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Publication Date
2019-02-12

DOI
10.1111/bju.14706

Peer reviewed

BJUI
BJU International

The landscape of urological retractions: the prevalence of reported research misconduct

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Objectives

To evaluate the landscape of retractions of literature and to determine the prevalence of research misconduct in the field of urology.

Methods

Three databases (PUBMED, Embase, Retraction Watch) were queried for all retracted studies on urological topics in both urological and non-urological journals from April 1999 to March 2018. Two reviewers screened the records and determined the final list of articles to be included in the analysis.

Results

A total of 138 articles met the inclusion criteria. Over 80% of retractions occurred after 2009. Retractions originated from 76 different journals (13 urological journals) and 28 countries. The most common reasons for retraction were plagiarism (28%), fake peer review (20%), error (20%), and falsification of data (13%). Misconduct accounted for two-thirds of the retractions (n = 93). A large watermark, indicating retraction of the article, was present in 75% of the manuscripts. Articles were cited a total of 4454 times, 38% of citations happened after retraction. The majority of retracted articles related to urological oncology (70%). The highest number of retractions for an individual author was five. Rates of retraction among popular urological journals since 2010 have increased but remain a small proportion of all publications: *BJUI*, 0.189%; *World Journal of Urology*, 0.132%; *European Urology*, 0.058%; *Urology*, 0.047%; and *Journal of Urology*, 0.024%.

Conclusion

Retractions of urological literature, similarly to retractions of other biomedical literature, have been rising over the last decade. The majority of these retractions stem from research misconduct. Despite retractions, flawed articles continued to be cited.

Keywords

retraction, research misconduct, plagiarism, citations, fake peer review

Introduction

Retractions are one of the ways by which readers of a journal are alerted to unreliable literature [1]. These alerts take place in the form of an online or print retraction notice, and with the placement of a watermark or stamp over the article when a reader accesses it. Articles may be retracted for a multitude of reasons including falsification of data, plagiarism, honest errors, and/or other ethical issues [1]. Retracted published studies not only affect the reputation of the scientists [2], but often involve costly investigations [3], and can even place patients at risk of harm when incorrect information is disseminated and used to guide treatment [4].

The rate of retraction of scientific literature has been rising steadily, with a more than 10-fold increase from 2001 to 2010 [5]. Two-thirds of these retractions have resulted from author misconduct [6]. In many instances, these articles continue to be cited despite being flawed [7,8], carrying the potential for future research to be based on false foundations. Several studies have documented the collective landscape of scientific retractions over the years, and researchers in medical specialties such as radiology [9], general surgery [10], orthopaedics [11] and neurosurgery [12] have described the extent of the phenomenon in their fields.

Retractions in also urology exist, including a fictional biography about the 'inventor' of the Coude catheter [13]. Also, a randomized controlled trial comparing myoblast and collagen bladder injections for urinary incontinence was retracted from the *Lancet* because the authors never obtained institutional review board approval [14]. To our knowledge, there is no study that describes the reasons for and trends in retracted urological publications. The aim of the present study was to describe the extent of this phenomenon in urology.

Methods

Search Strategy

Three online databases (PUBMED, Embase, Retraction Watch) were surveyed on 11 May 2018 for all articles of urological research retracted prior to that date. The search criteria used for each database were as follows. For MEDLINE, Medical Subject Heading (MeSH) keywords 'urology'; 'prostate'; 'urologic surgery'; 'urinary'; 'urethra'; 'penis'; 'ureter'; 'ureteral'; 'nephrolithiasis'; 'kidney stones', 'urinary tract'; 'testicle'; 'testicular'; 'kidney' were used, and separated by the Boolean operator 'OR', and with the 'Retracted Publication' and 'Retraction of Publication' filters. EMBASE lacked filters, so the keyword 'retracted' was added preceded by Boolean operator 'AND'. For Retraction Watch, the search was performed by selecting all entries retrieved under the Subject: '(HSC) Medicine – Urology', after application of the Nature of Notice filter: 'Retraction'.

Study Screening

Two reviewers (J.M., M.N.) independently reviewed all the records retrieved. An initial screen was performed using titles and abstracts, and the selected articles were then compiled for full-text review. Articles were included if they were retractions of original research, articles about any urological topic, at all levels of evidence, regardless of whether they were in a urological journal or not. A urological journal is one whose main coverage is exclusive to urological research, while non-urological journals might cover topics related to urology but their main focus is broader (e.g. a journal dedicated to oncology). Articles were excluded if they were on topics unrelated to urology, in a non-English language, duplicated, or if the article was unavailable for download from the publisher or journal site. Discrepancies regarding inclusion of articles were discussed among the two reviewers to reach a consensus, and persistent disagreement was resolved by incorporating a third reviewer (P.K.).

Data Extraction and Analysis

Initially, 10 full texts of selected articles were evaluated by three reviewers (J.M., M.N., P.K.) to ensure consistency in extraction of the data. Subsequently, the balance of articles was split equally amongst the reviewers. The following data were extracted: date of publication of original article and of retraction notice; reason(s) for retraction; journal; authors; first listed institution associated with article; type of study; sub-specialty of urology (i.e. oncology, andrology, sexual medicine, reconstructive, urogynaecology, and general urology); country(ies) of origin; and presence of a watermark. To address the variability in the wording of retraction notices, the entire text of any retraction notice was extracted verbatim and one reviewer (J.M.) assigned the reasons for retraction.

The number of citations before and after retractions, and the 5-year impact factor of the journal were obtained from Web of Science Core Collection and InCites Journal Citation Reports, respectively. The total number of published articles from urological journals was obtained by looking at the citable items in Web of Science's InCites Journal Citation Reports. The Web of Science site provides journal-specific, yearly number of citable items. Adding the number of these citable articles for the period of interest available (2010–2017) provided the basis on which to determine journal-specific percentage of retracted publications for the period 2010–2017 (%Retractions = Retracted Articles [2010–2017]/Sum of Citable Items [2010–2017]). The period used for determining the rates of retraction spans a different period from our entire study as this period more closely reflects the recent trends in retractions.

Univariate linear regression analysis was performed to assess the relationship between various available urology journal characteristics and number of retractions. For the purposes of the present study, P values < 0.05 were taken to indicate statistical significance. Data were compiled and analysed using Excel (Microsoft, Redmond, WA, USA), and Stata 15 (Stata Corp., College Station, TX, USA).

Results

Screening of Records

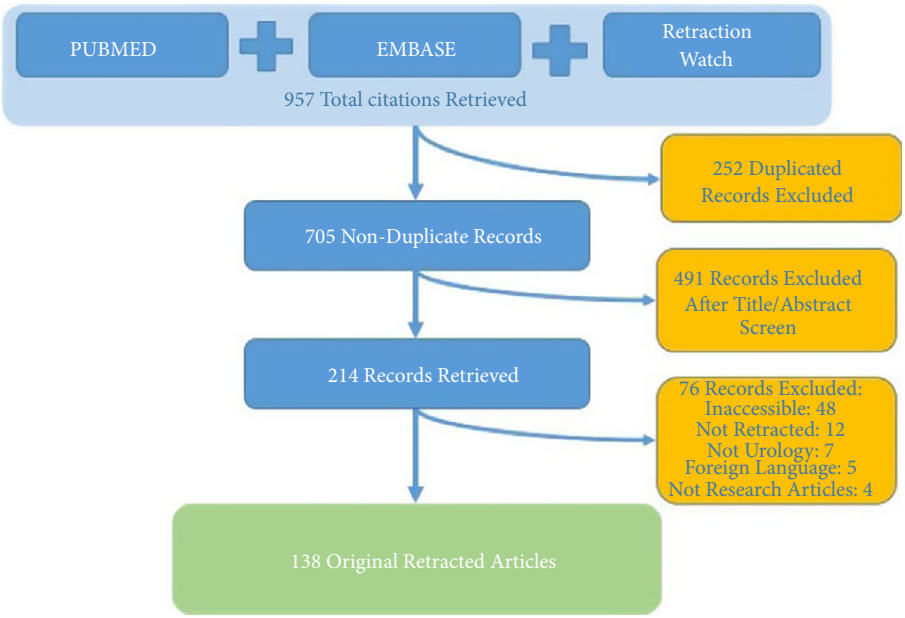
A total of 957 records were retrieved during our initial search. On screening of all titles and abstracts with application of the inclusion/exclusion criteria and identification of duplicates, a total of 743 records were excluded. The remaining 214 records were taken through a full-text review, through which an additional 76 records were excluded. A total of 138 original research articles were classified as meeting the inclusion criteria and were used for data extraction (Fig. 1).

Timing, Authors and Journals

The first recorded retraction was in April 1999, and the latest one in March 2018. A total of 83% of the retractions (n = 115) had occurred since 2010. A summary of retractions over the past 20 years can be seen in Fig. 2. The median time from publication to retraction was 30 months, with the fastest retraction taking 43 days, and the longest one 13 years. One journal issued 17 retractions on the same date as part of a large fake peer review investigation. Most authors had only one retraction, but 15 first authors and 12 senior authors were noted to have multiple. The highest number of retractions for one author was five.

A total of 76 different journals accounted for all the retractions. Of all the retractions, 19% (n = 26) were from

Fig. 1 Retrieval and screening of retracted urologic studies.

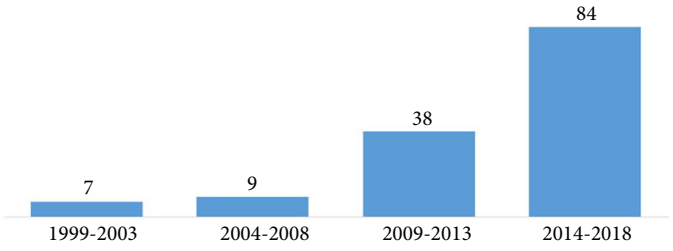


urology journals, 13 in total. The cumulative number of published articles from the top 12 urological journals for the 2010–2017 period was 21 144. The rates of retractions of these journals during this period can be found in Table 1. The median 5-year impact factor of all the journals was 3.45, with the highest being 52.67 and the lowest 0.589. Five journals did not have readily available impact factors. On univariate analysis impact factor, number of publications, nor year were associated with the number of retractions in urological journals ($P > 0.4$ for all).

Reasons for Retractions

Of the 138 retracted studies, 43% ($n = 59$) had a single reason for retraction, while 57% ($n = 79$) cited two or more reasons. Reasons for retraction fell into 17 different categories (Table 1). Plagiarism, of either self or of others, was the most common reason and was cited in 38 retractions. Some form of error in either data, analysis or conclusions was found to be present in 28 studies. Fake peer review was cited 28 times. In 18 studies, falsification/fabrication of data was present. Nine cited no reason for retraction. Seven studies were performed without appropriate approval from institutional review boards. Duplicate publications, authorship issues, and unspecified 'concerns about data' were seen six times each. The remaining reasons included inability to show data ($n = 3$), erroneous duplicate publication by publisher ($n = 3$), misconduct not specified (NOS) conflict of interest, outdated, new evidence invalidating results, ethical violations and copyright issues. Out of all the articles, 66% ($n = 93$) were retracted for misconduct.

Fig. 2 Number of retractions of urological research.



Topics and Article Types

A total of 70% of retractions were on topics of research related to oncology. The complete breakdown of topics can be found in Table 1; 51% of the retractions ($n = 70$) were basic science, and the remaining studies included randomized controlled trials ($n = 14$), meta-analyses ($n = 10$), case series ($n = 9$), cross-sectional studies ($n = 8$), case reports ($n = 7$), review articles ($n = 7$), case–control studies ($n = 5$), other ($n = 4$), computational studies ($n = 3$), and one cost study.

Countries

Retractions originated from 28 different countries; the top five countries with most retractions were USA ($n = 45$), China ($n = 41$), Japan ($n = 9$), Germany ($n = 8$) and Iran (n

Table 1 Rates of retraction in urological journals, retractions per urological sub-specialty, and reasons for retraction.

Urological Journal	Retracted publications 2010–2017, %
International Journal of Impotence Research	0.549
Prostate Cancer and Prostatic Diseases	0.423
International Journal of Andrology	0.322
BJU International	0.189
World Journal of Urology	0.132
International Journal of Urology	0.083
The Prostate	0.072
Urologic Oncology: Seminars and Original Investigations	0.067
European Urology	0.058
Urology	0.047
The Journal of Urology	0.024
Andrologia	0.000
Urological subspecialty	**No. of retractions**
Oncology	96
Prostate	62
Bladder	17
Renal	11
Collecting duct	2
Urothelial	1
Testicular	1
Imaging	1
Reconstructive Urology	12
Andrology	9
Sexual Medicine	7
Urogynecology	7
General Urology	5
Other	2
Reasons for retraction	**No. of instances**
Plagiarism	38
Error	28
Fake peer review	28
Falsification/Fabrication	18
No information available	9
Lack of board approval to perform the research	7
Miscellaneous*	7
Authorship issues	6
Duplicate publications	6
Unspecified concerns about data	6
Unable to show data	3
Erroneous duplicate publication by publisher	3

*Misconduct, conflict of interest, out of date review, new evidence invalidating results, civil proceedings, ethical violations, and copyright issues were seen one time each.

= 8) Table 2. Most retractions originated from individual countries, but 17 involved collaborations among institutions from different countries.

Citations and Retraction Watermarks

Overall, articles were cited 4454 times and 38% of these citations (n = 1707) took place after retraction. In all, 75% of articles (n = 106) had a large watermark, or retraction stamp that made the retraction obvious (Fig. 3). Articles without a watermark, 23%, accounted for 39% of the citations after retraction.

Discussion

The present study is the first to take a detailed look at the retractions of urological literature. A total of 138 retractions of individual urological research articles were identified between April 1999 and March 2018. These came from 76 different journals, including both urological and non-urological journals, with the latter accounting for 81% of the retractions. While most authors only had one article retracted, we found 12 senior authors and 15 first authors who had multiple retractions. The studies originated from 28 different countries. While 71% of the studies originated outside the USA, this was the country with the highest number of retractions (n = 45). Misconduct was found to be present in 66% of the retractions, with plagiarism, fake peer review, and fabrication/falsification of data being the top three reasons. Errors not attributable to misconduct were found in 20% of studies. Nine studies cited no reason for retraction.

Rates of retraction of urological research are increasing, as are the global rates of retraction [5,15,16]. This pattern was seen in both urological journals and non-urological journals, with over 80% of retractions identified in the present study taking place in the last 10 years for both journal categories, which is similar to findings in other surgical fields [10–12]. Several ideas have been proposed for this rise, including better plagiarism detection software, increased scrutiny, and faster retractions [17–19]. The launch of iThenticate, a leading plagiarism detection software, took place in 2004. While it is unclear when specific journals in the present study began implementing these type of tools, the majority of retractions for plagiarism have happened since this time and hint at their usefulness. In 2009, the Committee of Publication Ethics (COPE) issued guidelines for retractions [1], and in 2010 the RetractionWatch.com blog launched [20]. These two instruments, one providing clear instructions on how to handle questionable literature and the other showing the prevalence, could perhaps be influencing this change too. It is important to keep this increase in perspective as the rates of retractions remain low within urology. Since 2010, from the top 12 urological journals with most retractions in the study, retractions represented less than one out of every 1000 articles published. Previous work has demonstrated a relationship between impact factor and retractions [21, 22]. We were unable to demonstrate any correlation, perhaps because of the low number of events per journal.

Early studies of retracted scientific literature, prior to the release of COPE's guidelines and the RetractionWatch.com blog, studied the prevalence of misconduct and found it to be present in only a third of scientific retractions [16,23,24]. In the most recent decade, the rates of misconduct have been shown to be much higher (77–83%) [6,11] and more in line with our findings. Although high, the prevalence of

misconduct is probably even higher that can be shown, given the lack of information in some retraction notices and ambiguity in others [6,25]. While these data appear to show that misconduct is increasing, it is likely that the increase reflects greater oversight from the scientific community and the fact that we are getting better at spotting and acting on instances of flawed literature. This is demonstrated by decreased time to retractions, and an increase in retractions for reasons such as plagiarism and duplicate publications, which are newer retraction categories [17]. Furthermore, the increase in the number of journals issuing retractions while that of retractions per journal remains stable also points to greater oversight [18]. Another example of this was reflected in the bulk retraction of 17 articles by the journal *Tumor Biology*. These articles were part of over 100 papers retracted after an investigation by the publisher uncovered a compromised peer-review process [26]. Ideally, self-regulation of authors and professionalism should prevent misconduct in research publication, but negative consequences for authors found to have pursued purposeful misconduct may be necessary. For the time being, the public penalty is evidenced by a drop of citations in non-retracted, previously published work of ~10–20% when compared to authors publishing in the same journal and on similar topics [2].

Table 2 Countries of origin of retracted studies.

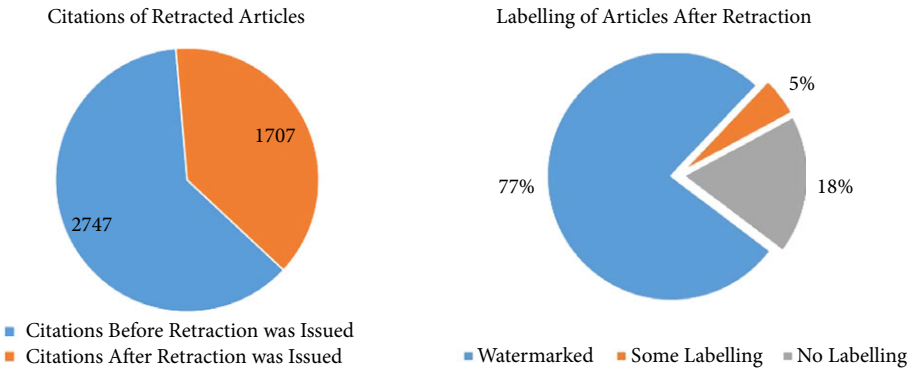
Country	No. of retractions
USA	45
China	41
Japan	9
Germany	8
Iran	8
Italy	8
Egypt	6
UK	6
Austria	3
Canada	3
France	3
India	3
Morocco	2
Switzerland	2
Belarus	1
Belgium	1
Brazil	1
Czech Republic	1
Denmark	1
Hong Kong	1
Israel	1
Pakistan	1
South Korea	1
Spain	1
Sweden	1
Taiwan	1
Turkey	1

In spite of retractions, studies continued to be cited at high rates [7,25]. The present study found that articles were cited 1707 times after the date of their retraction. This finding is not unique to urology [7,8,27,28]. The majority of these citations tend to be positive (they are not citing the fact that the article was retracted) [8,21].

One could argue that continued citations happen because authors are unaware that a study has been retracted. Databases such as PUBMED, clearly mark the title of articles that have been retracted. Watermarks, which are large stamps over the original text of a retracted article that make it obvious a study has been retracted, serve as an additional reminder. In the present study, 76% of articles had a large watermark and 18% had no evidence of the retraction within the text of the article. Clearly watermarked articles accounted for 61% of citations after retraction compared to 37% from those articles without clear marking. These data indicate that there is some benefit from the watermark but it is not a perfect solution, because they are not universal. Furthermore, research suggests many citations come from citing secondary sources [29], which would prevent citers from seeing the retraction notice posted on the original article.

While guidelines exist [1] on ways to signal that an article has been retracted, there is room for improvement in preventing the continued use of flawed literature [8]. Suggestions of other ways to deal with continued citations include requiring publishers to review references for

Fig. 3 Citation and labeling of retracted studies.



retractions and questioning authors on the use of such references, and creating databases of retractions for easier cross-referencing [8].

The present study has some limitations. Our keyword search was not exhaustive; potential urological studies may have been omitted. Given the global nature of our findings, research published in other languages may be of interest, but was excluded. In addition, studies from which abstracts or full text were not available were also excluded. Retraction notices originated from different publishers with different formats and levels of detail. To address this heterogeneity, we created our own categories to allow comparisons with prior studies. While this was straightforward for common reasons for retraction (e.g. fake peer review), obscure or vague reasons were difficult to assign to a category, which might have led to underestimation of incidences of misconduct. When assessing citations, we made sure to omit the citation of the original article by the retraction notice but we did not inspect individually cited articles for whether these were positive or negative citations.

In conclusion, this was the first study comprehensively to document retractions of urological literature and their characteristics. The number of yearly urological retractions has risen significantly over the last decade, and misconduct accounts for the majority of retractions. While the increase in retractions could be seen positively to indicate we are better at detecting flawed studies, continued citing of these studies suggests there is room for improvement to prevent the dissemination of retracted literature.

Conflict of Interest

None declared.

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Abbreviation: COPE, Committee of Publication Ethics.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. List of retracted studies.