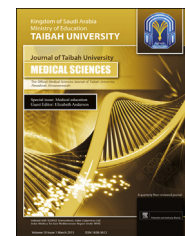Taibah University

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Review Article

Plagiarism in medical scientific research

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الملخص

أهداف البحث: يعرف الانتحال بأنه ''اقتباس كتابة أو عمل أو فكرة من شخص آخر وتقديمها كما لو كانت ملكا للشخص الذي اقتبسها''. هذا ويعد الانتحال أكثر أشكال ''عدم الأمانة العلمية'' شيوعا في البحوث العلمية. يهدف هذا المقال إلى تقديم شرح موجز ووافي عن الانتحال العلمي، لرفع مستوى الوعي بجميع أبعاد المشكلة.

طرق البحث: تم استخدام الكلمات الآتية ''الانتحال العلمي- أنواعه ـ كيفية اكتشافه- عواقبه'' للبحث في قاعدة البيانات''Medline''عن المقالات المنشورة تحت موضوع الانتحال العلمي.

النتائج: تم الحصول على ما يربو عن ٥٠٠ مقال. قسمت المقالات إلى مجموعات، بحيث تختص كل مجموعة بأحد أبعاد الانتحال. تمت قراءة هذه المجموعات، وتلخيص أهم النقاط والمستجدات في كل منها. ووجد من البحث أن أهم أسباب الانتحال العلمي هو عدم معرفة ماهيته. وعندما تجتمع عدم المعرفة هذه مع ضيق الوقت، وضعف مهارة كتابة البحوث العلمية، مضافا إليها الضغط الكبير الذي يشعر به الباحثون بضرورة نشر بحوثهم في مجلات علمية ذات سمعة عالمية طيبة، يقتبس كاتب البحث مقطوعات من بحوث الآخرين كما هي، مع ذكر أو عدم ذكر مصدرها، وهو بذلك يكون قد وقع في الانتحال العلمي. ولقد كان من الصعب في الماضي اكتشاف الانتحال العلمي في كتابة البحوث ولكن في

السنوات الأخيرة أصبح كثير من برامج الكشف عن الكتابات المنتحلة متاحا. يذكر هذا المقال كيف تستخدم المجلات والدوريات العلمية هذه البرامج للكشف عن الانتحال في البحوث. ويعد الانتحال العلمي من الناحية القانونية داخل المؤسسات الأكاديمية والتربوية ''خيانة علمية'' تترتب عليه عواقب وخيمة.

الاستنتاجات: إذا كان الانتحال العلمي هو أكثر المشكلات شيوعا في البحث العلمي فإن حجر الزاوية في منع تفاقم المشكلة، هو رفع مستوى الوعي به وبكل أبعاده. ويعد عمل دورات تدريبية داخل المؤسسات الجامعية وتوفير برامج كشف الانتحال هما وسيلتين أساسيتين في منعه.

الكلمات المفتاحية: الانتحال العلمي: نظرة تاريخية؛ أنواع الانتحال؛ كشف؛ عواقب

Abstract

Objectives: Plagiarism is defined as "the practice of taking someone else's words, work or ideas and passing them off as one's own". It is probably the most common form of scientific dishonesty found in research articles. The aim of this review is to present a comprehensive account about plagiarism to raise awareness of all aspects of plagiarism.

Methods: The key words "plagiarism", "types", "detection" and "consequences" were used to retrieve articles from the MEDLINE database.

Results: About five hundred articles were retrieved. Articles were divided into subgroups, with each group covering an aspect of plagiarism. Main findings and updates were summarized for each topic. The main reason behind plagiarism was found to be a lack of knowledge

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about the subject. When coupled with insufficient time, immature writing skills and the pressure on researchers to get their work published in good journals, authors take unacknowledged pieces of others' work and commit plagiarism. In the past, it was difficult to detect plagiarism; however, in recent years, many plagiarism-detection services and software programs have become available. The present article details how journals use these services and software as a helpful tool to check for plagiarism in submitted manuscripts. Within academia, plagiarism is an offense that can be devastating.

Conclusion: Plagiarism is the most common problem in research writing. The cornerstone in preventing this problem from getting worse is to raise awareness about how to cope with this growing problem of research misconduct.

Keywords: Consequences; Detection; Historical overview; Plagiarism; Types

Historical overview

The word "plagiarism" was first described in English in the year 1601 by the dramatist Ben Jonson, to describe someone guilty of literary theft.[1] The act of plagiarism itself goes a long time back in history. Numerous cases of plagiarism exist in nearly every specialty in science. In astronomy, David King (a British professor of the history of science) found that many of the theories and models that were presented by the famous Polish astronomer Nicolaus Copernicus in his famous book (On the Revolutions of the Celestial Spheres) actually were taken from the book of the Arabic scientist Ibn-Elshatir (The Final Quest Concerning the Rectification of Principles).[2,3]

Writing reports and articles about plagiarism goes back to the late eighteen hundreds when the first article written by Halsted G.B appeared in "Science" in 1896 under the title "complement or plagiarism".[4] Since this date, more than five hundred articles discussing plagiarism-related issues have appeared in the "Medline" databases.[5−8]

Terms and definitions

Plagiarism happens when one claims that an idea, or the expression of it, is his own when in fact it is someone else's. In dictionaries, plagiarism is defined as "The practice of taking someone else's work or ideas and passing them off as one's own". It is also defined as "The use of another author's language, thoughts, ideas, or expressions, and or the representation of them as one's own original work without crediting the source".[9,10] The word plagiarize comes from the Latin plagiare—to kidnap. A plagiarist is the person who commits plagiarism.

The size of the problem

Plagiarism is one of several forms of research misconducts that also includes the fabrication of results, falsification of data, misinterpretation of data, drawing certain conclusions and plagiarizing information or ideas within a research report.[11] Misconduct extends to include a breach of confidentiality and/or violation of authorship/publication.

In recent years, research has become a growing industry. There is fierce competition among more than 7.1 million researchers in the world to have their research published in over 25,000 journals. Researchers are under pressure to get their work published in good journals. When this pressure is coupled with a lack of time, lack of research skills and ease of obtaining information and articles from the internet, the rate of plagiarism increases.

In 2010, the Nature Publishing Group reported an alarmingly increasing level of plagiarism. Twenty-three percent of submitted articles are rejected because of plagiarism.[12] The prevalence of plagiarism varies from one community to another with reported rates from 11 to 19% in medical institutions.[13,14] These rates increase where the concepts of intellectual property and copyrights are not well understood and are not strictly respected.

Types and forms of plagiarism

According to the intention, plagiarism can either be accidental (unintentional) or deliberate (intentional). Accidental plagiarism is usually seen among students and junior researchers. Unintentional plagiarism is mainly caused by a lack of awareness of the limits of taking data and pieces of writing from other sources. Another reason for unintentional plagiarism is a lack of skills for appropriately acknowledging data sources and citing others' work.[15] Deliberate plagiarism usually takes the form of intentionally copying others' work and presenting it as if it is one's own. Copying large pieces of an article with the deliberate intent of deceiving the reader into thinking they are original is deliberate plagiarism. Legally, there is no distinction between intentional and unintentional plagiarism; both carry legal or financial penalties and can ruin a writer's reputation.[16] Therefore, it is very important that one understand how accidental plagiarism happens and what to do to guard against it. One must check his/her own work before submitting it anywhere.

According to the nature of the plagiarized production, plagiarism can occur in many types, including plagiarism of ideas, text, designs, collusion, self-plagiarism, patch-writing and many others (differences are summarized in Table 1).

Plagiarism of ideas is very difficult to detect because of a lack of proof and because there is no tangible production stolen.[17] An example that clarifies this form is when a researcher attended a presentation where he/she heard an interesting new research idea from the presenter. He/she then conducts research based on this idea and writes or presents the results as if it is entirely his/her own. Another example is when someone submits an article to a journal and his/her article is rejected for some reason, and one of

Table 1: Forms of Plagiarism.

Form	Description
Plagiarism of ideas	Theft of a new idea or a theory presented anywhere. The plagiarist then conducts research based on this idea/theory and presents it as if it is his/her own without acknowledgment of the source.
Plagiarism of text	This form is also known as "copy-cut-paste" or "word-to-word" writing. This occurs when a researcher takes an entire paragraph from another source and includes it in his own research writing.
Self-plagiarism	This occurs when a researcher uses substantial parts of his research in two different publications using the same findings or illustrations without referring to it.
Collusion	Asking someone else to write a piece of work for the plagiarist who then presents it as if it's his own.
Patchwriting	Copying parts of another work and changing a few words or the order of words to make it appear as if it is original.

the reviewers may choose the idea of the rejected article and write an article on the subject as if it was his own idea.[17,18]

Plagiarism of text is perhaps the most common form of plagiarism in medical research writing. This form is also known as "copy-cut-paste" or "word-to-word" writing. Because scientific research is always based on someone else's previous work, researchers need to mention scientific facts reported by others in their new articles. However, what is allowed to be taken from other's reports? It is common that some researchers take entire paragraphs from published articles and think it is permissible as long as they cite the reference at the end of the paragraph. In fact, this is plagiarism of text. Scientific findings are allowed to be taken from others' articles, but not their language or the exact paragraph that they wrote. In a new article, the previous findings from others should be presented in the writer's own language.[19]

Self-plagiarism occurs when a researcher uses substantial parts of his research in two different publications that use the same findings or illustrations without referring to both publications. This form of plagiarism is also known as "redundant data". There is a debate about self-plagiarism to consider if it is misconduct at all.[20] Scientific journals publish original articles; "original" means that every section in the article is new and has not been published before. If someone used his own previous published work in the new article, the journals' rules are violated. However, in real research practice, authors sometimes publish a series of articles on one research problem and it is very common that the author uses his previous findings as a basis for new findings. A simple practice to avoid this problem is to refer to what has been published or to seek permission from the publisher if the author needs to use the exact illustration from his own previous work.

Collusion is allowing someone else, such as professionals or agencies, with or without paying money, to write a piece of work and then the plagiarist presents it as if it's his/her own. This is a form of illegal unauthorized cooperation with the intent to deceive.[21]

Patchwriting is copying parts of another work and changing a few words or the order of words to make it appear as if it is original. This should not be mixed with paraphrasing, which is taking a fact from a source then writing it in one's own language and style. Paraphrasing is appropriate, while patchwriting is not.[22]

Whatever the type, plagiarism is divided according to the degree of the offence into two forms: minor and major. In minor forms, insignificant parts of the text are not properly cited. Major forms include the use of large portions from another source and presenting it as if they are one's own.[23,24] Minor plagiarism usually reflects academic immaturity while major forms indicate the intention to deceive. The penalties are therefore different between the two forms. More serious actions are taken against major forms.

Causes of plagiarism

- Misbelief: many researchers believe that taking entire paragraphs from different papers and including them in their writing is accepted as long as they mention the references at the end. The result will be a new article having substantial parts in the "copy-cut-paste" style, which is the definition of plagiarism. Submitted articles in this style are rejected by journals or may be retracted after being published.
- Poor time management and writing under stress.
- Immature writing skills: scientific writing is a language that undergoes development over time. The most important tool to gain this skill is excessive reading of literature and practice of scientific writing. Over time, writing research articles becomes an enjoyable experience.
- Intentional, as previously discussed.
- One of the most real causes of plagiarism is the enormous pressure on researchers and academic staff to publish their studies: the 'publish or perish' rule. Researchers find themselves obliged to publish research articles to get funds, prove academic competency, maintain their career and obtain better positions in the hierarchy of their jobs.[25,26]

Consequences of plagiarism

Committee on Publication Ethics (COPE) is the largest committee that makes guidelines for publication ethics in the world. COPE has published many guidelines for authors and editors. In 2006, COPE published flowcharts that help editors to distinguish between minor and major forms of plagiarism. When major plagiarism is detected in a published article after it has been printed, the consequences can be destructive to the reputation not only of the plagiarist but also for the coauthors, the journal reviewers and editors and for the institution to which the plagiarist belongs. Several forms of sanctions can be taken by the editor against the plagiarist author. These range from a letter of explanation in cases of minor forms of plagiarism that reflect the

misunderstanding of the concept, through formal letters to the heads of the plagiarist's institution, to refusal of future submissions from the author or his institution, up to retraction and reporting to the medical councils.[27]

Retraction is withdrawal of an article after publication when research misconduct is discovered in the article. There are several reasons for retractions including incorrect data, incorrect conclusions that cannot be used as a basis for further research, false claim of authorship, double publication and plagiarism.[28,29] Rate of retraction has increased tenfold in the last few decades. With retraction, the article is not completely removed from the journal web site or the databases, but the title, the author list and their affiliations remain with the addition of the term "retracted" next to the article title; this seriously damages the authors' reputations.[15] The request for retraction of a certain article is usually introduced to the editors of the journals by the author(s) of the article, their institution or by peer experts who discover research misconduct. After investigation, when misconduct is proven, the article is retracted. There are many examples where plagiarism costs authors and writers their entire career.

Legal implementations for plagiarism

Within academia, plagiarism by students, professors or researchers is considered academic dishonesty or academic fraud, and offenders are subjected to academic penalties up to expulsion.[30] Sanctions of plagiarism for undergraduate and postgraduate students include one of the following: A-redo the assignment/paper, B- fail the assignment/paper, C-redo the class/degree or D-fail the degree.

How is plagiarized writing detected?

In the past, detection of plagiarized work was the responsibility of the editors and was dependent mainly on personal experience. Each author has his own style of writing. Copying and pasting from different authors can be easily recognized by expert editors and reviewers. Recently many software-based services for detection of plagiarism in scientific publications have become available. Some of these software services are free while others are commercial; their capabilities in detecting plagiarism are variable.[31]

eTBLAST is a free service provided by the Virginia Bioinformatics Institute. The service can find exact matches between two articles in several databases, including Medline. It is available on the website: http://etest.vbi.vt.edu/etblast3/. Another successful tool is the Turnitin plagiarism detection software. Turnitin is a famous and worldwide program that is provided by IParadigms for use by teachers and professors. Institutions are required to pay annual fees to make this service available for their staff and students. Another well-known service is iThenticate, also provided by IParadigms.[31] Recently, journals using plagiarism-detection software check submitted articles before accepting them for publication to avoid retractions after publication.[28]

These services can detect the percentage of matching between the submitted article and the original sources. There is no exact universally agreed "percentage of match" above which a manuscript is deemed plagiarized; however, some

institutions and journals put a figure between 20 % and 30 % above which a manuscript can be rejected because of plagiarism.[32,33] The use of these software programs is not enough to make a decision about plagiarized work. Each case must be taken in context and after comparison between the submitted written document and the original work. Significant input is needed from editors for proper decision making.[28]

Solutions

Production of plagiarism-free scientific writing is a shared responsibility for any medical institution. The responsibility lies on the three main pillars of the institution: the students/junior researchers, the experts/senior staff and the institution itself. Here are some recommendations for each group that may be helpful in solving the increasing problem of plagiarism:

For students and junior researchers

To avoid plagiarism, source credit (i.e., mentioning references) should be given whenever another person's idea, opinion, theory, facts, statistics, graphs, drawings or any piece of information is used in one's own research. If exact words from another source are to be included in a piece of writing, these words should be put in between quotation marks " " followed by crediting the source. When a scientific fact is taken from an original article, it should be written in the author's own words, not an exact copy of the paragraph from the source. This is called "paraphrasing" and does not change scientific facts. Even after paraphrasing another author's writings, the source should be credited.

Using one of the available plagiarism-detection services (mentioned above) is helpful to check for unnoticed plagiarized pieces of writing within the new manuscript.

For experts and senior researchers

Writing an article, particularly for new junior researchers, is a difficult task; they need support from senior researchers. Supervisors, tutors and mentors should help their junior researchers to draw an outline for the entire writing subject. The subject can then be broken into multiple small pieces. Supervisors can then agree with the students/juniors to set a deadline for each piece and discuss it with the student/junior researcher to improve writing with each next piece.[34] Scholarly writing is a skill like any other skill, and particularly for junior researchers, it requires training and practice, and for senior experts, it requires patience and time.

For institutions

The first essential step in preventing plagiarism is ensuring that students and researchers within the institution have enough knowledge about plagiarism, its forms, types, consequences and how to avoid committing it. It was found that students and researchers will understand the entire issue of plagiarism and will appreciate its seriousness better if it is delivered to them in interactive workshops and seminars rather than in lectures, oral advice or warnings.[35]

Several plagiarism-detection services and software programs have become available. These are helpful tools for both students and experts; students can check their writing for pieces that may have an exact match in previously published articles, and seniors and journals can check submitted articles against plagiarized work. Such services are very helpful in decreasing the rate of plagiarism within institutions.[33,36] It is important for senior staff to note that before using plagiarism-detection services, they should make sure that students understand what plagiarism is and how to avoid it. Plagiarism-detection software is a tool that helps to find sources that contain text similar to the submitted work. The decision to deem any work as plagiarized must be made carefully and after careful examination of both the submitted paper and the suspected source.

Conclusion

Plagiarism is the most common problem in research writing. The cornerstone in preventing this problem from getting worse is increasing awareness about it. Running workshops and providing plagiarism-detection software in institutions are two essential tools in preventing plagiarism. Trust and honesty are at the heart of scientific research ethics; plagiarism shakes these values and creates an atmosphere of distrust that hampers scientific progress.

Conflict of interest

The authors have no conflict of interest to declare.

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