Review Article

Trends in reader access and article processing charges among urology journals: A systematic review

Hakki Uzun*, Eyüp Dil, Görkem Akça, Yusuf Önder Özsagir, Berat Sönmez, Erdem Orman

Department of Urology, Faculty of Medicine, Recep Tayyip Erdogan University, Rize, Türkiye
*E-mail: hakuzun@yahoo.com

ABSTRACT

Introduction: This bibliometric study is designed to investigate the relations of urology journals with access types and article processing charges (APCs) to assess the changing paradigm in urology publishing.

Methods: The three major databases: The Master Journal List directory by Clavirate Analytics, Scopus® and PubMed were queried for relevant journals in urology and subspecialties. Characterization of urology journals was undertaken, and citation metrics and APCs were compared across access types. A partial sampling was used to investigate the number of open access (OA) articles according to access types and correlations with both APCs and CiteScore.

Results: Seventy-seven journals were included into the study. Gold and diamond OA journals comprised 35.4% of urology journals in 2009 and were increased to 49.3% in 2022. No significant difference was found for change in the CiteScore of 2017 and 2021 between the access types, $F(2,63) = 0.152$, $P = 0.859$, $\eta^2 = 0.005$. A moderate positive correlation was found between APCs and CiteScore for both hybrid (rs [27] =0.431, $P < 0.0005$) and gold OA (rs [27] =0.489, $P = 0.007$) journals. The authors need to pay $1175 more to publish their articles in OA model in hybrid journals. The number of articles published in OA model by hybrid journals were not correlated with APCs (rs = 0.332, $P = 0.078$) but correlated with CiteScore (rs = 0.393, $P = 0.035$).

Conclusions: A paradigm shift in urology publishing toward OA model has been occurring. Authors choose prestige, OA model, rapid publication, and less rigorous peer-review to publish their articles. APCs bear only moderate correlation with the citation metrics of the urology journals.

INTRODUCTION

Medical publication has been carried on subscription-access model for centuries.[1] However, a paradigm shift in scientific publication toward open access (OA) model has been occurring. The number of articles published yearly has increased worldwide[2] and many new journals have started publishing an increased number of articles which require payment of article processing charges (APCs). Large publishing houses have adopted this type of publishing and increased their revenue.[3]

According to Web of Science database, OA publishing has been increased from 9.5% to 24% between 1998 and 2018 as well as in urology publications.[4,5] Accelerated publication and free access, challenges to publish in subscription-access type, and pressure for publishing have made authors increasingly publish their articles in OA platforms.[6,7] In addition, research institutions and funders mandate OA publishing, and universities and libraries are under pressure to meet the growing prices of subscription packages.[8] However, there are important ethical concerns that OA publishing does not uphold sufficient quality

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in peer review[6] and may lead to submission bias that low quality articles backed by funders or institutions may have advantage in being published in journals with higher citations scores.[9] There is concern that APC-based publishing may disrupt the traditional meritocratic nature of medical publishing.[9] However, the fact is that the greatest advantage of OA publishing is free access to articles that would increase information sharing, which is the mission of scholarship.

Scientific information has traditionally been shared in print but with the introduction of internet, decreased costs of publication have facilitated access to scientific information and submission of articles. This new paradigm has threatened the oligopoly of the big publishers and the prestige of the journals. However, is this sustainable? A comprehensive characterization of urology journals and comparison of access types has not been undertaken. Such an analysis can elucidate the shift in urology publishing and can help authors gain insight into the changing paradigm and ethics in new types of publishing. Furthermore, it can provide future directions to both old and newly established journals. Thus, we planned a bibliometric study to analyze the relations of the urology journals with access types and APCs to elucidate the changing.

METHODS

This was a cross-sectional bibliometric investigation of journals of urology and subspecialties. The inclusion criteria were English language publication, devoid of pseudojournals (predatory) publishing criteria, peer review journals publishing primarily in urology or subspecialties, actively publishing as of December 2022 and being indexed in at least one of the large database sources, Master Journal List, Scopus or PubMed/Medline.

Database sources

The Master Journal List directory by Clavirate Analytics, Scopus® (Elsevier BV, Amsterdam, Noord Holland, The Netherlands) citation database, and the National Library of Medicine Catalog/PubMed were queried with keywords urology and andrology for relevant journals in urology and subspecialties, and journals which met the criteria were included into the study after a rigorous review.

Journals publishing articles in many different disciplines as well as urology but not specific for urology and subspecialties were excluded. Included OA journals were additionally searched whether they were indexed in Directory of Open Access Journals (DOAJ). Journals for reproduction and sexual health (mostly publish articles related to psychiatry and gynecology) were not included. Journals publishing only information for urological disorders and supplements were not also included.

Access type

Journals were manually searched on their websites for type of access and classified into four categories (subscription-access, hybrid, gold OA, and diamond [platinum] OA) [Table 1].

Subscription access is the traditional way of publishing and refers to journals which publish paywalled articles for readers. These journals do not charge the authors to submit or publish their articles. APC is the fee the journals charge the authors or funders to publish original research, case, review, or brief article. APC paid articles are freely accessible to readers (OA) or only by subscribers (paid article). Paid articles are not freely accessible, even though an APC is paid by the authors or funders and are published under an exclusive license. Both transformative and hybrid journals publish paid articles. Paid articles are not OA but the requirement of APC to publish the article is similar to OA articles. The authors usually retain the full copyright of the published article, generally represented under the tag "Copyright© The Author(s)."[10]

Hybrid OA refers to a model where the author or funder has the option to pay APC to make their article OA in an otherwise subscription-access journal.[10] In other words, hybrid journals publish both subscription-access and OA articles. However, depending on the policies of the publisher, some hybrid journals give the author an option to publish their articles other than an OA model. These articles are APC paid but are not freely accessible.

To publish in gold OA journals, authors pay an APC and the publisher of the journal provides free immediate online access to the full content of the journal. Articles have a Creative Commons License applied, which specifies how the authors and readers can use the article.

Diamond OA refers to journals that are freely accessible at the journal's website and those at the repositories as gold OA journals. However, authors do not pay to publish their articles and journals do not earn money from the business. The outlays of the diamond OA journals are covered by the affiliations.

Table 1: Characteristics of access types

Access type	Freely accessible	Free publication	APCs payable
Subscription-access	–	+	–
Hybrid			
SA articles	–	+	–
OA articles	+	–	+
Paid article	–	–	+
Gold OA	+	–	+
Diamond OA	+	+	–
Transformative Journal			
OA articles	+	–	+
Paid article	–	–	+

SA=Subscription-access, OA=Open access, APCs=Article-processing charges ,+: Yes (available, valid), -: No (unavailable, invalid)

Transformative journal: During the manual inspection of the access type of the journals in their websites, we observed that some journals call themselves transformative. All the articles published in these journals are composed of OA or paid articles. However, transformative journals proactively promote the authors to submit in OA or paid article model during submission and peer review. We considered that transformative journals act as gold OA journals in a way, and therefore, they were transferred into the gold OA group for group comparisons and correlation analysis.

Citation metrics

Journal impact factor (JIF) and journal citation index (JCI) scores were obtained from journal citation reports, 2022. CiteScore, Source Normalized Impact per Paper (SNIP), SCImago Journal Rank (SJR), H index and Quartiles of journals were reviewed from Scopus and related SCImago Journal and Country Rank portal.

JIF and CiteScore are the primary citation metrics that measure the average number of citations per paper. JCI has the advantage of being easily interpreted and compared across closely adjacent fields, for example, those in biological sciences and represents the relative citation impact of a given paper as the ratio of citations compared to a global baseline. SNIP, unlike JIF or CiteScore, measures the impact of a single citation given higher value in scientific fields where citations are less likely, to correct differences in citation practices, thereby, to compare journals between subject areas. SJR is the average number of weighted citations (coming from journals which themselves are highly cited and vice versa) from publications in Scopus. It is also stated with the quartiles of the journals (Q1–Q4).

Study design

Journals were manually reviewed as being predominantly related to urology and subspecialties based on their titles and tables of contents. Each journal website was reviewed to obtain information on type of access, APCs, publishing original and/or only review articles, first issue publication date, publication frequency, publisher, and journal of affiliation. APCs were unified in US dollars (US$). Four journals charge APCs in European Union Euro and were converted into US dollars. The conversion rate was 1.03.

A further aim was consequently to study the total number of the original, review, and case reports published in subscription-access and OA model in the journals included in this study. However, there is no central indexing for subscription-access, OA or paid articles and it was impractical to manually review all the articles published after 2009. Therefore, a partial sampling was taken and the articles published in the last issues of the journals involving a quarter or 4-month period were manually counted. This timeframe was given because a few journals were published at least a quarterly basis. However, some journals were published bimonthly and the last two issues comprising the articles published in 4 months were included. In addition, the second challenge in counting the OA articles in hybrid journals is that publishers prefer differing ways of tagging a hybrid OA article in their tables of contents, and there is no uniform adopted so far. OA articles were reviewed under the tags of "creative commons" or "OA."[10] However, paid articles were identified using the labelling of such articles with text like "copyright the authors." Brief communications and opinions published in gold OA journals were also counted. In addition, OA (including paid articles) and subscription-access articles published in hybrid journals were also separately recorded. Letters, editorials, discussions, congress or meetings in hybrid, and subscription-access journals and articles allowed freely accessible by journals were not counted.

In this study, characterization of publishing in urology was undertaken, and then citation metrics and APCs were compared across access types.

Statistical analyses

Transformative journals were transferred into the gold OA group before group comparisons. A Kruskal–Wallis test was conducted to investigate the differences between nonnormally distributed variables (citation metrics) across the study cohorts (i.e., hybrid, gold OA, diamond OA). To estimate the difference between the CiteScore values in 2017 and 2021 in change from baseline in mean scores, an analysis of covariance (ANCOVA) model was used, which included the corresponding baseline values as covariate. To investigate the difference in APCs between the hybrid and gold OA groups, *P* values were calculated using the Welch *t*-test. $P < 0.05$ was considered statistically significant. A Spearman's rank-order correlation test was also run to investigate the association of CiteScore and APCs with the number of OA articles published by the hybrid journals. The association between citation metrics (JIF and CiteScore, SNIP and CiteScore) was investigated using Spearman correlation coefficients. The SPSS system (version 23; IBM, Armonk, NY, USA) was used for the calculations.

RESULTS

Journal characterization

The three major databases, including Master Journal List, Scopus and PubMed/Medline, revealed 121 journals, however, 19 journals were not actively publishing, 10 were former names of journals, and 15 journals were not publishing in the English language. The final cohort consisted of 77 peer-review journals which 55 of 77 (71.4%) were indexed in each of the 3 databases. Two of 15 diamond OA and 2 of 22 gold OA journals have not been indexed in DOAJ yet.

Table 2 summarizes the journals, access type and the publishers. The distribution of journals across access types

Table 2: Journals, access type, and publishers

Journal	Access type	Publisher
Actas Urologicas Espanolas	Hybrid	Elsevier
Advances in Urology	Gold	Hindawi
African Journal of Urology	Diamond	Springer Nature
Aging Male	Gold	Taylor and Francis Online
Andrologia	Gold	Hindawi
Andrology	Hybrid	Wiley-Blackwell
American Journal of Clinical and Experimental Urology	Gold	E-century publishing Corporation
American Journal of Men's Health	Gold	SAGE
Arab Journal of Urology	Diamond	Taylor and Francis Online
Archivio Italiano di Urologia e Andrologia (Arch Ital Urol Androl)	Gold	PAGEPress
Asian Journal of Andrology	Gold	Wolters Kluwer Health
Asian Journal of Urology	Diamond	Elsevier
Basic and Clinical Andrology	Gold	Springer Nature
BJU International	Hybrid	Wiley-Blackwell
BJUI Compass	Gold	Wiley-Blackwell
Bladder Cancer	Hybrid	IOS Press
BMC Urology	Gold	Springer Nature
Canadian Urological Association Journal	Diamond	Canadian Urological Association
Central European Journal of Urology	Diamond	Polish Urological Association
Clinical Genitourinary Cancer	Hybrid	Elsevier
Current Opinion in Urology	Hybrid	Wolters Kluwer Health
Current Urology	Diamond	Wolters Kluwer Health
Current Urology Reports	Transformative	Springer Nature
Current Bladder Dysfunction Reports	Transformative	Springer Nature
European Urology	Hybrid	Elsevier
European Urology Focus	Hybrid	Elsevier
European Urology Open Science	Gold	Elsevier
European Urology Oncology	Hybrid	Elsevier
IJU Case Reports	Gold	Wiley-Blackwell
Indian Journal of Urology	Diamond	Wolters Kluwer Health
International Brazilian journal of Urology	Diamond	Brazilian Society of Urology
International Journal of Impotence Research	Transformative	Springer Nature
International Journal of Urological Nursing	Hybrid	Wiley-Blackwell
International Journal of Urology	Hybrid	Wiley-Blackwell
International Neurourology Journal	Diamond	Korean Continence Society
International Urogynecology Journal	Hybrid	Springer Nature
International Urology and Nephrology	Transformative	Springer Nature
Investigative and Clinical Urology	Diamond	Korean Urological Association
Journal of Clinical Urology	Hybrid	SAGE
Journal of Endourology	Hybrid	Mary Ann Liebert, Inc.
Journal of Men's Health	Gold	MRE Press
Journal of Pediatric Urology	Hybrid	Elsevier
Journal of Sexual Medicine	Hybrid	Elsevier
Journal of Urological Surgery	Diamond	Society of Urological Surgery
LUTS: Lower Urinary Tract Symptoms	Hybrid	Wiley-Blackwell
Minerva Urology and Nephrology	Hybrid	Edizioni Minerva Medica
Nature Reviews Urology	Subscription-access	Springer Nature
Nephro-Urology Monthly	Gold	Brieflands
Neurourology and Urodynamics	Hybrid	Wiley-Blackwell
Prostate	Hybrid	Wiley-Blackwell
Prostate Cancer	Gold	Hindawi
Prostate Cancer and Prostatic Diseases	Transformative	Springer Nature
Prostate International	Diamond	Elsevier
Research and Reports in Urology	Gold	Dove Medical Press
Revista Internacional de Andrologia	Hybrid	Elsevier
Scandinavian Journal of Urology	Hybrid	Taylor and Francis Online
Sexual Medicine	Gold	Elsevier
Sexual Medicine Reviews	Hybrid	Elsevier
The Canadian Journal of Urology	Subscription-access	Canadian Journal of Urology
The Journal of Urology	Hybrid	Wolters Kluwer Health
Therapeutic Advances in Urology	Gold	SAGE
Translational Andrology and Urology	Gold	AME Publishing Company
Urogynecology	Hybrid	Wolters Kluwer Health
Urogynaecologia International Journal	Diamond	PAGEPress

Contd...

Table 2: Contd...

Journal	Access type	Publisher
Urolithiasis	Transformative	Springer Nature
Urologia Journal	Transformative	SAGE
Urologia Internationalis	Hybrid	Karger
Urologic Oncology: Seminars and Original Investigations	Hybrid	Elsevier
Urological Science	Diamond	Wolters Kluwer Health
Urology	Hybrid	Elsevier
Urology Annals	Gold	Wolters Kluwer Health
Urology Case Reports	Gold	Elsevier
Urology Journal	Gold	Urology and Nephrology Research Center
Urology Practice	Hybrid	Wolters Kluwer Health
Urology Research and Practice	Diamond	Turkish Association of Urology
World Journal of Men's Health	Gold	Korean Society for Sexual Medicine and Andrology
World Journal of Urology	Transformative	Springer Nature

was subscription-access 2, hybrid 29, transformative 8, gold OA 23, and diamond OA 15 [Figure 1]. Seven of 8 transformative journals are published by Springer Nature. "Andrologia" journal converted to gold OA by the end of 2022 and is listed as gold OA in this study. Five of 23 gold OA journals were considered earlier to be subscription-access which changed to gold OA type. The remaining 18 journals have been founded as gold OA.

Importantly, a significant number of urological journals (44 of 77, 57%) are published by the 5 big publishers (Elsevier [16], Wiley-Blackwell [9], Springer Nature [12], Sage, Taylor and Francis [4]). However, the rate was 68.8% (31/45) before 2009. In addition, Wolter's Kluwer Health publishes 9 urology journals. Nonetheless, 54 (70%) of 77 journals have affiliations with urological associations, societies, or universities. Twenty-one (27.2%) journals are monthly publications and 40 (52%) are published bimonthly (20) and quarterly (20). Five journals accept only review articles. Two new founded gold OA journals publish only case reports. Eight journals (10.4%) were identified as sister journals. Seventy-four journals were indexed in Scopus and 23 journals were categorized in Q1, 25 in Q2, 19 in Q3, and 7 in Q4 (SCImago Q categorization).

Longitudinal publication trends

The distribution of newly founded journals after 2009 was analyzed to investigate the longitudinal change in urology publishing. More than a third of journals included in this study, 29 of 77 (37.6%), began publication during this period (2.23 new journals per year). A substantial gold and diamond OA journals, 72.4% (21 of 29), constituted most newly founded journals. Gold (8) and diamond (9) OA journals comprised 35.4% (17 of 48) of urology journals indexed in 3 major databases in 2009; however, it was increased to 49.3% (38 of 77) in 2022. However, no new subscription-access journal has been founded after 2009. The distribution of journals starting publication before and after 2009 across access types is shown in Figure 2.

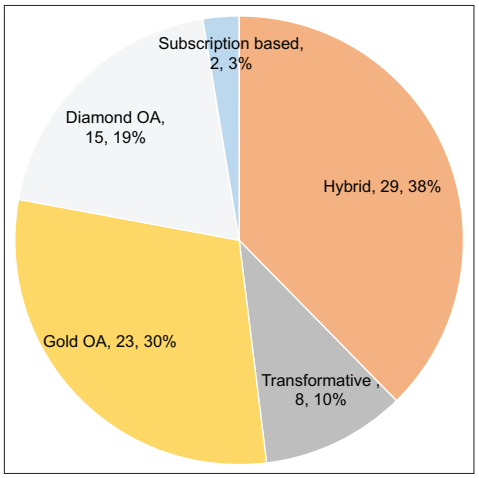

Figure 1: Distribution of urology journals across access types

Citation metrics between access types

A Kruskal–Wallis test was conducted to determine if there were differences in JIF, JCI, CiteScore, SNIP, SJR and H index scores between hybrid ($n = 69$), gold OA ($n = 72$), and diamond OA ($n = 72$) groups. Distributions of metric scores were similar for all groups, as assessed by visual inspection of a boxplot. Median JCI ($\chi^2[2] = 7.708$, $P = 0.021$), CiteScore $\chi^2[2] = 8.187$, $P = 0.017$, SJR $\chi^2[2] = 12.858$, $P = 0.002$ and H index scores $\chi^2[2] = 12.161$, $P = 0.002$ were statistically significantly different between the groups. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Adjusted P values are presented. This *post hoc* analysis revealed statistically significant differences in median JCI scores between the hybrid (0.71) and diamond OA (0.5) ($P = 0.018$), in median CiteScore between the hybrid (3.9) and diamond OA (2.3) ($P = 0.021$), in median SJR scores between the hybrid (0.77) and gold OA (0.51) ($P = 0.02$), and hybrid and diamond (0.4) ($P = 0.004$) groups. Median H scores were found statistically significantly different between hybrid (52) and diamond OA (20) ($P = 0.002$) groups.

Change in CiteScore of journals between 2017 and 2021

An ANCOVA was run to determine the effect of changing paradigm of urology publishing on the CiteScore of the

urology journals. This timeframe was given because many newly established journals do not have CiteScore before 2017.

Two of the diamond OA journals had a Citescore of 0 in 2017, and therefore, the following year CiteScore was taken. There was a linear relationship between the CiteScore of 2017 and 2021, as assessed by visual inspection of a scatterplot. There was homogeneity of regression slopes as the interaction term was not statistically significant, $F(2,60) = 1.786$, $P = 0.176$, and homogeneity of variances, as assessed by Levene's test ($P = 0.625$). There was 1 outlier in the data, as assessed with standard residuals greater than ± 3 standard deviations (SDs) and was kept. After adjustment for CiteScore 2017, there was not a statistically significant difference between the groups in CiteScore 2021 and 2017, $F(2,63) = 0.152$, $P = 0.859$, $\eta^2 = 0.005$ [Table 3].

Correlations between citation metrics

Spearman correlation was run to investigate the correlation between JIF and CiteScore for urology journals, and a strong correlation was found (rs = 0.937, $P < 0.0005$). A similar correlation was also obtained between CiteScore and SNIP (rs = 0.927, $P < 0.0005$) [Figure 3].

Correlation between article processing charges and CiteScore

A Spearman's rank-order correlation was run to assess the relationship between APCs and CiteScore in hybrid and gold OA journals. All 29 hybrid and 29 of 31 gold OA + transformative journals (gold OA group) had a CiteScore [Figure 4]. Preliminary analysis showed the relationship to be monotonic in both correlation tests, as assessed by visual inspection of a scatterplot. There was a statistically significant, moderate positive corelation between APCs and CiteScore, hybrid, rs (27) =0.431, $P < 0.0005$; gold OA group, rs (27) =0.489, $P = 0.007$.

Article processing charges between access types

Data are mean ± SD, unless otherwise stated. The median APC for 60 (hybrid [median $3300] + transformative [$3500] + gold OA [$1500]) journals was $3000 ($311–5000). A Welch *t*-test was run to determine if there was a difference in APCs between hybrid and gold OA group journals due to the assumption of homogeneity of variances being violated, as assessed by Levene's test for equality of variances. APCs for hybrid and gold OA group journals were normally distributed, as assessed by Shapiro–Wilk's test ($P > 0.05$). Mean APCs for hybrid OA journals (3348 ± 672.27) were higher than mean gold OA group journals (2172 ± 1223.81), which is a statistically significant difference of 1175.32 (95%

Table 3: Adjusted and unadjusted CiteScore means and variability for 2021 CiteScore with 2017 CiteScore as a covariate

Access Type	*n*	Unadjusted, mean±SD	Adjusted, mean±SE
Hybrid	27	5.37±6.21	4.13±0.36
Gold OA	26	3.47±1.88	3.93±0.36
Diamond OA	13	2.60±1.49	4.25±0.52

n=Number of patients, SD=Standard deviation, SE=Standard error, OA=Open access

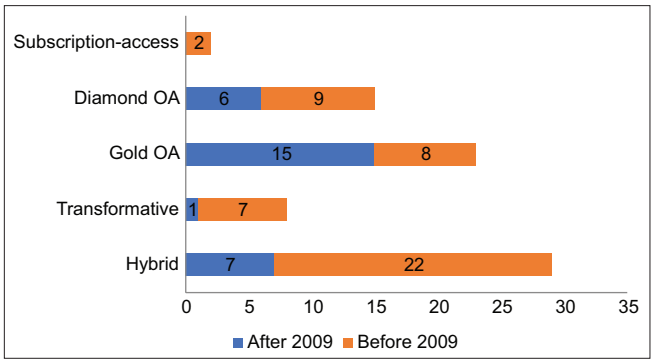

Figure 2: Number of journals starting publication before and after 2009

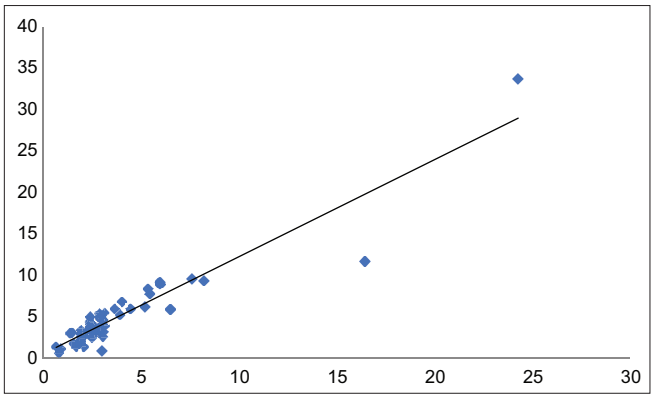

Figure 3: Spearman correlation between JIF and CiteScore. JIF = Journal impact factor

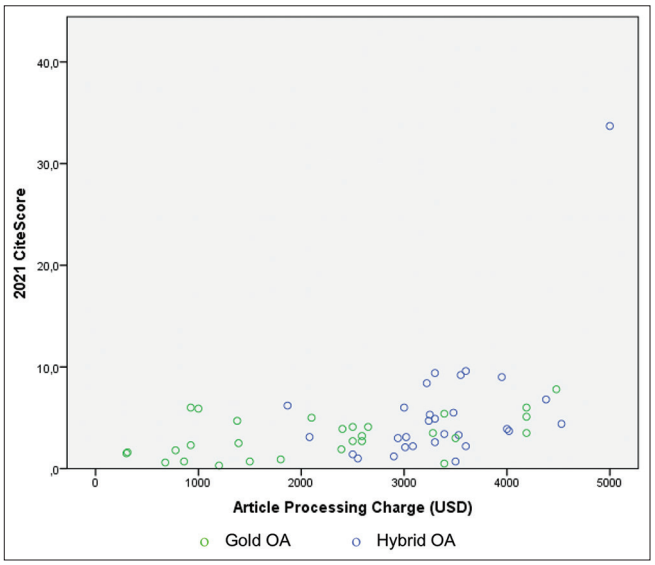

Figure 4: CiteScore versus APCs for gold OA and hybrid publishing in plastic surgery. Blue data points represent hybrid urology journals; green data points represent gold OA urology journals between. OA = Open access, APCs = Article processing charges

confidence interval: 666.85–1683.79), t (47.212) =4.650, $P < 0.0005$.

Correlation of total number of open access and paid articles published by hybrid journals with article processing charges and CiteScore

Total number of articles according to access types published in the urology journals of the last issues of 3 or 4 months was manually counted. The 2 gold OA journals publishing only case reports published 234 (34.6%) of 676 totally published articles in gold OA journals. In comparison, 213 OA and 33 subscription-access articles were published by 15 diamond OA and 2 subscription-access journals, respectively. Number of articles published in gold OA journals was calculated 2.92 times higher than diamond OA journals. The percent of OA and paid articles (192) published in hybrid journals was calculated as 14.4% (0–62.5). Five hybrid journals published no OA or paid article. However, 304 articles were published by 8 transformative journals with no distinguishable subscription-access article. The percentage of the sum of the published OA and paid articles (1385) to total number of published articles (2556) in all journals in this study was 54.2%. A spearman's rank-order correlation was run to investigate the correlation between the number of OA and paid articles published by 29 hybrid journals and APCs and CiteScore 2021. A nonsignificant correlation was obtained with the APCs, rs = 0.332, $P = 0.078$. However, a significant correlation was found with the CitesScore 2021, rs = 0.393, $P = 0.035$.

DISCUSSION

A significant number journals indexed in databases have begun publication after 2009, of which more than two-thirds were gold and diamond OA. Hybrid journals were found to have significantly higher JCI, CiteScore, SJR and H scores compared to diamond OA journals, and higher SJR scores in comparison to gold OA journals. However, no significant difference was observed for change in the CiteScore of 2017 and 2021 between the access types. A strong correlation was found between CiteScore and JIF. A moderate positive correlation was observed between APCs and CiteScore for both hybrid and gold OA journals. Transformative journals have the highest median APCs and authors or funders need to pay $1175 more if they intend to publish their articles in hybrid journals in comparison to gold OA + transformative journals. More than half of the articles (54.2%) were published as OA or paid article in partial sampling of all the journals included in this study. Number of total OA and paid articles published by hybrid journals was not correlated with APCs but correlated with CiteScore.

It is obvious that the paradigm in urology publishing is changing. The percent of gold and diamond OA urology journals indexed in 3 databases has reached 49.3%. In addition, priorly 8 (10.4%) subscription-access journals flipped to transformative journals. In line with this, 54.2% of all articles published in the last issues of the urology journals were composed of OA and paid articles. This trend is expected to continue in favor of OA journals. Furthermore, subscription-access journals may disappear in medical publishing. There are only 2 journals left and they may change to other access types to remain competitive. However, in this study, it is observed that some hybrid journals with lower citation metrics with no or very low OA uptake still act mostly as subscription-access journals. Authors are under pressure of funders and institutions to publish their articles in full OA (gold and diamond OA) journals.[1] Thus, it is rational to expect that growth of OA journals will continue and may put some hybrid journals with low OA uptake under pressure to flip to other OA types.

Hybrid journals were found to have higher citation metrics than gold and diamond OA journals as expected. They were more established, priorly subscription-access journals, and gained prestige over time. However, we intended to investigate how the citation metrics were influenced by the changing paradigm in urology publishing. We observed that hybrid journals did not gain higher increase in CiteScore in comparison to full OA types during the 4 years, 2017–2021. The hypothesis that OA journals receive more citations than subscription and hybrid journals was investigated, and contradictory findings were reported.[8,11,12] These conflicting studies may be discipline-specific or more likely due to confusion in tagging OA articles. Diamond OA journals have the advantage to be free for subscription and publishing, and many have increasing citation scores and may close the distance over time.[13] Gold OA journals may have a similar chance due to lower costs and support given by research funders. However, the main concern of OA publishing is the potential conflict of interest that publishers may generate revenue by accepting marginal papers to maximize their profits.[14,15] Some prestigious hybrid or transformative journals may in time be in risk to lose their citation score advantage due to mismanagement.

The support and financial contributions to OA publishing and growth of OA publications have concomitantly significantly increased over time.[16] Several research funders in Europe have set up centralized funds and others negotiate deals with publishers to cover APCs.[10] In this study, the median APC for 60 urology paid journals was $3000 which has also become more or less of an industry standard.[17] However, publishing OA in hybrid journals was found more expensive than gold OA + transformative urology journals. Thus, whether urology journals have the impact worthy of its APCs achieves importance. In this study we found that APCs showed a moderate correlation with CiteScore for both hybrid and gold OA urology journals. Several studies reported weak-moderate correlations with citation metrics and APCs.[9,18] Furthermore, in this study, the number of published OA and paid articles in hybrid urology journals

showed correlation with CiteScore but not with APCs. These results suggest that authors prefer high-impact journals to publish their articles rather than the amount of payment because of perceptions of prestige. On the other side of the coin, high APCs risks excluding researchers who are less wealthy or are not backed by funders and may act as a barrier of OA publishing. Despite the financial support to cover APCs, research funders have begun to pay fees for only gold OA journals because of lower APCs.[3] It comes to mind that some research funders may cancel the funds for paying APCs in the times ahead and put the researchers under pressure to publish their articles in diamond OA journals which do not charge the authors or research funders.

It was reported that grant-funded articles were more likely to have been published OA.[9] OA model offer higher acceptance rate, speed publishing and free access. These advantages may direct the authors to publish their APCs-covered articles in OA type. However, even though diamond OA journals do not charge neither the authors nor the funders, the number of articles published in gold OA urology journals is 2.92 times higher than the number of those published in diamond OA journals. The rate of OA articles published in hybrid journals in different disciplines was reported between 3.26% and 10.6%,[11,19] however, it is slightly less than this study (14.4%). This difference is suggested to be related to the confusion in tagging OA or paid articles.

Transformative journals give an interesting experience. Although these journals intended to change to gold OA, most of their contents are composed of paid articles. Journals charge both the authors and the subscribers. However, many prestigious hybrid journals have similar ways of publishing. Interestingly, in this study, we found that 8 transformative urology journals published 304 OA or paid articles in comparison to 192 articles published by 29 hybrid journals although transformative journals charge higher APCs. This difference in favor of transformative journals may be attributed to successful marketing. Whether these journals eventually change to gold OA or continue to be transformative remains uncertain.

CiteScore is a similar journal-based citation index to JIF; however, while CiteScore represents the last 4-year performance, JIF corresponds to a 2-year window. Urology journals may be in uncertainty to use any of these metrics. However, we found a very high correlation between CiteScore and JIF for urology journals, and concluded that both could be used in place of the other. Similar correlations were also reported by many other studies for different disciplines including radiology, nuclear medicine, and medical imaging.[20]

The introduction of internet and digital online publication has changed the paradigm in publishing; however, has also influenced the researchers to publish their articles. OA publishing has resulted in the introduction of citation metrics into academy and requesting APCs from the authors or funders. Citation metrics have ranked the journals, and journals with higher citation metrics had the advantage to request higher APCs. Thus, the publishers and the editors started paying attention to the acceptance of submitted highly citable articles to increase the citation metrics of their journals. The authors before submission should keep in mind that the citable potential of their article will be the most important factor for most of the editors. In addition, this study shows that APCs bears only moderate correlation with the citation metrics of the urology journals. Both funders and authors should be careful when considering the cost implication of publishing in urology journals. Furthermore, diamond OA urology journals have similar increasing trend in citation metrics in comparison to hybrid and gold OA urology journals. Journals with higher citation metrics create a strong incentive for authors to publish in these journals, however, diamond and gold OA urology journals offer a viable option.

This study has several limitations. Some journals may discount authors, however, this may not significantly change the results of the statistical analysis, and the study data were limited what was available online on their websites. Hybrid and transformative journals have several ways of tagging an OA article, and to our knowledge, there is no definition or study investigating transformative journals or paid articles. A small number of articles published in urology journals in the field of nephrology and different aspects of men's health were not excluded. We consider this is a transitional period in medical publishing as well as for urology journals and future studies will be needed to understand the relation of OA publishing with the change in scientometrics. Further investigations should elicit the authors' and funders' attitudes toward OA publishing and the financial sustainability of supporting OA publications.

CONCLUSIONS

Subscription-access has been the main form in medical publishing for centuries. The changing paradigm to OA publishing seems to be irreversible Authors choose prestige, rapid publication, and less rigorous peer-review to publish their articles and OA model as long as they have a choice to cover the costs of publication; however, the increasing APCs may act as a barrier for authors and may cause a shift in the plan of funders and institutions. Diamond and gold OA journals have a great opportunity to grow under these circumstances and the policy of the funders and the states will determine the shape of urology publishing.

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