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A Mummers Farce – Retractions of Medical Papers Conducted in Egyptian Institutions

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Abstract
Egypt currently holds the record for the most retractions in the continent of Africa according to the Retraction Watch database, and the 2nd highest of countries in the Middle East. The purpose of this study was to analyse the retracted medical publications from Egyptian affiliations, in order to delineate specific problems and solutions. We examined databases including Pubmed, Google Scholar and others, for all retracted medical publications that were conducted in an Egyptian institution, up to the date of August 31st 2022. We observed for the reason(s) for retraction, number of citations of the retracted work, the length of time between publication and retraction, and where the work was published (journal, publisher and impact factor). 68 retractions were identified. Most retractions were from the speciality of Obstetrics and Gynecology (n = 22), followed by Anesthesia (n = 7). The top 3 reasons for retraction were unreliable results, FFP level misconduct, and duplicate publication. The number of retractions significantly increased over the years, especially in 2022. When taking into account the number of medical publications per institution, the institute with the highest rate of retractions was Mansoura University, while the lowest rate was Cairo University. The number of retracted medical Egyptian publications continues to increase over time, although they represent a small portion of the overall body of Egyptian medical research. Future studies on retracted articles should employ a methodology that considers the institutions where the studies were conducted. This could allow a better understanding of specific problems in certain countries or regions.

Keywords Retracted Publication · Ethics · Misconduct · Egypt · Plagiarism

Introduction

Scientific misconduct is classically defined as plagiarism, fabrication, and falsification of scientific research, by the US Office of Research Integrity (Gross, 2016; Resnik, 2019; Resnik et al., 2015). Misconduct has devastating consequences as the falsified results can have major impact on clinical guidance and decision making, as well as on individual and public health (Barde et al., 2020; Mousavi & Abdollahi, 2020; Steen, 2012). Once

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a scientific publication is identified to have this level of academic dishonesty, it may be retracted from the literature, reported to the affiliation of the authors, and even result in criminal prosecution (Bülow & Helgesson, 2019; Leung, 2019).

Scientific misconduct is a growing concern and is considered by some to be the most imminent threat to medical research. The overall number of retractions globally has been increasing (Barde et al., 2020; Campos-Varela & Ruano-Raviña, 2019; Oransky, 2022). Across medical specialties, there is a rise in retractions from papers authored from a variety of countries, and for different reasons. In infectious disease literature for example, the USA, China and India, are among the leading countries with retracted research (Zilberman et al., 2023). In Schizophrenia related research, the United Kingdom leads the highest number of retracted papers (Chen et al., 2022).

In the Middle East, metrics suggest that across the past two decades both the number of retractions and publications have increased in this region (Liu & Lei, 2021). Overall, in this region, the leading causes of retraction are due to misconduct including plagiarism, and duplicate publication (Ghorbi et al., 2023). Egypt currently ranks first among African countries with the most retractions, and 3rd among the Middle East (Nordling, 2019). We embarked on this study to characterise retracted medical papers that were specifically conducted in Egyptian institutions, in order to determine the causes of retractions unique to them.

Methodology

Data Collection

In this cross-sectional study, we examined medical papers found on PubMed, Scopus and Google scholar using the search query "Egypt", and "Retracted", or "Retraction Notice". We included any article that was retracted for any reason, be they author related or not (such as publication error ie. Published after rejection decision).

We also used the Retraction Watch database to identify retracted papers. The database was used by searching "Egypt" under the countries field (http://retractiondatabase.org/). The search was narrowed to include articles posted upto the date 08/31/2022 (expressions of concern were not included).

We also examined the Egyptian journals collection published by Springer Nature, which is sponsored by the Egyptian Knowledge Bank. It is likely that Egyptian authors are submitting to these journals, and some of which are not Scopus or PubMed Indexed.
(https://www.springer.com/gp/campaign/egyptian-journals-ekb).

Data Inclusion and Exclusion Criteria

A total of 9954 papers were identified from the initial search. All articles were examined according to our inclusion criteria. Any duplicates were removed.

To be included in our study as an "Egyptian" paper, an Egyptian affiliation must be specifically listed in:

- Any mention of an Egyptian affiliation referred to in acquiring ethical approval for the study, or listed as the place where the study took place in the methods and or acknowledgements section of the manuscript.

We also included articles where it was mentioned that the study was conducted in an Egyptian institution, and did not have a lead author affiliated with an Egyptian institution.

Only Original Research or Case reports or series were included- no reviews, editorials, grey literature or otherwise was considered. Papers with any expression of concern were not included in this study. We included any retracted paper until the date of Aug 31st 2022, that was still available in its full-text form (this is was necessary to confirm if the study was conducted in an Egyptian institution in the methods or otherwise).

Data Characteristics

The outcomes collected in this study included: the date the paper was published, the date the paper was retracted, the number of authors, subject area, whether or not the paper was COVID-19 related, the number of reads or accesses of the paper, the number of citations, Publisher and Cite Score of the retracted paper, the affiliation of the study, reason(s) for retraction, and whether or not the authors approved the decision.

The number of citations were determined using Google Scholar (and or Web of Science).

Causes of Retraction

The causes of retractions were determined directly from the reasons mentioned in the retraction notices, and were broadly categorised as:

- Unreliable results – any mention of data errors, or inconsistencies, methodological errors, or suspicions into the integrity of the presented data
- Duplication – if the work had in full or in part been previously published
- Failure to provide data – failure to provide data sheets upon request for investigation
- Plagiarism – false attribution of another persons work as one's own
- Fabrication or Falsification – misrepresentation of results (including manipulation – of images or otherwise)
- Consent concern – failure to obtain written informed consent by patient participants.
- Author dispute
- Author request
- Fake authorship
- Fake peer review
- No institutional board approval
- Publication error (such as publication of an article after a rejection decision)
- Unspecified causes – no clear mention of the reason for retraction in the retraction notice
- Other causes

A retracted article may have had more than one reason for its retraction.

Data Analysis

Descriptive analysis was reported as averages and standard deviation or as median and range when appropriate.

P values < 0.05 were considered significant. Spearman Rho was used to determine if there was significant relation between two variables. Outcomes were recorded on a workbook (Microsoft excel). Pie graphs/bar graphs were made using Microsoft excel when necessary. Statistical analysis was conducted on MedCalc for Windows version 19.1 (MedCalc Software, Ostend, Belgium).

Results

A total of 68 retracted publications met our inclusion criteria. All articles had a clear mention that they were conducted at an Egyptian institution. This mention was specifically made in the methodology, acknowledgements, or otherwise.

Causes and Citations of Retracted Research

Among the 68 retracted papers, 98 reasons for retraction could be identified (1.44 causes per article) (Fig. 4). The top three reasons for retraction were unreliable results, FFP type misconduct, and duplication of publication. Failure to provide data sheets on the request of the Editor of the journals was another common reason for retraction. Among the FFP type of misconduct, 7 retraction notices mentioned a direct concern for manipulation of data or images. Other ethical concerns included failure to obtain patient consent, and Institutional Board approval.

The median number of citations of the retracted research was 11 (IQR = 30), with the lowest value being 0, and the highest number of citations being 255.

Timeline of Retractions

The time from publication to retraction was a median of 698.5 days (IQR, 1322), or 1.91 years. Figure 1 shows the days between publication and retraction of the articles. The shortest and longest time to retraction was 42 days and 5054 days respectively.

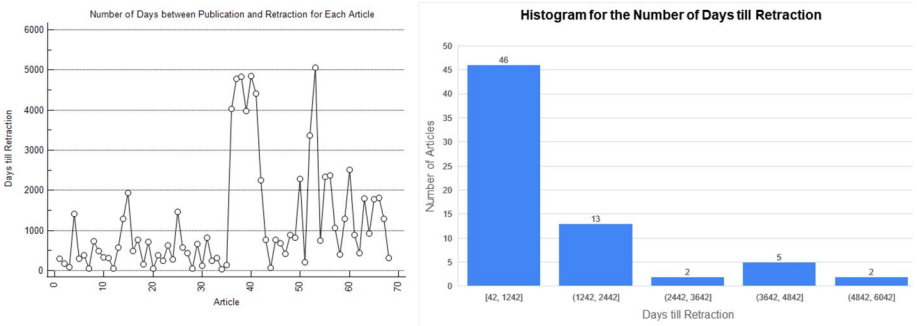

Fig. 1 Number of days between publication and retraction (left) and histogram depicting the difference in days (right). The number of days between publication and retraction was a median of 11 with the longest time being 5054 days which equates to 13.84 calendar years. 46.9% of articles were retracted sometime within 3.5 calendar years

The retractions were highest in 2022, which encompassed 35.24% of the identified retracted papers (n = 24). The number of retractions have increased over the years, significantly (Spearman Rho = 0.616, P = 0.0191, 95% CI for rho = 0.126 to 0.864) (see Fig. 2).

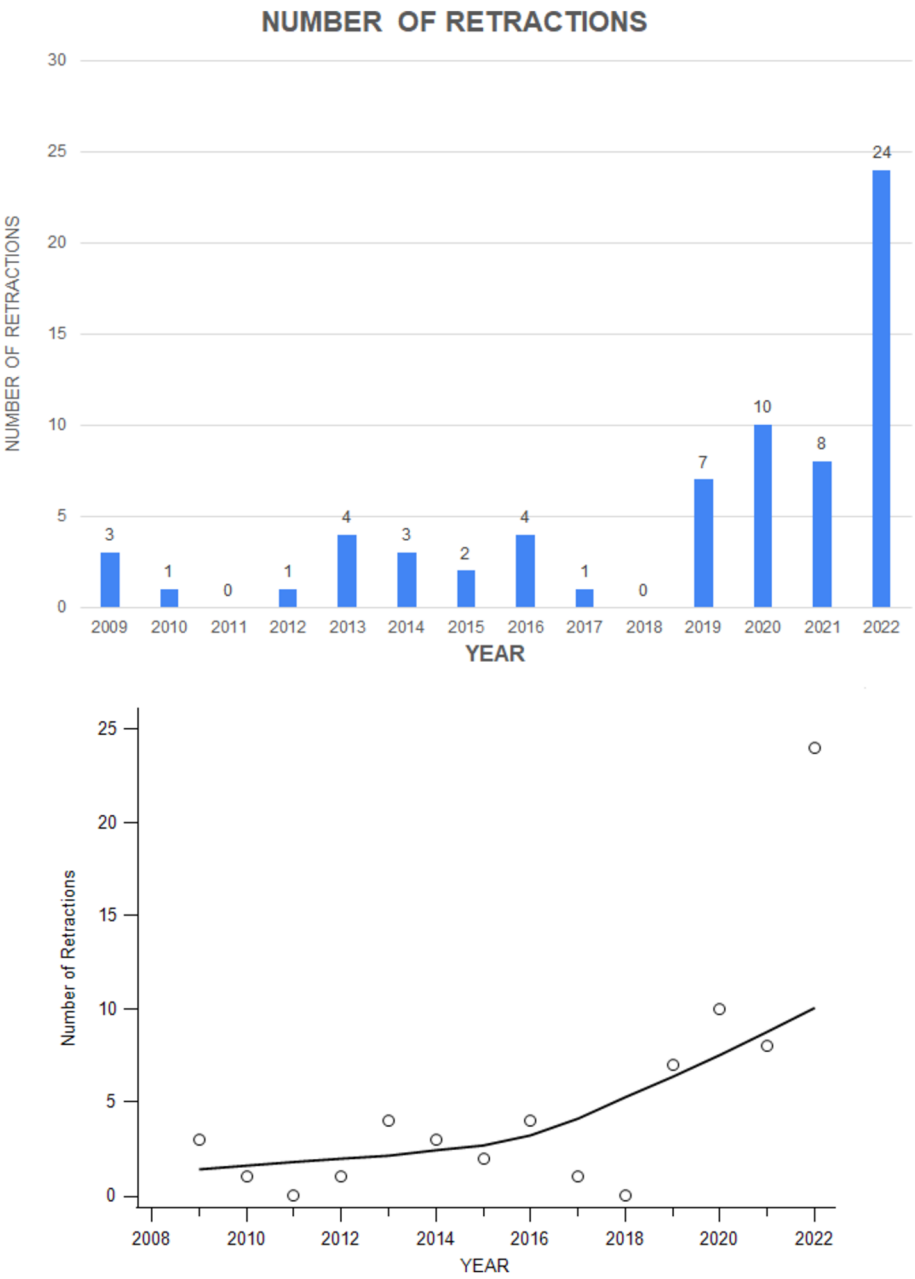

Fig. 2 Bar graph showing the number of retractions per year (top), and line graph showing significant rise per year (bottom). The number of retractions increased significantly throughout the years, especially in 2022

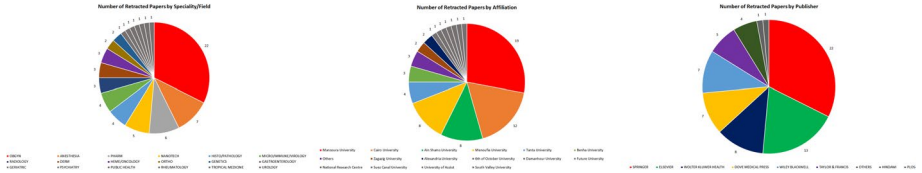

Fig. 3 Pie graphs depicting the number of retracted papers by speciality (left), number of retracted papers by affiliation (middle), and number of retracted papers by publisher (right). The specialties with the leading retractions were Obgyn and Anesthesia. The affiliations with the highest number of retractions were Mansoura University, Cairo University, Ain Shams University. Spinger and Elsevier were the leading publishers with retracted articles

Author Related Factors

The median number of authors on the retracted papers was 4 (IQR, 2), with the least number of authors being 1 and the highest number of authors was 17.

All articles, except for 3, had a lead author with a primary Egyptian institution. The remaining 3 articles had lead authors from the; University of Helsinki (Finland), University of Nottingham (United Kingdom), and Qassim University (Saudi Arabia).

Speciality Related Retractions

Retractions were highest in the field of Obstetrics and Gynecology, 32.35% (n = 22), and in Anesthesia, 10.29% (n = 7) (see Fig. 3). 7.35% of retracted articles were COVID-19 related, (n = 5).

Affiliation Related Factors

The affiliations with the most retractions were Mansoura University, Cairo University, and Menoufia and Ain Shams University, 27.94% (n = 19), 17.64% (n = 12), 11.76% (n = 8), 11.76% (n = 8), respectively.

Table 1 Retraction rates of Egyptian Institutions

Top 5 Affiliations	Number of Medical Publications (SCOPUS)*	Number of Retractions Identified	Rate of Retractions
Mansoura University	8612	19	**0.230%**
Cairo University	20506	12	**0.058%**
Ain Shams University	12186	8	0.065%
Menoufia University	3598	8	0.222%
Tanta University	4175	4	0.096%

The top five affiliations associated with retracted medical research. Mansoura University and Cairo University are leading in the number of retractions coming from them. However, we should also consider the medical research output coming from them. A SCOPUS search on the number of medical research in each institution places Cairo University as the affiliation with the most research output, and so the lowest retraction rate at 0.058%. Future research should consider where the retracted research was conducted, and the total medical research output from that institution

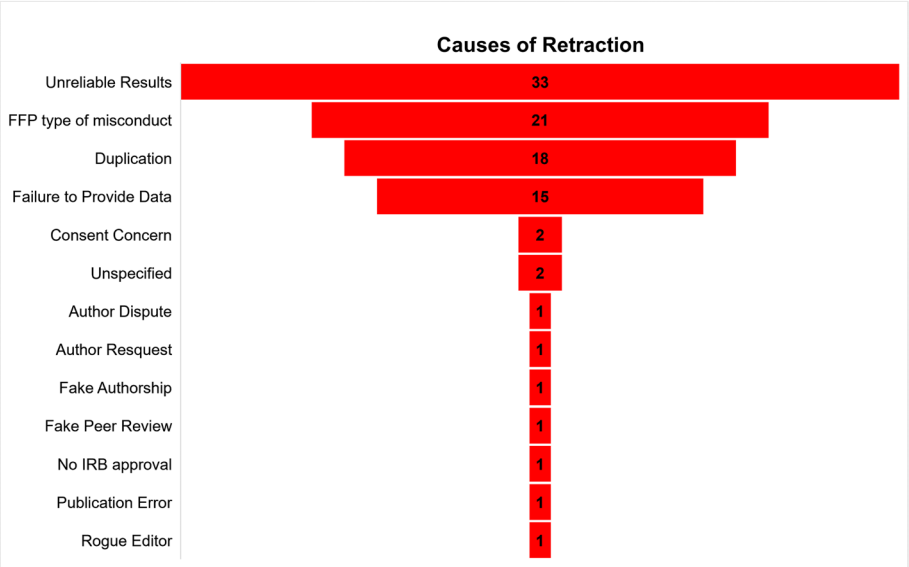

Fig. 4 Causes of retraction. The leading causes of retraction were unreliable results, Fabrication/Falsification/Plagiarism, and Duplicate submission. Other causes of retraction included lack of patient consent, and IRB approval, authors request, fake authorship, and a rogue editor. Overall, among the 68 retracted articles we examined a total of 98 distinct causes of retraction were identified from the retraction notice, which equates to 1.44 reasons for retraction per article

If we adjust for the number of medical papers published from these institutions (see Table 1), then the institution that had the highest rate of retractions was Mansoura University with 0.230% retraction rate. The affiliation with the least rate of retractions was Cairo University at 0.058%.

Journal and Publisher Related Factors, and Authors Opinion

The publishers with the highest rates of retractions were Springer, 32.35% (n = 22), and Elsevier, 19.11% (n = 13). Where the Cite Score was available, the median Cite Score was 4.1 (IQR 3.7), with the lowest and highest scores being 0.70 and 70.2 respectively.

Twenty-seven retraction notices mentioned the authors opinions on the retraction. Nine mentioned disagreement with the decision, 1 mentioned disagreement while another author did not respond. 12 notices mentioned total agreement with the decision, while 3 articles showed agreement and other authors not responding. 2 articles showed agreement, but the authors disagreed with the wording of the retraction notice.

Discussion

Critical Analysis of the Results

In this study, we examined the causes of retractions in medical research that was conducted in an Egyptian institution. We identified a total of 68 retracted articles, and a total of 98 causes of retraction. Retractions were significantly increasing across the years. Misconduct – with fabrication/falsification/plagiarism amounted to 21.43% of the causes of retraction (n = 21). Unreliable results and duplicate publication were also among the leading causes of retraction. Unreliable results were determined from reasons such as errors in the methodology or results, and nonreproducible results. Other causes of retraction extended beyond misconduct, and included reasons such as author request, failure to provide data upon request for further investigation, author disputes, fake authorship, no consent, no Institutional Review Board approval, and journal editorial board hacking.

It took an average of 1.91 calendar years for a paper to be retracted, while the longest time a paper remained in the literature was 13.84 calendar years. This is an astounding length of time where an article can remain in the literature. The longer the life-span that a flawed research remains in the literature, the greater the cost is to the scientific community, as this research will continue to accumulate impact, reads, citations, and result in adverse effects (Ghorbi et al., 2023). The influence of these articles is large as some have been published across prominent journals. Some of these journals included Nature (Cite Score 70.2), and Fertility and Sterility (Cite Score 10.2). Likewise, the number of citations received for the retracted research is significant with the median number being 11, and the highest number of citations was 255. This opens the door for other concerns since papers that have cited a retracted article might themselves require corrections, such as using a retracted article in a systematic review and meta-analysis (Bolland et al., 2022).

Lastly, the specialities leading in the number of retractions were Obgyn and Anesthesia. It is likely that this phenomenon is due to the recent studies, which examined integrity concerns, that highlighted Egyptian authored research as problematic within in these two specialities (Carlisle, 2021; Linn & Mol, 2022).

Highlights from Retraction Notices

Interesting information and highlights obtained from the retraction notices we examined included:

1. Outsourcing results to another lab which provided fabricated images to the authors. The authors were cooperative with the investigation by the Editor, but the fabricated images resulted in retraction.
2. One article was retracted for several reasons including the fact that one variable was extremely significantly different from other variables among the study groups, plus two variables showed different rounding to significant figures, plus different distribution of variables when moving across groups. These variations could not be accounted for and represented a serious concern for the validity of the study and its randomization process.
3. In one study, authors were requested to provide the datasheets. The authors provided several copies, none of which could recapitulate the results in the published article.

4. The authors requested to retract their article based on inconsistences with a preferred model of a tool used that would have led to increased reporting of poorer outcomes. All authors agreed to this decision.
5. One of the co-authors of a paper discovered unacceptable levels of duplication with another study and alerted the Editor.
6. In one article, the Editor observed a high level of similarity with 2 other published articles. All 3 articles reported the same clinical trial number. The results in all 3 studies were identical, with only variations in the group sizes (ie n = 50 or n = 25).
7. One article was retracted because it replicated 2 figures from 1 figure from within the same study.
8. One article was retracted due to extensive similarity with a previously published article. One of the authors requested that his name be removed from this list of authors. He claimed to have no direct or indirect involvement with the research.
9. One retraction notice reported that an article had substantially copied text from 3 articles from a single other journal. The retraction notice made clear mention that the involved institution would be informed, and a reference to similarity checking software used in plagiarism detection.
10. One article was retracted because of methodological errors, as well as citing other retracted articles. The results were deemed unreliable.
11. In one study, the authors were requested to provide the original data. Their response claimed that the electronic copy of the data was no longer available due to a power outage. They instead provided the hard copy data of 90 out of 125 patients. This data was still analysed by the journal Editors, and it was immediately found to have significant discrepancies in the means and standard deviations.
12. One study was retracted because of the failure of the authors to provide the raw data sheets for their study, after waiting for a one-month period. It is notable that this particular study was the largest of its kind on the use of antenatal corticosteroid use prior to elective caesarean procedure. The study was so large and significant that it singlehandedly overwhelmed other trials in systematic review, and is recognised to be the leading influence on the use of corticosteroids antenatally which could affect fetal brain development.
13. In one exemplar of honesty, the authors themselves reported the following about their work:

    "There were 60 children in the study. The ages were by accident duplicated between the upper and lower halves of the database. Thus, the ages for the first 30 children in the data set were identical and in the same order with the ages for the second set of 30 children… This duplication thus directly invalidates the second part of the data set, and thus the reported outcome. We have not been able to sort out the reason for this duplication. The files with the original data are not available any more, making it impossible to reconstruct a valid data set for reanalysis." (Hemilä et al., 2012)

    This article was one of three articles that we examined where the lead author was not affiliated to an Egyptian institution.
14. In one extraordinary retraction, the Editor details a rogue editor event in the Journal. This paper, which is related to the COVID-19 topic, was published in an unrelated nanoparticle research journal. The article in question was accepted through a guest-edited special issue. The Editor-in-Chief observed concerns with the editorial handling and peer review of this special edition and retracted all articles published therein. The article was out of scope with the journal, and the authors disagreed with the decision

(Khalifa et al., 2020). Further investigation revealed that the group of academics that had proposed the special issue were being impersonated by an organized group that had purchased email domains similar to those of their affiliated universities, in order to hack the publishing process (Pinna et al., 2020).

Impact of Misconduct in the Medical Field

In the medical field, research and its outcomes play a pivotal role in the decision-making process in patient care. Once fabricated, plagiarised, or duplicated work enters the space of the literature, it can skew one clinical decision over another, in an erroneous and detrimental way that can amount to harm (Barde et al., 2020) It should be recognised that research misconduct is harmful to society as a whole, and ultimately, since research is publicly accessible, the potential for harm can spread worldwide (Gupta, 2013; Rahman & Ankier, 2020).

This circumstance was discovered by Bordewijk et al. While incidentally updating a systematic review and meta-analysis, they observed unusual similarities in randomised trails conducted by 2 authors from Mansoura University (Egypt) on the topic of ovulation. These similarities could not be accounted for by chance alone, and were unlikely to have occurred under any observable biological reality (Bordewijk et al., 2020). A call to investigate the trials conducted by these authors, as well as any in the region, has led to a domino effect of investigations and retractions of papers from Mansoura University and in the field of Obstetrics and Gynaecology. In our study we recognised these findings as Mansoura University had the highest rate of retracted papers, and OBGYN had the most retractions of any field.

Types of Misconduct and Causes of Retraction

U.S federal policy defines misconduct as FFP – Fabrication, Falsification and Plagiarism. Some arguments have been made that this definition must be broadened to include failure to disclose conflict of interest, sexual harassment, deceptive use of statistics, and more (Resnik, 2019). In our study, we identified several reasons for retractions which extended beyond FFP, including methodological errors, failure to provide complete data sheets to corroborate study results, ethics concerns, duplicate publication, authorship disputes, rogue editors, and compromised peer review.

Plagiarism was one of the leading causes of retraction that we identified in our study. Plagiarism is the act of stealing another person's words or ideas and claiming them as ones own (Dhammi & Ul Haq, 2016). The research output on identifying plagiarized work in the medical field is steadily rising (Baskaran et al., 2019; Higgins et al., 2016; Menshawey et al., 2023). Plagiarism can be avoided by employing original writing skills, complemented with the use of commercially available similarity checking tools. Although many journals check submitted work using similarity checking tools, there is room for these results to be misinterpreted if not paired with human judgement (Menshawey et al., 2023; Taylor, 2017).

Duplicate publication was another leading cause of retraction in among the articles we examined. Duplicate publications are a serious problem in medical literature, that violate copy right agreements (Hong et al., 2015; Le et al., 2015). Duplicate publication counts as a redundancy in the scientific literature and are considered highly unethical and are condemned (Haworth et al., 2014). It wastes the time of readers, reviewers, editor and

publishers with redundant results, and they pose further issues by skewing the results of metanalysis, and can lead to retractions of those papers that cited them (Le et al., 2015; Tramer et al., 1997; Villar, 2015). One of the retracted papers identified in our study was found to have been previously published multiple times. In response to this, the journal stated:

> "The authors were initially served with a show-cause notice and then the dean of the university was also informed when the authors did not respond… a complete restriction on the part of the journal on all future articles in which they are assigned/mentioned as an author/coauthor was imposed and the author was notified accordingly… authors are barred from submitting manuscript(s) to IJD in future" ("Serum mucosa-associated epithelial chemokine in atopic dermatitis: a specific marker for severity: retraction" 2014).

Regional Thoughts on the Retractions

Our study aimed at capturing a comprehensive view of retracted papers specifically conducted within Egyptian institutions. Egypt, holds the record for the highest rate of retractions of an African country on the Retraction Watch Database (Nordling, 2019). There are growing frustrations with the lack of Egyptian institutional action and response when concerns arise (Marcus, 2020). Institutions must be made aware of the impact of retractions on their reputation, as well as develop policies on the matter of misconduct (Lievore et al., 2021; Steen et al., 2013; Stern et al., 2014; Yi et al., 2019).

Another study by Janevi et al. recognised Iran, Egypt, Turkey, Saudi Arabia, Israel, Lebanon, and the United Arab Emirates as the countries with the highest number of retracted articles in the health sciences in the Middle East (Janavi & Moradi, 2019). In an interesting report by Al Fanar Media (an independent non-profit news with a focus on education and research), examined retractions among the Arab region, and identified Egypt and Saudi Arabia has having the highest number of retractions in this region, but overall, globally, the Middle East and North Africa region has comparatively low rates of retraction. Bahrain had the highest rate of retraction with 0.12%, though these values need to consider the extremely low rate of publications (only 6600 articles authors in Bahrain from 1996 to 2018) (Benjamin, 2019).

In the Middle East, the attitudes towards research misconduct are variable. One study by Felaefel et al., found that among Egypt, Lebanon, and Bahrain, 59.4% of investigators reported having done one instance of misbehavior, while 74.5% reported awareness of another colleague's misbehavior. The biggest areas of concern were circumventing research ethics regulation, and fabrication and falsification (Felaefel et al., 2018). This study also identified that the lack of previous ethics training was a significant predicator of misconduct. Meanwhile, the majority of Egyptian medical students are not aware of the basic principles of research conduct. As a study by El-Shinawi points out, the development of educational campaign can increase awareness about responsible conduct of research, and that these campaigns should be incorporated into the current Egyptian medical school curriculum (El-Shinawi et al., 2016). With regards to Egyptian investigators attitude towards misconduct, one study points out that 77.3% of investigators expressed concern about the misconduct in research, 50% states that misconduct is common, 64.5% attributed the misconduct to factors such as promotions and the pressure to publish, while 71.8% were aware of the regulations governing human and animal research (Faleafel, 2015).

An interesting outcome in the neighboring state of Morocco occurred when a study by Moroccan researchers reported significant plagiarism among university professors. The study also recognized several actionable factors that could be targeted through direct interventions that could address the growing concern of plagiarism in that region. The study later inspired the Moroccan Association for Research and Ethics to develop workshops that provide integrity training directly on university campuses (Wagdy, 2019). Likewise, the results of this study could be used to influence future policy and targeting specific integrity concerns among Egyptian researchers, institutions, and medical specialties like Obgyn and Anesthesia.

Overall, retractions and scientific misconduct remain a global concern, and it is on the rise. One study suggests that USA, Japan, and Germany are leading in the number of retractions involving human research participants. The leading reasons for retraction were misconduct (51%) and error (14%). As per retraction distribution per continent, Asia and Europe are leading globally with 36 and 32% respectively, and 26% of retractions came from North America alone. All of the leading journals with retractions were related to the topics of Anesthesia and Obgyn (Fontelo & Liu, 2018).

Lastly, we should consider that research in the Arab world shows somewhat increased trends in publication rates, but remains lagging behind the rest of the world, with an average 189 publications per million people (El Rassi et al., 2018). Rates of retraction in those regions might appear inflated due to the lesser number of publications.

Retraction Research in the Region

Other studies have examined misconduct and retractions across the region. In Nigeria, one study examined the attitudes and perceptions towards misconduct and found that half of the respondents were aware that a colleague had engaged in misconduct, over 88% were concerned about the level of misconduct in their institution and are worried about its effects and credibility concerns, and the majority believed that getting caught for misconduct was unlikely (Okonta & Rossouw, 2014).

Meanwhile, a study on the entire Retraction Watch database (2018) showed that in the African region, plagiarism and duplication were the leading causes of retraction, while international collaboration showed fewer retractions for these reasons but had more issues with authorship disputes (Rossouw et al., 2020). A bibliometric analysis in retractions in the Middle East in the last two decades showed that both the number of publications and retractions in this region was significantly increasing. Misconduct was prevalent (79.2%), the majority of which was plagiarism, and most retractions were from the medical field. The countries with the most retractions were Iran, Turkey, and Egypt (Liu & Lei, 2021) (Table 2).

(Chauvin et al., 2019; Cortegiani et al., 2021; McHugh & Yentis, 2019; Chambers et al., 2019; Stavale et al., 2019; Christopher, 2022; Rapani et al., 2020; Gaudino et al., 2021; King et al., 2018).

Thoughts and Solutions for the Future

Future research on retracted publications should aim at delineating specific concerns in each region to provide a more specific measure for problematic areas, by taking into consideration the institutions in which the research was conducted. The context of the retraction can help determine root causes, be they individual issues or broader incentives or pressures that might

Table 2 Summary of literature reporting on Retracted papers

Author:	Year:	Field / Topic	Number of Retracted articles:	Main reason for Retraction:
Chauvin et al.	2019	Emergency Medicine	28	Plagiarism
Cortegiani et al.	2021	COVID-19	45	Incorrect results
McHugh and Yentis	2019	Anaesthesiology	16	Data Fabrication
Chambers et al.	2019	OBGYN	176	Plagiarism and Data falsification
Stavale et al.	2019	Health/ Life Sciences	65	Plagiarism and missing data
Christopher	2022	Veterinary Medicine	242	Plagiarism, duplicate publication, Data Fabrication
Rapani et al.	2020	Dentistry	180	Plagiarism, duplicate publication, Data Fabrication
Gaudino et al.	2021	Biomedical sciences	5209	Plagiarism, duplicate publication, Data Fabrication
King et al.	2018	Surgical Literature	184	Duplication, Plagiarism, Review board Violations

This table details some of the literature which examined retractions based on medical specialities or medical sciences. Leading causes of retractions in these studies include plagiarism, fabrication and falsification

be influencing the trend of misconduct or retractions. If we dissect plagiarism as an example, it is recognised that plagiarism is a leading cause of retraction among non-Anglophone countries. However, closer inspection reveals there are valid concerns regarding a variable understanding of plagiarism in these regions. As Gupta el al points out: "There was a significant disagreement on the legitimacy of text copying in scholarly articles, permitted plagiarism limit, and plagiarized text in methods section." (Gupta et al., 2021). Some of the events of plagiarism in non-Anglophone research maybe rooted in language difficulties when writing in a non-native language. As mentioned by Hosseini et al.: "The problem is particularly significant in countries where the researchers, for the promise of the promotion, were compelled by the academic institutes to publish their papers in reputable English journals, whereas English is not their first language." (Hosseini et al., 2009).

Based on our results on Egyptian retractions, institutions and researchers can focus on 3 major issues– (1) Fabricated/falsified data which can be deterred by the promotion of data sharing in more fields of medicine which promotes transparency and may minimise fabrication/falsification (Huh, 2019), (2) Plagiarism—can be detected by commercially available tools (Menshawey et al., 2023), (3) Duplicate publication—matching tools can also be used to locate duplicate publications, and additionally authors should be made aware to avoid multiple submissions at once.

Direct and early education is needed via ethics and integrity initiatives, as many of the observed causes of retractions could be avoided through awareness and education (Marusic et al., 2016; Rathore et al., 2018).

Ultimately, we recommend the following, based on our results:

For Authors:

- Authors must have their data sheets ready on hand to provide to Editors when an investigation is underway. Failure to provide data sheets has resulted in retractions.
- Authors should consider the use of similarity checking tools before submission. Original writing should be employed at all times, along with citation of sources.

- Authors must be aware that duplicate publication is unethical and universally condemned and should avoid it completely. Submissions can only be made to one journal at a time. Many journals already require you to agree to this ethics clause during the submission process.

For institutions:

- Institutions must have policies promoting ethical conduct in research in order to protect patients from unethical studies – such as those that lacked consent or board approval.
- Institutions can provide integrity work-shops to promote and bolster stronger ethics attitudes towards research. Workshops should expand to include undergraduates in order to build ethical research attitudes at a younger academic point.
- Institutions should re-affirm their integrity policies and stances against research misconduct and engage in proactive communication and promote investigations when concerns arise.

Retractions are a Good Thing?

Lastly, it is important to recognise the value of retractions and what they truly represent. As Fanelli mentions, retractions do not represent the "prevalence of misconduct but […] the efficiency of the system that detects it" (Fanelli, 2013). Fanelli suggests we should be critical when it comes to conflating retractions with outright misconduct to avoid cutting short a positive trend (Fanelli, 2013). In our research for example, outside of the obvious misconduct related causes of retraction, we did identify other reasons such as, retractions requested upon author request, or authorship disputes, or publication errors, which could be valid reasons for retraction but do not themselves fall under the umbrella of outright scientific misconduct. Additionally, the increased rate of retraction and availability of information through retraction notices, suggest an increased openness regarding the handling of these events (Marcus & Oransky, 2014). As it stands, the current definition of misconduct remains unchanged since the 1980's, while many countries to this day have not established frameworks to deal with allegations of misconduct (Fanelli, 2013). Ultimately, the growing number of retractions represent the increased ability for the recognition of misconduct, and the ability to address these problems and correct or amend the scientific record. With tools such as similarity reports, Artificial Intelligence language detectors, forensic image analysis tools and more, journals, editors, and independent readers and researchers are now more equipped then ever before to validate and assess the integrity of the research they read. Retractions ultimately represent the self-correcting nature of science, and this is an inevitable and welcomed phenomenon.

Study Limitations

Limitations of our study include the fact that we did not consider retractions of medical research that could have been published in the Arabic language. We also did not consider articles with an expression of concern which may later develop into retracted articles. Also, we did not include literature reviews, abstracts, editorials other grey literature. Inclusion of these types of articles may have increased the total number of retractions. Retracted research is a global and growing concern, so continued studies and examination are needed as integrity concerns arise.

Conclusions

Retractions are rising significantly for medical papers conducted in Egyptian institutions. Unreliable results, FFP misconduct, and duplicate publication are among the leading reasons for retractions. More research is needed to understand the root causes or risk factors for misconduct in this region, which may be due to pressure to publish or publication incentives. A revitalised research culture that promotes ethics, and a no tolerance attitude towards misconduct is swiftly needed in this region to restore trust on the international scientific stage. Lasty, retractions should be interpreted as a positive trend that aims to rectify the scientific record which can only benefit individual and public health.

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Declarations

Ethical Approval This study was conducted on publicly available information and is exempt from review and approval.

Conflict of Interest The authors confirm they have no conflict of interest to declare.

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