ANALYSIS OF 50 MOST CITED ARTICLES ABOUT REFRACTIVE SURGERY FROM AN ALTMETRIC PERSPECTIVE

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SUMMARY

Aims: The purpose of this study is to evaluate an Altmetric analysis of the 50 most cited refractive surgery articles in Ophthalmology journals and to compare them with traditional metrics.
Methods: The term "refractive surgery" was searched, using a time filter between 2010-2020 in the Web of Science core collection database. The 50 most cited articles between 2010 and 2020 were recorded. Descriptive statistics were performed. The Spearman correlation test was used to evaluate the correlation between traditional metrics and Altmetrics.
Results: The Altmetric scores of the top 50 articles ranged from 0 to 25, and the median Altmetric score was 4. The citation numbers of the 50 articles ranged from 83 to 523, and the median citation number was 119.5. The most cited article topic was "Toric Intraocular Lens"; the topics with the highest Altmetric scores were "Toric Intraocular Lens" and "Trifocal Intraocular Lens". There was no significant correlation between Altmetric scores and number of citations. There was a weak correlation between Altmetric scores and the average citation per year.
Conclusion: The Altmetric score is insufficient, compared with traditional metrics, to show the scientific value of articles on refractive surgery. Altmetrics can be used to supplement traditional metrics.
Key words: Altmetric score, refractive surgery, citation number, social media, articles

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INTRODUCTION

Refractive errors are one of the most common causes of reversible visual impairment worldwide, and refractive surgery is among the most commonly performed eye surgeries worldwide [1]. Refractive surgery can be divided into two categories: corneal procedures and lens procedures [2]. Corneal procedures are surface ablation procedures (photorefractive keratectomy-PRK, subepithelial laser keratomileusis-LASEK), laser in situ keratomileusis (LASIK), and small incision lens extraction (SMILE). Lens procedures include refractive lens exchange and phakic lens implantation. PRK, in which the corneal epithelium is mechanically separated, and the LASEK procedure, in which the epithelium is separated using alcohol, are generally appropriate procedures for patients with high myopia and thin corneas [3]. The LASIK procedure, in which a corneal flap separation, and laser application result in faster visual rehabilitation and fewer ocular surface symptoms than surface ablation procedures [4]. With the development of femtosecond laser technology, the SMILE procedure was defined as a lenticule extraction procedure in refractive surgery [5]. The advantages of the SMILE procedure are fewer ocular surface symptoms, less laser energy use, and less corneal inflammation [6,7]. Bifocal and trifocal (diffractive) IOLs have been developed due to visual problems, especially in the intermediate and near range, after the implantation of monofocal IOLs [8,9]. Monofocal toric and multifocal toric IOLs are used in patients with corneal astigmatism. However, due to patients' complaints of halo and glare after the implantation of these IOLs, extended depth of field intraocular lenses (EDOF IOLs) have been developed to provide good quality vision at intermediate and long distances [9]. In addition, toric IOLs are used in patients with severe corneal astigmatism [10]. The Phakic IOL procedure, used as

an intraocular lens implantation without any intervention to the crystalline lens, was developed to correct high-grade refractive errors, when using refractive surgical procedures is risky [11].

The authors are curious about the impact of their published articles on a large audience. Traditional metrics measure the quality and effectiveness of each article and journal. These include the number of citations the article has received and the journal's impact factor. With the increase in Internet and social media users in recent years, Altmetrics, a web-based measurement method, has emerged to measure articles' effectiveness and quality [12]. The Altmetric system has become a measurement system that quickly offers researchers the effectiveness of their published articles. In this system, the effectiveness and quality of published articles are measured by the number of citations received and the number of downloads and mentions on social media platforms, such as blogs, Facebook, and Twitter. The Altmetric Score (AS) reflects the overall interest that the article received. The Altmetric system is also known as the social impact factor [13].

In this study, we aimed to analyze the 50 most cited articles in the field of refractive surgery published in Ophthalmology journals using traditional metrics and Altmetrics.

MATERIAL AND METHOD

In this study, the term "refractive surgery" was searched, using a time filter between 2010–2020 in the Web of Science (WoS) core collection database base search. The 50 most cited articles in Ophthalmology journals between 2010 and 2020 were included in the study (Access date: Dec 01, 2022). The English articles with full text in the literature were listed according to the number of citations. Two researchers independently reviewed the articles. The main inclusion criteria were articles related to refractive surgery. Articles unrelated to refractive surgery, not written in English, and whose full text could not be obtained were not included in the study. The articles found after the search were sorted from most cited to least cited, and a list of the top 50 articles was generated. The titles of all articles, publication year (PY), number of years since publication (NYsP), first authors, number of citations (CN), average citations per year (ACPY), AS, type of studies, journals in which they were published,

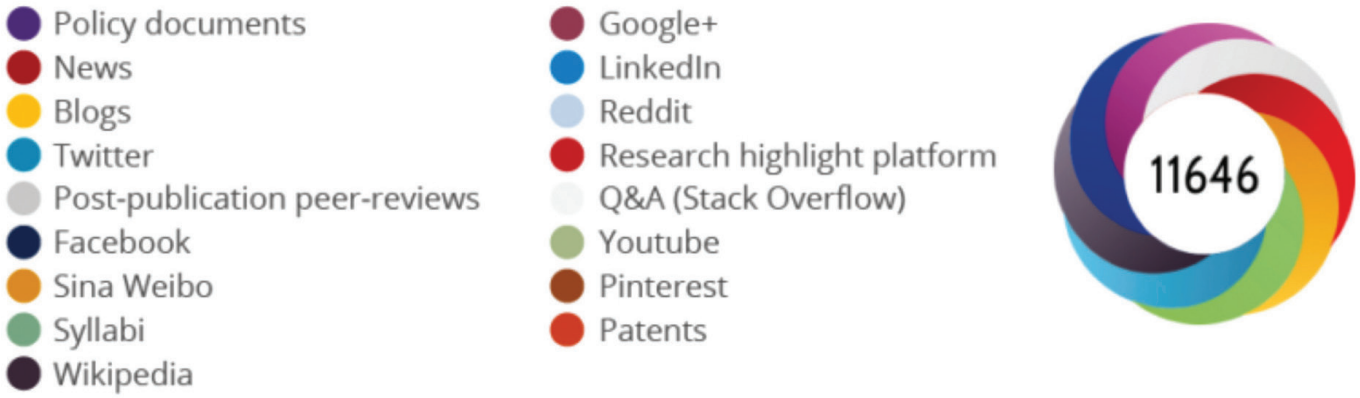

Figure 1. Altmetric donut

Table 1. Journals with top-50 articles, ranked according to the number of articles

Journal name	AN	Q category	H index	IF	5-year IF	CN	AS
Journal of Cataract and Refractive Surgery	24	Q1	148	1.25	2.875	115 (105.5–144)	3.5 (3–7)
Journal of Refractive Surgery	9	Q1	99	2.71	3.125	132 (105–140)	7 (3–10)
Ophthalmology	4	Q1	256	8.47	8.339	177 (160.50–208)	7 (5.5–16)
American Journal of Ophthalmology	4	Q1	194	4.01	4.451	106 (99.5–123)	4 (3–5.5)
British Journal of Ophthalmology	3	Q1	162	3.69	3.402	103 (100–313)	12 (9–12)
Graefes Archive for Clinical and Experimental Ophthalmology	2	Q1	105	2.39	2.258	133 (123–143)	4.5 (3–6)
Investigative Ophthalmology & Visual Science	1	Q1	123	2.21	3.659	98 (NA)	0 (NA)
Cornea	1	Q1	137	4.19	2.362	83 (NA)	1 (NA)
Progress in Retinal and Eye Research	1	Q1	229	3.47	14.384	97 (NA)	5 (NA)
Survey of Ophthalmology	1	Q1	164	14.86	4.037	135 (NA)	14 (NA)

AN – number of articles, IF – impact factor, CN – number of citations, AS – altmetric score, NA – not applicable

journals' Q category, impact factors (IF) for 2019, 5-year impact factor, and H index were recorded and analyzed.

The AS is designed to make it easier to determine how much interest a study is receiving. The bookmark "Almetric it" from the website www.altmetric.com was used to calculate AS (accessed Dec 01, 2022). Clicking on this bookmark displays the colored Altmetric donut (Figure 1). Each color in the Altmetric donut represents a different source of attention. AS was calculated and recorded separately for each item, using this automatic algorithm. The score obtained represents the attention received by the Altmetric company that created the page for each research article.

Statistical Analysis

SPSS software (IBM, version 26) was used for the statistical analysis of all data. The median and interquartile range (IQR) of 25 % to 75 % were used, since all data did

Table 2. Number of citations and altmetric scores of top 50 articles, ranked according to the study topics

Study topics	AN	CN	AS
SMILE	10	131.5 (98–183)	3.5 (3–6)
Multifocal IOL	7	131 (112–145)	3 (3–5)
SMILE-FemtoLASIK comparison	6	116 (97–132)	1.5 (0–12)
Toric IOL	6	175 (148–181)	7 (4–8)
Trifocal IOL	5	106 (105–123)	7 (3–10)
SMILE-LASIK comparison	3	148 (132–176)	4 (3.5–14.5)
Phakic IOL	3	129 (116–132.50)	3 (3–5)
LASIK	2	108 (106–110)	2.5 (1–4)
Presbyopia correction procedures	2	96 (105–123)	4.5 (4–5)
Others	6	111.5 (105–113)	7.5 (7–18)

AN – number of articles, CN – number of citations, AS – altmetric score, SMILE – small-incision lenticule extraction, LASIK – laser-assisted in-situ keratomileusis, IOL – intraocular lens

Table 3. Number of citations and altmetric scores of top 50 articles, ranked according to the study types and publication year

Study Type	AN	CN	AS
Prospective comparative	14	110.5 (101–132)	3 (1–12)
Prospective observational	13	137 (112–177)	6 (3–7)
Review	10	117 (97–135)	5.5 (3–8)
Prospective randomized	3	114 (108–147)	4 (3.5–4)
Prospective non-randomized	2	310 (97–523)	7 (2–12)
Retrospective case series	2	191.5 (136–247)	5 (3–7)
Retrospective obsevational	2	101.5 (93–110)	7 (4–10)
Systematic review and meta analyse	1	136 (NA)	7 (NA)
Retrospective comparative	1	106 (NA)	1 (NA)
Evaluation of diagnostic test	1	140 (NA)	10 (NA)
Computational modeling study	1	116 (NA)	4 (NA)
Publication year			
2010	8	110 (104–126)	3 (3–3)
2011	7	140 (104–324)	3 (3–7)
2012	4	138.5 (121–161.50)	5 (3–7.5)
2013	6	152 (123–177)	7 (6–8)
2014	13	129 (106–136)	4 (2–7)
2015	1	148 (NA)	25 (NA)
2016	7	97 (96–99)	6 (3–12.5)
2017	2	123.5 (112–135)	10.5 (7–14)
2018	1	111 (NA)	19 (NA)
2019	1	97 (NA)	5 (NA)

AN – number of articles, CN – number of citations, AS – altmetric score, NA – not applicable

Table 4. Correlation between metrics

	AS	CN	ACpY	PY	NYsP	IF	5 year IF	H index
AS	1	0.072	0.319*	0.369**	0.065	0.320*	0.295*	0.003
CN	0.622	1	0.500**	-0.240	0.174	0.041	0.025	0.072
ACpY	0.024	< 0.001	1	0.603**	0.199	0.361*	0.345*	0.065
PY	0.008	0.093	< 0.001	1	-0.020	0.392**	0.387**	-0.008
NYsP	0.659	0.236	0.175	0.890	1	-0.021	-0.033	0.039
IF	0.024	0.775	0.01	0.005	0.886	1	0.998**	0.410**
5 year IF	0.038	0.862	0.014	0.006	0.825	< 0.001	1	0.425**
H index	0.981	0.618	0.652	0.958	0.792	0.003	0.002	1

The values above the diagonal consisting of one value extending from the top left to the bottom right represent the "R" value, and the values below represent the "P" value.
**Correlation is significant at the .05 level (2-tailed)*
***Correlation is significant at the .01 level (2-tailed)*
CN – number of citations, NYsP – number of years since publication, AS – altmetric score, ACpY – average citation per year, IF – impact factor, PY – publication year

not conform to the normal distribution according to the Shapiro-Wilk test. Categorical variables were expressed as percentages and numbers. Spearman's rank correlation analysis was used to evaluate the correlation between AS, CN, ACpY, PY, NYsP, IF, 5-year IF, and H indexes. $p < 0.05$ was considered statistically significant.

RESULTS

The Web of Science search revealed that 5 978 articles on refractive surgery were listed in the Ophthalmology category between 2010 and 2020. The CN of the 50 articles ranged from 83 to 523, and the median citation number was 119.5 (IQR 102.75–146.5). The most cited article was "Small incision corneal refractive surgery using the small incision lenticule extraction (SMILE) procedure for the correction of myopia and myopic astigmatism: results of a 6-month prospective study", written by Secundo and published in the "British Journal of Ophthalmology" in 2011 and the number of citations was 523. The AS of the top 50 articles ranged from 0 to 25, and the median AS was 4 (IQR 3–8). The article with the highest number of AS was "Dry Eye Disease after Refractive Surgery Comparative Outcomes of Small Incision Lenticule Extraction versus LASIK" by Denoyer and published in the journal "Ophthalmology" in 2015, and its AS was 25. The top 50 articles were written by 43 first authors and published in 10 different Ophthalmology journals (Table 1). The journal with the highest number of articles in the top 50 list was "The Journal of Cataract and Refractive Surgery" with 24 articles. When the journals were evaluated according to the "Scimago Journal and Country Rank" category, all journals were in the Q1 category. The journal with the highest impact factor was "Survey of Ophthalmology"; the journal with the highest 5-year impact factor was "Progress in Retinal and Eye Research" and the journal with the highest H-index was "Ophthalmology" (Table 1). Articles in the top 50 list were separated by study topic (Table 2). Most article topics were related to small-incision lenticule extraction (SMILE); the most frequently cited article topic was "Toric Intraocular Lens" (IOL), and the topics with the highest AS were the toric IOL and trifocal IOL groups (Table 2). When articles were separated by study type, there were 39 original research articles and 11 review articles (Table 3). The number of articles, CN, and AS by year of publication of the articles are shown in Table 3. The year in which the most articles were published was 2014 (Table 3). The results of the correlation analysis between CN, NYsP, AS, ACpY, IF, 5 year-IF, PY, and H index, are shown in Table 4. There was a weak positive correlation between AS and AcpY, PY, IF, and 5-year IF, and there was a strong positive correlation between CN and ACpY, but there was no correlation between AS and CN and H-index (Table 4). The titles, first authors, PY, CN, ACpY, and AS of all articles are shown in Table 5. Three of the top 50 articles did not have AS.

DISCUSSION

The impact of scientific research on academia is assessed by the CN it receives and the journal's impact factor. The higher the CN an article receives, the higher is its quality and the more it contributes to Science. However, it takes a long time for a scientific article to be cited. In addition, some journals limit the number of article references, which encourages authors to be more selective in their choice of references. With the widespread use of the Internet and social media in recent years, it has become apparent that these criteria, along with the CN of articles, are also important for evaluating the effectiveness of Science, as articles can be published on platforms such as news sites, Twitter, Facebook, blogs, LinkedIn, and YouTube and reach a wider audience. It is possible to interact with the article on the Internet quickly and to reach a large population. Every day, much scientific content is shared on the Internet. All these developments have led to the Altmetric system, a web-based criterion, gaining importance [12]. Altmetrics shows the interactions of scientific research on the Internet and

Table 5. Top 50 article by metrics

Rank	Article title	First author	PY	CN	ACpY	AS
1	Small incision corneal refractive surgery using the small incision lenticule extraction (SMILE) procedure for the correction of myopia and myopic astigmatism: results of a 6-month prospective study	Sekundo W	2011	523	52.3	12
2	Results of small incision lenticule extraction: All-in-one femtosecond laser refractive surgery	Shah R	2011	401	40.1	3
3	Dissatisfaction after implantation of multifocal intraocular lenses	de Vries NE	2011	247	24.7	3
4	Safety and Complications of More Than 1500 Small-Incision Lenticule Extraction Procedures	Ivarsen A	2014	235	33.57	7
5	Mathematical Model to Compare the Relative Tensile Strength of the Cornea After PRK, LASIK, and Small Incision Lenticule Extraction	Reinstein DZ	2013	204	25.5	3
6	Small-incision lenticule extraction for moderate to high myopia: Predictability, safety, and patient satisfaction	Vestergaard A	2012	183	20.33	3
7	The AcrySof Toric Intraocular Lens in Subjects with Cataracts and Corneal Astigmatism a Randomized, Subject-Masked, Parallel-Group, 1-Year Study	Holland E	2010	181	16.45	4
8	Correcting astigmatism with toric intraocular lenses: Effect of posterior corneal astigmatism	Koch DD	2013	177	22.12	11
9	Toric Intraocular Lenses in the Correction of Astigmatism During Cataract Surgery a Systematic Review and Meta-analysis	Kessel L	2016	173	34.6	7
10	Multifocal intraocular lenses in cataract surgery: Literature review of benefits and side effects	de Vries NE	2013	156	19.5	6
11	Dry Eye Disease after Refractive Surgery Comparative Outcomes of Small Incision Lenticule Extraction versus LASIK	Denoyer A	2015	148	24.66	25
12	Toric intraocular lenses: Historical overview, patient selection, IOL calculation, surgical techniques, clinical outcomes, and complications	Visser N	2013	148	18.5	8
13	Comparison of Visual and Refractive Outcomes Following Femtosecond Laser Assisted LASIK With SMILE in Patients With Myopia or Myopic Astigmatism	Ganesh S	2014	146	20.85	2
14	One-year refractive results, contrast sensitivity, high-order aberrations and complications after myopic small-incision lenticule extraction (ReLEx SMILE)	Sekundo W	2014	143	20.42	6
15	Predictors for the Outcome of Small-incision Lenticule Extraction for Myopia	Hjortdal JO	2012	140	15.55	3
16	Design and qualification of a diffractive trifocal optical profile for intraocular lenses	Gatinel D	2011	140	14	10
17	Central Corneal Volume and Endothelial Cell Count Following Femtosecond Laser-assisted Refractive Cataract Surgery Compared to Conventional Phacoemulsification	Takacs AI	2012	137	15.22	8
18	Eight-Year Follow-up of Posterior Chamber Phakic Intraocular Lens Implantation for Moderate to High Myopia	Igarashi A	2014	136	19.42	7
19	Multifocal intraocular lenses: An overview	Alio JL	2017	135	33.75	14
20	Comparison of the Visual Results After SMILE and Femtosecond Laser-Assisted LASIK for Myopia	Lin FY	2014	132	18.85	0
21	Multifocal intraocular lenses: Relative indications and contraindications for implantation	Braga-Mele R	2014	131	18.71	1
22	Corneal biomechanical effects: Small-incision lenticule extraction versus femtosecond laser-assisted laser in situ keratomileusis	Wu D	2014	129	18.42	0
23	Phakic intraocular lenses Part 2: Results and complications	Kohnen T	2010	129	11.72	3
24	Visual outcomes and subjective experience after bilateral implantation of a new diffractive trifocal intraocular lens	Sheppard AL	2013	123	15.37	7
25	Femtosecond lenticule extraction for the correction of myopia: preliminary 6-month results	Blum M	2010	123	11.18	3
26	Comparison of biomechanical effects of small-incision lenticule extraction and laser in situ keratomileusis: Finite-element analysis	Roy AS	2014	116	16.57	4

27	Intermediate visual function with different multifocal intraocular lens models	Alfonso JF	2010	114	10.36	3
28	Comparison of bifocal and trifocal diffractive and refractive intraocular lenses using an optical bench	Gatinel D	2013	113	14.12	7
29	Visual performance after bilateral implantation of 2 new presbyopia--correcting intraocular lenses: Trifocal versus extended range of vision	Monaco G	2017	112	28	7
30	A Comparative Evaluation of a New Generation of Diffractive Trifocal and Extended Depth of Focus Intraocular Lenses	Cochener B	2018	111	37	19
31	Association Between the Percent Tissue Altered and Post-Laser in Situ Keratomileusis Ectasia in Eyes with Normal Preoperative Topography	Santhiago MR	2014	110	15.71	4
32	Visual outcomes and optical performance of a monofocal intraocular lens and a new-generation multifocal intraocular lens	Alio JL	2011	110	11	3
33	Outcomes of a new diffractive trifocal intraocular lens	Mojzis P	2014	106	15.14	10
34	Laser in situ keratomileusis flap complications using mechanical microkeratome versus femtosecond laser: Retrospective comparison	Moshirfar M	2010	106	9.63	1
35	IntraLase Femtosecond Laser vs Mechanical Microkeratomes in LASIK for Myopia: A Systematic Review and Meta-analysis	Chen SH	2012	105	11.66	7
36	Effect of astigmatism on visual acuity in eyes with a diffractive multifocal intraocular lens	Hayashi K	2010	105	9.54	3
37	Small incision lenticule extraction (SMILE) and femtosecond laser LASIK: comparison of corneal wound healing and inflammation	Dong ZX	2014	103	14.71	12
38	Phakic intraocular lenses Part 1: Historical overview, current models, selection criteria, and surgical techniques	Guell JL	2010	103	9.36	3
39	Visual and Refractive Outcomes of Femtosecond Lenticule Extraction and Small-Incision Lenticule Extraction for Myopia	Kamiya K	2014	102	14.57	4
40	Comparative Analysis of the Clinical Outcomes with a Monofocal and an Extended Range of Vision Intraocular Lens	Pedrotti E	2016	101	20.2	18
41	Early Corneal Wound Healing and Inflammatory Responses after Refractive Lenticule Extraction (ReLEx)	Riau AK	2011	98	9.8	0
42	Comparison of toric intraocular lenses and peripheral corneal relaxing incisions to treat astigmatism during cataract surgery	Mingo-Botin D	2010	98	8.9	3
43	Presbyopia: Effectiveness of correction strategies	Wolffsohn JS	2019	97	48.5	5
44	Five-year results of Small Incision Lenticule Extraction (ReLEx SMILE)	Blum M	2016	97	19.4	6
45	Clinical Outcomes of SMILE and FS-LASIK Used to Treat Myopia: A Meta-analysis	Zhang YJ	2016	97	19.4	24
46	Trifocal Intraocular Lens Implantation to Treat Visual Demands in Various Distances Following Lens Removal	Kohnen T	2016	97	19.4	2
47	Efficacy and safety of multifocal intraocular lenses following cataract and refractive lens exchange: Metanalysis of peer-reviewed publications	Rosen E	2016	95	19	4
48	Intracorneal inlay to correct presbyopia: Long-term results	Yilmaz OF	2011	95	9.5	4
49	Outcomes of Small Incision Lenticule Extraction (SMILE) in Low Myopia	Reinstein DZ	2014	93	13.28	10
50	Clinical Outcomes After SMILE and Femtosecond Laser-Assisted LASIK for Myopia and Myopic Astigmatism: A Prospective Randomized Comparative Study	Liu M	2016	83	16.6	1

PY – publication year, CN – number of citations, ACpY – average citation per year, AS – altmetric score

social media and produces a score. Altmetrics provides metrics for different types of impact and the number of citations. Some authors suggest using Altmetrics as a measure of an article's "diffuse impact" and citations as a measure of its "scientific impact" [14]. However, Altmetric criteria also have negative aspects. Altmetrics are used by both the researchers and also the public, which can lead to misinterpretation when evaluating articles. In addition, popular topics receive more attention than technical topics. In this case, it becomes difficult to make an objective assessment. Studies that are not newsworthy, especially regarding refractive surgical procedures, receive fewer interactions and have lower Altmetric scores. Some journals use social media to promote their articles, while others do not. In this case, Altmetric values also vary from journal to journal.

The article with the highest AS in the top 50 list was "Dry Eye Disease after Refractive Surgery Comparative Outcomes of Small Incision Lenticule Extraction versus LASIK". When patients decide to undergo laser treatment, they have to deal with potential post-treatment side effects in addition to the treatment itself. Therefore, we believe that the comparative outcomes of dry eye disease after SMILE and LASIK treatments have more social interaction. However, the most cited article was "Small incision corneal refractive surgery using the small incision lenticule extraction (SMILE) procedure for the correction of myopia and myopic astigmatism: results of a 6-month prospective study". This suggests that academics may be more interested in the latest technology treatment techniques such as SMILE in refractive surgery.

In our current study, the most cited articles were in the "Journal of Cataract and Refractive Surgery". The journals with the highest average AS were the "British Journal of Ophthalmology" and "Survey of Ophthalmology", and the journal with the highest average CN was "Ophthalmology". In the top 50 list, the most studied topic in refractive surgery was SMILE. Although the SMILE laser, a relatively new method, compared with other refractive laser procedures, is the most studied topic by researchers, the most cited topic was "toric IOL", and the topics with the most AS were "toric IOL" and "trifocal IOL". This indicates that the toric IOL implantation procedure, a suitable option for patients with corneal astigmatism unsuitable for laser correction and who want spectacle independence, is of interest to researchers and the public. In addition, we believe that trifocal IOL implantation, which is a suitable procedure for patients in the presbyopic age group with near, intermediate, and distance vision who want spectacle independence, has received much attention in recent years, because of its increasing popularity and social impact AS.

In the field of refractive surgery, topics of interest to scientists may not be of interest to the general public. In our current study, 3 articles did not have AS. Similarly, Şener et al. performed an Altmetric analysis of articles on uveitis, and 9 articles did not have AS [15]. Again, in the study by Bulut et al., in which they performed an Altmetric analysis of articles on glaucoma, 8 articles did not have AS [16]. As the social importance and popularity of the article's topic increases, Altmetric activity also increases. In a study evaluating the Altmetric analysis of the 100 most cited articles on Covid 19, which was very popular during the pandemic period, the average Altmetric value was found to be 3 246 ±3 795 (85–16 548) [17].

When the AS values of the top 50 articles in our current study were evaluated by year of publication, the AS values of the articles were higher than in the previous 5 years. We believe that this situation is due to the increasing activity in social networks on the Internet in recent years.

Our current study found no significant correlation between AS and CN, but there was a weak correlation between AS and ACpY. Similarly, in a study conducted in Ophthalmology journals in the field of retina, the authors reported no significant correlation between AS and CN, but a weak correlation between AS and AcpY [18]. In contrast to our study, a study that evaluated articles in general medical and ophthalmic journals on glaucoma found a significant positive correlation between AS, CN, and AcpY [16]. General medical journals have a higher AS than branch journals [19]. Therefore, AS was low in our current study, which included only articles in ophthalmic journals. Articles on a technical topic such as refractive surgery may have attracted less social attention. A weak correlation between AS and CN was reported in a study that performed an Altmetric analysis of articles on Radiology [20].

Limitations of our study are the small number of articles, the inclusion of only English-language articles, using single-search terms, and using time filters. Since almost all articles on refractive surgery are published in Ophthalmology journals, general journals are not included in our current study. Since general journals receive more AS than branch journals, this can also be considered as a limitation of our study. Our current study is the first study in which an Altmetric analysis of "Refractive Surgery" articles was performed.

CONCLUSIONS

Our study provides useful information about which procedures attract more attention in refractive surgery. AS is insufficient, compared with traditional metrics, to show the scientific value of articles on refractive surgery. AS is influenced by social media platforms that are open to the use of not only researchers but also of society. Therefore, it cannot provide objective results. However, AS can be used to supplement traditional metrics and can be improved to provide more reliable results.

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