



Top 50 Most-Cited Publications on Blepharoplasty Surgery Between 2015 and 2022: From a Current Altmetric Perspective of Research Impact

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Abstract

Background Blepharoplasty is one of the most-performed esthetic operations, and social media platforms have become an influential tool for distributing scientific information. Because the internet has gained popularity among medical experts and surgeons to connect with the public, we aimed to evaluate the altmetric–bibliometric analysis of the top 50 most-cited articles on blepharoplasty surgery between 2015 and 2022 and assess correlations with various metrics.

Methods “Blepharoplasty” was searched using the WoS database, and the altmetric score was obtained. Co-authors, keywords, country of authors, and cited journal network map analysis were created using VOSviewer for the 485 publications retrieved. The articles’ focus was examined quantitatively and the most prolific parameters were identified.

Results The most research was performed by the USA, the most productive institution was the “University of California System,” and the most prolific author was “Wonn CH.” The number of citations ranged from 37 to 9, and altmetric attention scores ranged from 54 to 0. The most articles and citations peaked in 2021. Altmetric and Twitter scores were moderately correlated with journal metrics but there were no correlations with citation counts.

Conclusion The first comprehensive altmetric analysis on blepharoplasty surgery offers new guidelines for upcoming articles by demonstrating the recent investigation trends, prolific parameters, and zones with potential for the public’s attention and education, providing valuable data regarding the distribution of scientific knowledge in social media platforms and to the general public. A social network may be used to increase the visibility of scientific articles apart from creating brands and markets.

Keywords

- ▶ altmetric
- ▶ blepharoplasty
- ▶ correlation
- ▶ Facebook
- ▶ social media

Introduction

The use of social network platforms to share information and create brands and markets among medical professionals and

patients has gained popularity.¹ Practitioners in specialties with a visual side have a high rate of having a professional social media account.^{2,3} Twitter and Facebook are real-time networks for connection between plastic surgeons and

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potential consumers and allow sharing of text, images, videos, and links to promote their research as well as to educate the public.² However, determining the true impact of a specific article is challenging. Bibliometrics (bibliometric analysis), a traditional methodology in the field of library and information science, provides an orderly, transparent, repeatable, and verifiable review process of numerous dynamics that quantify the impact of the published literature within academic fields through statistical analysis as the main indicator of a journal's or research's quality.^{4,5} Unlike qualitative approaches, bibliometrics collects confidential and quantitative information from a large number of scientific publications and guides authors by identifying the trends within a particular subject, which is essential to the practice of evidence-based medicine. Conventional bibliometric parameters include impact factor, publication and citation counts, productive countries, journals, authors, or institutions, and other citation-based calculated metrics related to a particular area, which require time to become measurable.

With the progress of online media and electronic publishing, however, altmetrics (alternative metrics) has recently emerged as a substitute for measuring scholarly output (*h*-index) to assess digital attention given to a publication and monitor social media platforms. In contrast to quantitative bibliometrics, altmetrics is accepted as a novel tool that offers prompt feedback on scientific articles based on being mentioned in online access platforms by tracking and scoring attention on blogs, news, information platforms (such as Wikipedia), and social networks (such as Twitter and Facebook).⁴ Altmetric parameters include download counts, number of page views, and comments,⁶ which can help to identify the conspicuous publications for diverse audiences. Therefore, article-based current altmetrics and author-based traditional bibliometrics have complementary roles. Indeed, publishers have recently been using and presenting altmetrics on published articles. To date, many analyses have recently been reported investigating metrics and their trends in the field of plastic reconstructive surgery.⁷⁻⁹

Blepharoplasty is one of the most performed functional and esthetic operations in the world and may be an option for upper eyelids with dermatochalasis restricting visual fields, under-eye bags, tired facial appearance, and many eyelid disorders. It can also be applied at the same time as another procedure, such as a brow lift and facelift.¹⁰ Although various techniques have been developed for blepharoplasty, the variety in the available literature for published articles reflects the difficulty in achieving excellent surgical outcomes. During the last decade, however, blepharoplasty has become popular surgery among various subspecialty surgeons, and patients may look for their plastic surgeons based on online rating services such as social media to have blepharoplasty. To understand current research trends in blepharoplasty surgery and their attention in the online social network, we aimed for the first time to (1) evaluate an altmetric analysis of the top 50 most-cited research articles on blepharoplasty between 2015 and

2022, (2) perform a correlation comparison between current attention scores and traditional bibliometrics, (3) show topic trends and relations with the social media platforms, and (4) obtain a global snapshot for guiding plastic surgeons who wish to interact with their colleagues and inform or educate potential patients, consumers and the general public.

Methods

Ethical approval was not required as this article is a web-based research. The Web of Science (WoS) core collection database (www.webofknowledge.com) was preferred in this research because it is one of the most widespread databanks, which offers journal articles published from SCI that have a high impact in the sciences, and exports these reports into the bibliometric-altmetric data structure, enabling authors to build up search terms in the advanced search section to identify all related articles. Therefore, the term "blepharoplasty" was searched in the title of the advanced search section, the time filter was applied between January, 01, 2015 and April, 27, 2022, and a final of the most-cited 50 articles was retrieved. All data were obtained on the date of access (access date: April 27, 2022). The list of the top 50 articles retrieved is shown in **Supplementary Table S1** (available online only). In addition, the bibliographic results of 485 studies published during the last 8 years (2015-2022) were analyzed.

The altmetric score of the publications was retrieved using the bookmark "Altmetric it!" (www.altmetric.com) for the top 50 publications and journal metrics were obtained from WoS and Journal Citation Report 2020, Clarivate. All statistical analyses were performed using the SPSS software version 22. Retrieved publications were investigated in detail by numerous features including citation counts, impact factor, normalized eigenfactor score, immediacy index, and article influence score. The focus of the articles was examined quantitatively and the most impactful articles, prolific authors, influential journals, institutions, and countries were identified. A correlation comparison was performed for attention scores with these features. Shapiro-Wilk normality test was performed with the data set. Data were non-normally distributed and medians (25%-75% quartiles) were used. Metric data were evaluated with Spearman's rho correlation analysis. Correlation coefficient was interpreted as < 0.19 none, 0.20-0.39 weak, 0.40-0.59 moderate, 0.60-0.79 strong, and ≥ 0.80 very strong correlation.¹¹

Coauthors, keywords, country of authors, and cited journal network map analysis were created using the VOSviewer software, which offers text mining functionality represented as nodes and links to give a visual representation of the connections among the 485 publications. The dimension of each dot designates the number of times a word was used, whereas the link length between the dots directs the strength of the partnership between associations. Authors and countries used at least two times were included in this analysis. Cited journal and keywords used at least five times were included in this analysis. In addition, the keywords

burst of 485 articles were assessed using the CiteSpace software.

Results

The country with the most research related to the topic of blepharoplasty was the USA with 173 documents among 485 articles, and the journal with the most research was *Aesthetic Plastic Surgery* with 47 documents. The most cited institution was the “University of California System” with 34 documents and the most prolific author was “Wonn CH” with 11 documents. The top five list in these categories is presented in ▶ **Table 1**.

There were five clusters of 44 links in the co-authorship network map, and the authors with the highest link strength were Massry GG, Goldberg RA, and Nakra T. There were eight clusters of 48 links in the country of the co-authorship network map, and the countries with the highest link strength were the USA, China, and South Korea. Co-authorship, country of co-authorship, cited journal, and keyword network map are pre-

sented in ▶ **Supplementary Fig. S1** (available in the online version). The year in which the number of citations and published studies peaked was 2021 (▶ **Supplementary Fig. S2**, available in the online version). The year 2022 continues to be updated. The top six keywords with the strongest citation bursts are presented in ▶ **Supplementary Fig. S3** (available in the online version). The scatter plot for AAS based on publication year for top 50 most-cited publications on blepharoplasty surgery are presented in ▶ **Supplementary Fig. S4** (available in the online version), which demonstrates that the AAS value is gradually increasing by year.

The number of citations of the evaluated articles ranged from 37 to 9, and altmetric attention scores ranged from 54 to 0. Altmetric scores of 18 articles were not available. The median altmetric score and citation count were 1 and 13, respectively. The article with the highest altmetric score was “*The six-step lower blepharoplasty: using fractionated fat to enhance blending of the lid-cheek junction*” written by Rohrich RJ. Thirty-six of the articles were published in the surgery category, whereas 14 were published in the ophthalmology

Table 1 Top five of all blepharoplasty documents in different category

Countries	Number of documents	Number of citations	Average citations of per document
USA	173	608	3.51
China	78	183	2.35
South Korea	63	201	3.19
Italy	25	87	3.48
Iran	21	67	3.19
Journals	Number of documents	Number of citations	Average citations of per document
Aesthetic Plastic Surgery	47	126	2.68
Plastic and Reconstructive Surgery	43	243	5.65
Ophthalmic Plastic and Reconstructive Surgery	40	145	3.63
Aesthetic Surgery Journal	38	99	2.61
Journal of Craniofacial Surgery	32	77	2.41
Authors	Number of documents	Number of citations	Average citations of per document
Wonn CH	11	49	4.45
Innocenti A	9	28	3.11
Massry GG	9	63	7.00
Goldberg RA	8	59	7.38
Melita D	8	28	3.50
Institution	Number of documents	Number of citations	Average citations of per document
University of California System	34	171	5.03
University of California Los Angeles	25	140	5.60
Chinese Academy Medical Sciences Peking Union Medical College	18	40	2.22
David Geffen School of Medicine at UCLA	18	100	5.56
Peking Union Medical College	18	40	2.22

Table 2 Article and journal metrics of the top 50 most-cited publications

	N	Altmetric score	Twitter	Facebook	Citation Number	Journal IF
All articles	50	1 (0-4.25)	1 (0-5)	0 (0-1)	13 (11-16)	2.326 (1.985-4.725)
Journal category						
Surgery	36	1 (0-16)	1 (0-14)	0 (0-1.75)	13 (11-16)	2.326 (2.314-4.763)
Ophthalmology	14	1 (0-2.25)	0.5 (0-2)	0.5 (0-1)	13 (11.75-17.25)	1.865 (1.746-3.756)
Study type						
Review	10	0 (0-3.25)	0 (0-2.75)	0 (0-0.25)	13.5 (11.5-16)	2.165 (1.685-4.429)
Original research	32	1 (0-3.75)	1 (0-3.75)	0.5 (0-1)	13 (11-16)	2.533 (1.848-4.763)
Educational content	4	33.5 (20-51.5)	53.5 (32.25-79.25)	2.5 (1.25-3.75)	19.5 (15.5-25)	4.763 (NA)
Expert opinion	4	2.5 (0-6.25)	0.5 (0-7.75)	0 (NA)	11.5 (11-12)	2.314 (2.314-2.323)

Note: Median (25%–75% interquartile range).

Abbreviations: NA, not applicable; ACpY, average citation per year; NYsP, number of years since publication; IF, impact factor; Nor-EF, normalized eigenfactor; AIS, article influence score; II: immediacy index.

category. In addition, the median value of AAS in published open access articles ($n = 14$) and articles requiring subscription ($n = 36$) was similar when AAS (1 [0.0–4.5], 1 [0.0–7.0], $P = 0.531$, respectively) was evaluated. The metrics of the top 50 articles according to their categories are presented in ► **Table 2**. The top 50 articles were published in 20 journals and the journal with the most cited articles was “*Plastic and Reconstructive Surgery*” with 10 documents.

There was no correlation between attention score and citation count. However, there was a moderate correlation between attention score and impact factor ($r = 0.474$, $P = 0.001$), normalized eigenfactor ($r = 0.585$, $P < 0.001$), and article influence score ($r = 0.401$, $P = 0.004$), and strong correlation between attention score and immediacy index ($r = 0.648$, $P < 0.001$). Similarly, there was no correlation between the Twitter score and citation count whereas there were moderate correlations between Twitter and impact factor ($r = 0.530$, $P < 0.001$), normalized eigenfactor ($r = 0.589$, $P < 0.001$), article influence score ($r = 0.468$, $P < 0.001$), and immediacy index ($r = 0.570$, $P < 0.001$). The correlation analysis between the metrics is presented in ► **Table 3**.

Discussion

In this paper, we performed a comprehensive bibliometric and altmetric analysis by identifying the top 50 most-cited publications in the field of blepharoplasty between 2015 and 2022. There was a moderate correlation between altmetric scores and journal metrics. Twitter score was parallel to the altmetric score and moderately correlated with journal metrics. However, altmetric score and Twitter score were not correlated with the number of citations. Similarly, the altmetric score of seven articles was higher than the number of citations they received. Indeed, one of the most important features of an altmetric score is its speed, and this was supported by the strong correlation between the altmetric score and the immediacy index.

Twitter is a social media platform that can be used by healthcare professionals to discuss current issues and inform the public. However, Instagram is mostly used for personal marketing.¹² At the same time, a recent study showed that a significant portion of posts about facelift content on Instagram is made by non-health professionals.⁷ Altmetrics is distinguished from other social media statistics, especially by following scientific articles on Twitter and not aiming for branding.^{13,14} Any metric can be manipulated artificially. However, the Altmetric Company states that its data are fully auditable and has taken measures to prevent metrics from increasing artificially.¹⁵

The fact that the altmetrics were moderately correlated with journal metrics such as the impact factor and strongly correlated with the immediacy index (but not with citation counts) revealed the importance of publishing an article in journals with high metrics. Indeed, while the journal with the most articles was “*Aesthetic Plastic Surgery*,” the journal of “*Plastic and Reconstructive Surgery*” was found to be the most-cited journal, which was followed by “*Ophthalmic Plastic and Reconstructive Surgery*.” In other words, articles published in prestigious journals increase the report’s visibility on social media platforms.

In the top 50 list, it was seen that the altmetric score of two video-based and two text- and image-based articles aiming at education for health professionals was higher than other types of articles, and the source was especially Twitter. The use of e-learning via the Internet is growing steadily among healthcare professionals worldwide.^{16,17} Some journals contribute to e-learning and health professionals may be interested in this. Fear of postoperative complications related to lower lid blepharoplasty may lead surgeons to prefer conservative approaches.¹⁸ Therefore, of these four educational articles, two were about the lower eyelid, one was about the upper eyelid, and one was about both eyelids. New surgical techniques have been described by surgeons to maximize surgical safety and improve outcomes. In our series, 12 articles in the first 50 publications

Table 3 Correlation matrix of metrics

		Citation Count	IF	Nor-EF	II	AIS	Twitter	Facebook
IF	r p	0.136 0.379						
Nor-EF	r p	0.058 0.689	0.744 <0.001*					
II	r p	0.209 0.184	0.687 <0.001*	0.641 <0.001*				
AIS	r p	0.134 0.352	0.881 <0.001*	0.613 <0.001*	0.521 <0.001*			
Twitter	r p	0.136 0.347	0.530 <0.001*	0.589 <0.001*	0.570 <0.001*	0.468 <0.001*		
Facebook	r p	0.277 0.051	0.448 0.002*	0.561 <0.001*	0.558 <0.001*	0.370 0.008*	0.583 <0.001*	
AS	r p	0.469 0.105	0.474 0.001*	0.585 <0.001*	0.648 <0.001*	0.401 0.004*	0.905 <0.001*	0.728 <0.001*

Abbreviations: AIS, article influence score; AS, altmetric score; IF, impact factor; II, immediacy index; Nor-EF, normalized eigenfactor; r, correlation coefficient.

presented the results of a surgical technique, while 5 articles were about the comparison of surgical techniques. Other notable issues were the evaluation of the effects of blepharoplasty on the periocular regions and the ocular surface.

The country with the highest demand for plastic surgery procedures is the USA, in which blepharoplasty is the fourth most commonly performed procedure.^{19,20} In accordance with this information, the USA was found to be the leading country in blepharoplasty research with the highest number of publications, highest citations, and average number. At the same time, as seen in the country network map, the USA attaches great importance to cooperation in the scientific community and has many links, which is followed by China. Institutions with the most publications follow a parallel course with country statistics.

Dermatochalasis of the eyelids can be associated with blepharoptosis and forehead droop, resulting in eyebrow ptosis in some cases.²¹ In this case, there is an esthetically worse appearance. Sometimes, the optic axis may be closed due to dermatochalasis and may cause low vision. In such circumstances, blepharoplasty surgery is performed for both esthetic and functional reasons.²² Of the articles in the top 50, 35 were related to upper eyelid blepharoplasty, 12 to lower eyelid blepharoplasty, and 3 were related to both eyelids blepharoplasty. However, the strength of lower lid blepharoplasty was higher in the keyword citation burst list and terms such as “transposition,” “subperiosteal pocket,” and “midcheck” related to the lower eyelid were on the list.

Web 2.0 internet-based applications have provided alternative ways of disseminating scientific research and social media services are at the forefront of these ways, which expedite the expansion of social networks online by linking a profile with those of other groups and/or persons who construct user-specific profiles for a site or app designed by a social media service.¹⁴ Therefore, social media platforms have changed the way plastic surgeons

interact with their colleagues and potential patients. Indeed, articles can have high download and view rates when shared on social media platforms such as Twitter, which provide a real-time measure of the impact of research findings.^{23,24} There were significant differences between articles that received more attention on social media and articles that received more citations. Journal metrics were found to be more important. This may be due to the tendency of authors to share their articles in journals with high metrics, and such journals may be more active on the social network. In contrast, the type of articles also seemed to be important. It was observed that articles aimed at educating health professionals were shared on social networks at a high rate. Consequently, the use of social network platforms may gradually increase as authors are accustomed to promoting their articles to the public and their colleagues with collaboration. Publishers can also support this by providing altmetrics in addition to bibliometrics in their online resources.

The strength of this article was that we scanned titles to avoid irrelevant articles. Therefore, our results did not include non-blepharoplasty applications in the analysis. The limitation of the study was that we only used the Institute for Scientific Information-WoS as the databank to obtain articles and did not include PubMed and Scopus. However, we preferred WoS over PubMed because it is the most commonly used reference databank for such an altmetric–bibliometric investigation with its unique citation report function. In addition, it has been reported that more correctness is obtained when compared with Scopus in terms of document type assignment.^{25,26}

Conclusion

The first comprehensive altmetric–bibliometric study on blepharoplasty research provides deep insight by showing

topic trends and relations with the social media platforms, which wish to enlarge the field with the dissemination of landmark blepharoplasty articles to consumers and the general public. Importantly, journal metrics correlated with altmetric scores but not with citation count. The last year showed an upsurge in yearly publications and citation counts, and the social network is used to increase the visibility of scientific articles apart from creating brands and markets. Social media can be used to disseminate peer-reviewed plastic surgery literature and promote plastic surgery education. However, plastic surgeons who publish their blepharoplasty research in prestigious ophthalmology or plastic surgery journals may expect considerable social media attention for their distributed reports. This, in turn, may increase web traffic to a surgeon's and/or journal's site and affect the perception of consumers.

Ethical Approval

Ethical approval was not required as this paper was web-based research.

Availability of Data and Materials

Data available on request from the corresponding authors.

Conflict of Interest

None declared.

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