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# Effective methods in preventing plagiarism in medical research: A qualitative study at Tabriz University of Medical Sciences-Iran



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## ABSTRACT

**Background:** The most effective way to manage problems in research, especially plagiarism, is to prevent them from initially occurring. Therefore, comprehensive planning to prevent and reduce plagiarism, or actions to internalize honesty in speech, behavior, and actions, will not only make researches worthwhile but also reduce plagiarism.

**Methods:** In this qualitative research, eighteen faculty members of Tabriz University of Medical Sciences participated from 2015-2016. Data were collected through a semi-structured interview and analyzed by qualitative content analysis (Mayring method).

**Results:** Effective factors in the prevention of plagiarism were extracted and presented in 23 subclasses and four themes including policy-making, legislation, an institutionalization of ethics in research, and the application of technology capabilities.

**Conclusion:** Providing strategic and operational plans to internalize ethics in research and gradual changes in policy making and updating laws and regulations are factors affecting preventive measures. Also, with an increase in information literacy and applying information technology capabilities, it is possible to prevent informed and uninformed plagiarism.

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## INTRODUCTION

Observing morality in research is one of the fundamental principles of scientific publications and paying attention to intellectual property rights is a significant issue of which plagiarism and other misbehaviors in research are considered at the opposite end. Plagiarism has increased widely with the increase in formal education and the need to gain higher positions through the generation of knowledge. Thus, knowledge has become a means of earning income, and higher status, so preventative measures regarding plagiarism should be taken seriously.

The great former and/or contemporary researchers and writers have all emphasized the observance of the author's rights and the fair utilization of researchers conducted, both implicitly or explicitly. They believed that an essential role of critics is to discuss and research "the inspirational source of the work," and have pointed to some people named the "Book Describers," in ancient Greece and Rome whose responsibility was to specify the similarity between the works and to point them out to the authors. Also, Abuhlal Askari was the first person who has spoken about the advantages and disadvantages of citation.<sup>1</sup>

Jeremy and Williams (2016) have referred to the alarming spread of "post-modern" plagiarism among students and talked about the widespread copying and distribution of papers through online sales companies.

According to them, in the virtual world, the sale of student papers and theses through the internet is the third and most successful E-commerce industry.<sup>2</sup>

According to investigations conducted on research frauds among students when during the compilation of theses, it was revealed that the data falsification and data forgery rate in Iran is 40% and 37%, respectively. 15 to 45% of theses have only been written on paper and in fact, no actual research has been carried out.<sup>3,4</sup> Self-plagiarism and fraud in the translation of texts is another case raised by Anderson and Steneck. In their opinion, fraud in the translation of texts means that the language of the original article is not the same as the translated article.<sup>5</sup>

Common practices of plagiarism corresponding to the development of information technology include: loading from sources with free access, copying articles from web-based electronic databases, copying articles from local databases, and cutting and pasting content from different sources. Failure to insert quotation marks when quoting is the case of forging documents.<sup>6</sup>

However, what is at stake in this research are plagiarism prevention strategies. Plagiarism refers to copying a text, a paragraph, or some sentences without quotation marks, to explain and interpret ideas from a source without citation or with the

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inaccurate citation. This plagiarism was presenting the work of others (informed or uninformed) as his/her work, downloading or purchasing an article and presenting it as his/her work, sending an article to several publishers, and using the work of others without mentioning the source or providing a correct citation.<sup>7</sup> The present study aims to identify effective strategies for preventing plagiarism with a qualitative approach to determine the most important and useful ways to avoid or reduce plagiarism.

## METHOD

The present study was qualitative content analysis. The faculty members of Tabriz University of Medical Sciences formed the study population. The study inclusion criteria consist of the willingness to participate in the research, having at least five years of educational and research experience and having a moral sensitivity to plagiarism. Data collected through “semi-structured individual interviews” with experts. The purposive sampling method used in this study and the sample size depended on data saturation. After identifying eligible professors, they interviewed considering the inclusion criteria. After the interview, the text of the conversations was transcribed, it was repeated several times, the obtained data were coded, and then a subsequent interview was carried out. After completing 18 interviews, due to data saturation and no further extraction of a new code data collection was achieved. The duration of the interviews was 30 to 50 minutes. A qualitative content analysis approach using the Mayring method was applied to analyze the data. This approach is not limited to a specific background and is used primarily to analyze personal views collected through the interview.<sup>8</sup> For this purpose, the text of the interviews was typed and encoded using MAXQDA software. According to the Mayring approach, the data analysis steps were arranged such that important statements related to the research question (initial summarization) could be coded simultaneously with data collection. Then the similar codes were sorted and summarized in the specified classes (second summarization). Finally, the classes derived from the previous stage were grouped according to their similarity; these classes were reviewed several times, and the similar classes were merged into each other. Then, desired themes were obtained by combining classes in generalizable terms (third summarization), indicating that the data were summarized in a more abstract level.

Four criteria including credibility, confirmability, dependability, and transferability were used to confirm data accuracy.<sup>9</sup> Therefore, various methods such as allocating sufficient time for data collection, good communication with the participants, and conducting interviews in selected locations by the participants were applied to increase the reliability of the data. To validate the transcriptions from the tape or extracted codes, they were reviewed by other contributors and colleagues and hence discussed and finalized in joint sessions. The study objectives were explained to the participants before data collection to observe ethical considerations, and they were interviewed after obtaining their consent. Other criteria such as the right to cooperate with the study or decline, confidentiality, and retaining information are also considered.

## RESULTS

Participants in this study were 18 faculty members of Tabriz University of Medical Sciences, including 14 male and 4 female; 5 professors, 7 associate professors, and 6 assistant professors. Factors affecting the prevention of plagiarism were categorized into four groups of policy-making, legislation, an institutionalization of ethics in research, and application of technology capabilities (Table 1). Each of these themes consists of several subclasses and selected codes, each describing one particular aspect of the preventive methods.

### 1. Policy-Making

The above themes indicate resolving weaknesses in research policy making. This is because the participants' experience confirmed that the importance of a program depended on its priority and according to them, programs that promote honesty in research have not been prioritized. Subcategories of this theme include meritocracy regarding ethics in research, qualitative improvement before publication and providing research support.

#### 1.1. MERITOCRACY IN THE AREA OF RESEARCH ETHICS

Of critical consideration in interviews is the role of professors and trainers in communicating social norms, providing cultural experiences, shaping students' behaviors, beliefs and attitudes, and educating students' ethical virtues. Therefore, taking into account ethical merits as one of the important policies in teacher recruitment is an important prevention strategy.

**Table 1** Themes, Sub-themes, and Selected Codes of Plagiarism Preventive Methods

Theme	Sub-theme	Items
Policymaking	Paying attention to meritocracy	Recruiting people with good morals and not assigning key positions to those at fault
	Improving quality before publication	Control of the writing process by professors, assigning ethical codes to researchers
	Providing research support	Increasing funding for research projects, establishing a publishing unit and research consultation centers
Legislation	Accepting and adhering to the international laws	Providing requirements for the approval of copyright laws
	Reviewing regulations and legislating based on existing facts	Considering the ability of individuals in approving regulations
	Delegation of authority to approve the research regulations	Decentralization in decision making
	Clarity in codification and implementation of regulations	Clarifying examples of plagiarism, clarification of research offenses by investigators
Institutionalization of ethics in research	Justice-based approaches	The dominance of laws instead of relations, immediate reaction in the event of plagiarism
	Educational interventions	Highlighting the immorality of plagiarism in textbooks, justifying the philosophy of citation in workshops
	Motivational interventions	Valuing honesty in the organization, acknowledging moral researchers
Utilizing technology capabilities	Punitive interventions	Guidance measures and notifications, disclosure of the violator's name, imprisonment, and fines
	Applying Knowledge Management Software	Utilizing citation software, creating cohesive databases, using plagiarism checker software

“It’s very influential to recruit people adhering to ethics. Everyone follows their sample, the head of the university, their professor. In the case of any flaw occurring, and a student or colleague at lower levels realizes this, that their superior colleague has deviated from the right path, chaos will break out...” (interview 9)

Ethical and competent managers play a crucial role in removing or diminishing barriers in research because they can prevent much of the unethical research and consequently prevent informed and uninformed plagiarism.

“... When assigning managers, the individual’s background is very influential, whereas if an individual has committed plagiarism, key research positions should not be given to him/her; so that he/she can have a claim to make and confront anyone who does such a deed.” (Interview 9)

### 1.2. IMPROVING THE QUALITY BEFORE PUBLISHING

Policy-making to enhance the quality of scientific publications, at the pre-publication phase, will be achieved through effective monitoring of

the writing process. The insufficient attention of professors to plagiarism will lead to an increase in plagiarism. Therefore, in the review stage, professors should take plagiarism into account and give students remarks on ethical points.

“Unfortunately, nowadays research is not being investigated from the plagiarism point of view, and is only evaluated from the methodology and statement of the problem perspective.” In fact, our professors do not care the students themselves have written the paragraphs or sentences, or they are copied.” (Interview 1).

As the education system expects students to have research output, it is necessary to have a monitoring system along with this expectation to assess the quality of the research. Qualitative assessments using policies such as moral control by the sponsor organization is an effective way to prevent the spread of plagiarism.

“If a researcher wants to publish an article in a reputable journal, the article must have a moral code; any research that is to be done should be started by obtaining the code and the permission of the ethics committee ...” (Interview 16)

### 1.3. PROVIDING RESEARCH SUPPORT

Providing research support to empower researchers is the best way to prevent plagiarism and prevent them from wasting their potentials. Also, logical financial support and all-around support from the organization can lead to an upgrade of the organization's ethical rating and significantly reduce data manipulation and unnecessary repetitions. Lack of research funding increases the chances of data manipulation. Regarding policy making to increase research budgets, one of the experts have stated that:

“One cannot write an article presentable in credible journals with a limited fund, the research budget should be increased so that more experimental data can be obtained in the research, and the research experiments be evaluated in several ways ...” (Interview 6)

Establishing a publishing unit and research consultation centers in universities and research institutes is a necessity referred to by the interviewees. Statistical and thematic consultation services provided by the university can keep researchers away from private profit-seeking organizations, as there are a much illegal translation, typing, book-binding and private research project consultation centers that sell others people's research.

“These centers usually steal research contents that have been given to them for printing, translating or bookbinding, and sell them as a new article or thesis to other students by adding some information to them. If consultation and translation centers are under the supervision of universities or academic centers, misuse of others' research will be minimized “(interview 7)

## 2. Legislation

This theme addresses the legal challenges in the admission, codification, and implementation of laws and regulations. Sub-categories of the themes as mentioned above include 1) accepting and adhering to international laws, 2) reviewing regulations and legislating based on existing facts, 3) clarity in codification and implementation of regulations and 4) justice-based approaches.

### 2.1. ACCEPTING AND ADHERING TO INTERNATIONAL LAWS

Uncertainty about the acceptance and weaknesses in enforcing intellectual property rights in domestic laws have provided the means for increased plagiarism and led to a major challenge in the field of research trusteeship. Therefore, these laws should have been considered by legislators many years

ago to provide cultural and ethical backgrounds in research and to prevent the widespread prevalence of plagiarism. Creating a suitable infrastructure for accepting international laws is a solution proposed by contributors.

“At a certain time in our country, we did not pass the copyright law nationally and internationally and did not meet its requirements. Meeting provisions of approval for the copyright law could prevent many illegal translations and offsets ...” (Interview 8)

### 2.2. REVIEWING REGULATIONS AND LEGISLATING BASED ON EXISTING FACTS

Realism in the adoption of research regulations increases the quality of scientific publications and reduces unnecessary repetitions. Therefore, the approval of research guidelines should be consistent with the capabilities of individuals and available facilities, and the idealistic regulations should be modified. In this regard, considering the ability of individuals and society's potential is a chosen code that is explained as follows:

“Considering the ability of individuals when legislating is very important. Increased plagiarism is one of the consequences of irrational laws passed beyond the ability of the researcher. Thus, we require relevant regulations for the researcher proportional to the available facilities.” (Interview 14)

### 2.3. DELEGATION OF AUTHORITY TO APPROVE THE RESEARCH REGULATIONS

The delegation of authority is important for modifying research regulations by academic staff because research decision-making is a professional task and local people at each campus can better understand the status, and thus can make appropriate decisions according to their conditions, positions, and available facilities. The chosen code for this subclass is decentralization in decision-making and research legislation. As one of the interviewees stated:

“The reform of the research system is an expert-oriented long-term task, which will not be achieved via a few changes and/or meetings. I believe that a specialized team should be created in each university, and decentralization in research decisions should be implemented, and the locals at each university should adopt research regulations for themselves.” (Interview 18)

#### 2.4. CLARITY IN CODIFICATION AND IMPLEMENTATION OF REGULATIONS

According to the participants, clarity of research laws and regulations is one of the most important factors that have contributed to the reduction of plagiarism. Explaining details in examples of plagiarism, clarifying the process of investigation and determined punishments imposed on this research violation are among the major issues suggested by interviewees, which were referred to as selected codes concerning their importance.

“Instances of plagiarism should be brought to the attention of all students or presented in details on boards or the university website from the very first day of the academic course.” (Interview 14)

Most of the participants agreed upon clarifying the verification sources and even plagiarism laws and regulations. Unfamiliarity with the rules of plagiarism prosecution is the primary challenge faced by the interviewees. In this regard, one of the interviewees has explicitly acknowledged that he has no information about the plagiarism prosecution process and does not know to whom he should refer to in such cases.

“I do not know where to refer to in such situations, whom to report to, or what to do. We do not have very clear rules about how to deal with violations or about imposed punishments.” (Interview 14)

#### 2.5. JUSTICE-BASED APPROACHES IN LAW ENFORCEMENT

The punitive rules and regulations for plagiarism will be effective only when there is a justice-based approach, and the position of individuals does not affect law enforcement. According to one of the participants, the ignorance of law enforcement is the main reason for the prevalence of plagiarism. He believes that:

“We ignore the rules and do not enforce them for the sake of some considerations in communication, without knowing that we are indiscriminately promoting plagiarism...” (Interview 9)

Considering the social nature of plagiarism, dealing with it as soon as possible is an important preventive factor. Therefore, the shorter the time interval between committing violations and enforcing laws on plagiarism, the greater its effectiveness will be. Accelerating the implementation of punitive rules for plagiarism will have a greater impact on the honest behavior of others, especially novice researchers.

“As plagiarism is considered social misconduct, its urgent and serious encounter will have a greater impact on other research offenders...” (Interview 17)

### 3. Institutionalization of Ethics when Conducting Research

The increasing statistics of plagiarism indicates the inefficiency of universities in justifying ethical issues to their members. Thus, the planning theme for institutionalization will be possible using subcategories of educational interventions, motivational interventions, and punitive interventions.

#### 3.1. EDUCATIONAL INTERVENTIONS

The most common method of plagiarism prevention is through formal education and workshops. This subcategory consists of the selected codes of education through textbooks and training with workshops, and it is necessary that experts in the field of ethics determine the quantity and quality of each.

From the participants' point of view, it is necessary to express the research ethics philosophy, especially the issue of plagiarism within formal education through specifying course headlines. However, this has not been taken into account, and there is nothing about plagiarism in the textbooks. Even fundamental principles, i.e. instances of plagiarism and limitations of utilizing other sources cannot be found in textbooks. In this regard, one of the participants has pointed out that:

“plagiarism is just like stealing from people, so it is important to highlight its offensiveness in school textbooks so that everyone can understand it.” (Interview 1)

Since some people think that citation reduces the value of their research, education regarding the value of citation and justifying the role of citation in writing research is an important issue,<sup>10</sup> as explicitly pointed out by participants:

“Individuals should be taught that citation does not reduce the value of the research but also makes it highly valuable. Therefore justification of the philosophy of citation and trusteeship is a skill that is to be gradually acquired by the researcher.” (Interview 11)

#### 3.2. MOTIVATIONAL INTERVENTIONS

Encouragement is the most effective way to institutionalize behavior. From the viewpoint of most interviewees, the impact of encouragement is much more than punishment, and the best punishment

for perpetrators of plagiarism is to encourage honest and trustworthy individuals. Besides, encouraging individuals will lead to moral excellence in the organization. The above-mentioned subcategory is justified by two selected codes: giving value to the organization through behavioral integrity and acknowledging moral researchers.

“We need to encourage honest and capable individuals; thus those who work very well should be encouraged first. We should show our appreciation to verify their dignity in society and the institute and organization. Adding value to the organization through honesty is essential to promote honest behavior...” (Interview 17)

The appreciation of moral researchers and scholars on special occasions such as the research week can also be effective. Also, granting the honesty award to honest researchers and creating valid competition to achieve the award is another suggested method extracted from the interview text.

“It is useful to consider honesty awards during research week that is held every year in the university, because those researchers who refrain from plagiarism should be encouraged” (interview 9)

### 3.3. PUNITIVE INTERVENTIONS

There is no doubt that there should be penalties and punitive regulations for plagiarism because the research system requires some effective and formal deterrent factors, which could result in the reduction of violations. Procedures for punitive interventions are associated with selected codes of guidance measures, the disclosure of the plagiarizer’s name and negative actions such as imprisonment and punishments.

“In case a researcher commits plagiarism, the initial measures can be a verbal or written notification or an entry in his/her records...” (Interview 1)

When doping is proven about an athlete in sporting tournaments, his medal is taken back, and his name is publicly announced. This procedure is suggested for plagiarism, with the difference that this is done if plagiarism is repeated, not in one or two unintentional or intentional cases.

“We can disclose the name of the violator because most people avoid being defamed and consequently will avoid plagiarism.” (Interview 1)

Finally, depriving violators of privileges such as “revoking their teaching ranking, assigning a

negative rating, repeating the student’s course” are some significant methods referred to by experts. In a comparison of the punishment for plagiarism with other countries, one of the participants stated that it is necessary to foresee imprisonment or fines for the violator, and pointed out that some of these instances can be enforced by the judiciary.

“... In a country like South Africa, the punishment intended for plagiarism is a cash penalty (for the first time) and a cash penalty in addition to a prison sentence (for the second time) is implemented, which can also be applied here.” (Interview 13)

## 4. Utilizing Technology Capabilities

As the progress in information technology has facilitated access to information, it also provides researchers with the possibility to publish original research. Of the major capabilities of information technology are storing, organizing, retrieving and sharing human knowledge. Thus, utilizing these capabilities directs the research path toward improvement.

### 4.1. APPLYING KNOWLEDGE MANAGEMENT SOFTWARE

The theme of utilizing technology capabilities is one of the major prevention mechanisms that is characterized by the subtheme of using knowledge management software with selected codes, utilizing citation software, creating databases, and using plagiarism checker software.

Due to the diversity of citation formats, the main mental challenge of researchers has been resolved in this area. Researchers can resolve the resource standardization problem using the citation software. In this regard, one interviewee mentioned that:

“Using citation software during the process of writing articles can solve the researchers’ problem regarding difficulties in the citation.” (Interview 11)

Given the numerous research courses in universities, establishing a database consisting of all researchers, completed projects and those in-progress, has resolved the problem of copying to a great extent. The absence of a reference database has resulted in repetitive studies being easily accepted and carried out.

“There should be a set of methods and tools for scientific judges to control research projects, a cohort database or checking system, through which research topics received from any research center can be checked.” (Interview 10)

Nowadays, the plagiarism checker software has been designed to prevent plagiarism. This software is available online and shows the level of similarity and overlapping of texts. Many professors have suggested the application of this software:

“The Plagiarism Checker software can be used; even the author can evaluate his/her work prior to publication, in order to resolve any doubts about plagiarism. Universities must purchase this software and make it available to their researchers.” (Interview 2)

## DISCUSSION

The findings of this study were based on the exact experiences of participants and showed that plagiarism prevention programs are not among the foremost research policies and regulations of the university, and that lack of awareness regarding plagiarism and preventive strategies has been the main factor for the increase in this research dilemma. This is while the efforts of one or two organizations are not enough to prevent plagiarism, but require the cooperation and coordination of all related organizations and associations. Reviewing and comparing these findings with the results of other studies suggests that there are some important and notable challenges in the field of plagiarism prevention that should be considered seriously in order to develop ethics of research.

The findings of the first research theme indicate that preparing a suitable infrastructure for changing the common research methods and prioritizing ethical requirements is an important factor in the decisions of trustee managers, which is consistent with the findings of Ibegbulam. He believes that something more than punishment is required to prevent plagiarism and considers managerial policies as an important factor in solving the problem.<sup>11</sup> In another study, while emphasizing the standards of professional and ethical behavior, Lapid has considered professors the most effective people in transferring righteous ethical conduct<sup>12</sup> The second theme suggests insufficient support for novice researchers, which has increased the motive for plagiarism. Providing financial aid and consultation, printing, typing and binding facilities by the university press or institutions licensed by the university is another idea for prevention that has had a great effect on reducing plagiarism. Allocating ethical codes is the best method for identifying repetitive subjects and topics which can eliminate unnecessary repetitions during approval.

Accepting and adhering to the international laws accepted by most countries is the underlying culture necessary for the fair and ethical use of others works. Publishers and researchers have given regard to self-management in scientific production by relying on the principle of prosecution in the event of the violation, and the challenge of intellectual property rights in international law is shaped by providing an appropriate cultural ground in scientific environments.

Also, disregarding the ability of individuals along with stressful factors, such as the large number of assignments in a highly competitive environment and the researcher's capabilities and skills being not proportional to what is expected from him/her has been faced with various reactions; some do not have the sufficient talent and ability, while others do not have the required accuracy, so they may resort to plagiarism. This discussion is consistent with Dawson and Park's research.<sup>13,14</sup>

Some of the main challenges regarding prosecution includes the individual's low level of legal knowledge regarding punishments, the process of taking measures in the pursuit of unethical research and the competent centers dealing with research violations. Thus, clarifying the rules and prompt and fair reaction in the event of violations, are considered invalidities against plagiarism.

The third theme is to emphasize the internalization of intellectual property rights through education, motivation, and punishment. Many studies have considered this educational triangle, deeming it necessary to determine the issues related to trustworthiness, citation, and plagiarism when designing medical ethics courses or research methodology syllabuses.<sup>15,16</sup>

Considering the importance of institutionalizing intellectual property rights, teaching 'how to research and write medical articles' should be added to the curriculum and seriously pursued in all colleges and universities. In addition, ethics committees should be established in institutions, and punitive disciplinary action should be taken for young researchers, the results of which are in line with Pathore's research.<sup>17</sup>

Considering the spread of plagiarism, participating in compulsory training workshops becomes a necessity. Workshops for becoming familiar with citation styles or methods for judging and reviewing scholarly papers have been put forth at two levels for professors and students, which has also been referred to in Hall's research.<sup>18</sup> Pecorari (2010) has considered lack of knowledge and adequate training as effective factors in the formation of

fraud. Therefore, the institutionalization of honesty through workshops and formal education and continuous notifications in this study are in line with these studies.<sup>19,20</sup>

The last theme reflects the technological capabilities in the prevention of plagiarism. Many kinds of research have considered rapid and easy access to information databases as a promoting factor in plagiarism. However, on the contrary, the results of this study have identified accessibility as a decreasing factor in plagiarism. Therefore, considering the principle of correctness in citation of research being pivotal, accessibility of information resources has reduced the distribution of false information because the limited accessibility of information is a great defect incorrect citation, which is not consistent with numerous other studies.<sup>11,21</sup>

Given the fact that in the cyberspace era, intellectual property rights have received much-added value, the use of the plagiarism checker and citation software and websites are suggested to prevent plagiarism. With the ability to facilitate the citation process, this software shows the similarity of texts in quantitative terms.<sup>22</sup>

## CONCLUSIONS

The development of research ethics requires a systematic approach which is realized by creating the proper context using strategic and operational programs. The rigorous rules cause educators to become isolated, and the irregular preventive programs will not be effective. Therefore, investigating the plagiarism dilemma from all perspectives is of significance. In addition, the viewpoint of ethical individuals is an important issue in the reducing plagiarism.

Universities are the most important site of scientific publications. Pathology of effective factors in plagiarism and providing appropriate solutions can preserve the scientific dignity of individuals and make the research more valuable. Some interventions such as reconsidering research policymaking, establishing laws by individual's potentials, training and utilizing technological capabilities can significantly reduce informed and uninformed plagiarism.

## CONFLICT OF INTEREST

All authors declare there is no conflict of interest regarding publication of this manuscript

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