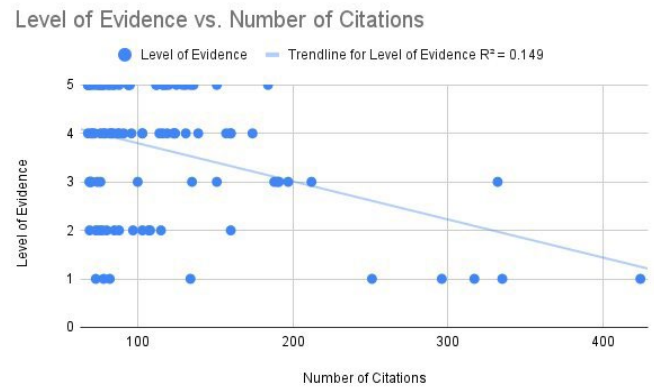


Figure 7: Correlation between level of evidence and number of citations of top 100 articles in Hallux Valgus.

There are some limitations inherent in the methodology of this citation analysis. Citations were the metric of choice in this analysis; citation counts are easily accessible and serve as a quantifiable measurement of scientific impact. However, many papers fail to cite information thoroughly. They fail to cite basic assumptions or information, cite secondary sources rather than primary ones, and do not cite informal influences [10]. In an analysis of 15 randomly selected papers, Cole found that authors had given only 216 references out of 719 required ones, covering only 30% of the entire sample [10]. Self-citations are also included within this metric, perhaps artificially inflating the estimated "scientific impact" of an article. Additionally, the selection of citations is highly biased and inconsistent, with some sources always cited when used while others never cited [10]. In Cole's review of articles in the history of genetics, 1/3 of credit is given to a description of a fact in a secondary source rather than its origin or primary source. Alongside flaws in using citations, there are significant differences between citation-tracking databases such as Scopus or Web of Science. Scopus's citation-tracking feature only retrieves original articles and does not count articles prior to 1996. If this methodology were repeated with a different database, the top 100 cited articles would be different.

In this study, only a single database (Scopus) was used. Attempts to use multiple databases were counterproductive for the following reasons. Methods for tracking citations differ between databases. Sometimes, the same article would have vastly different citation counts on different databases. Other times, one database would have an article and a citation count that the other would not. Combining search results from two databases would misrepresent citation counts and could be counterproductive.

Conclusion

There is a paucity of level 1 and level 2 evidence studies on hallux valgus. Coupled with a small median sample size, median year of 2003, and a median number of 95 citations, this citation analysis suggests a need for scientifically rigorous studies on hallux valgus. There is a weak positive correlation between strength of evidence and number of citations in the top 100 articles cited on Hallux valgus ($r= 0.149$) (Figure 7).

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