Predictors of Plagiarism Research Misconduct: A Study of Postgraduate Pharmacy Students in Jordan

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Abstract

This study aimed to evaluate Jordanian pharmacy postgraduate students' knowledge, behavior and perception about plagiarism and why do they commit such research misconduct.

This is a cross-sectional survey that was conducted in Jordan during the period between June-July 2019. The study targeted postgraduate pharmacy students from all Jordanian universities. Recruited students were asked to fill out the study questionnaire to evaluate their knowledge, behavior, and perception about plagiarism.

A total of 103 postgraduate students participated in this survey, most of them (n=93, 90.3%) were enrolled in masters programs. Most of them (n=72, 69.9%) reported that they have committed plagiarism during their studies, but this work was unintended for about 76.4% (n=55) of the plagiarist.

Students were asked about 12 items that represented plagiarism actions and most of postgraduate students were able to identify most of the actions as plagiarism (>60% for most items). Overall, the mean knowledge score for students about plagiarism was 8.6 ± 2.6 (out of 12).

Regarding students' perceptions towards plagiarism, many students (n=99, 96.1%) believed that plagiarizing is as bad as to steal from someone and 92.2% (n=95) reported that plagiarism is considered against their ethical values.

This study found a high rate of plagiarism among postgraduate pharmacy students in Jordan despite their awareness and understanding of the concept and its different forms. Academic institutions must establish formal policies to raise awareness about plagiarism, enforce and implement penalties for those who commit plagiarism.

Keywords Plagiarism · Students · Pharmacy · Perception · Behavior

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Introduction

The main goal of conducting scientific research is to generate new information that may contribute to improve human health. However, inappropriate and unethical practices by some academic researchers are inescapable and may, in turn, weaken the research integrity and affect the reliability of information generated from research (Denisova-Schmidt, 2018).

Among the well-known forms of academic research misconduct that are identified by authorities are falsification, fabrication, and plagiarism (FFP) (David B. Resnik et al., 2015). Plagiarism is common in research and includes using an author's words and ideas during scientific writing without proper acknowledgment of that author, and therefore undermining the honesty and integrity of scientific writing (Roig, 2006). Plagiarism includes cases where a researcher plagiarizes intentionally or unintentionally (Joob and Wiwanitkit, 2018).

Plagiarism is undoubtedly contrary to research ethics and is prohibited in scientific writing (Sinha et al., 2009; David B Resnik, 2005). However, it is unfortunately widespread in the academic community, especially among students (Jordan, 2001; Gullifer and Tyson, 2010; Park, 2003; Jereb et al., 2018). In one study that was conducted in Australia, results showed that a 30–50% of university students attempted different types of plagiarism during their studying such as "copying information directly from a website, book or periodical with reference to the source but no quotation marks", and "paraphrasing information from a website, book or periodical without referencing the source" (Brimble and Stevenson-Clarke, 2005).

Plagiarism is one of the biggest challenges facing universities nowadays (Jereb et al., 2018; Selemani et al., 2018; Ryan et al., 2009). One of the essential reasons behind the spread of this phenomenon is the technological revolution, which allows researchers to easily plagiarize others' ideas and words using a 'copy and paste' technique (Scanlon and Neumann, 2002). Also, the number of web-based research articles published in open access journals has been increased, making it easier for plagiarists to access and copy information (Ryan et al., 2009). Moreover, the increasing number of postgraduate students in universities might be a none ignorable challenge to academic supervisors in training and guiding their students not to commit this practice (Jereb et al., 2018).

Recently, several studies have warned of the growing problem of plagiarism in scientific publications of postgraduate students (Jereb et al., 2018; Selemani et al., 2018; Ryan et al., 2009; Idiegbeyan-Ose et al., 2016; Ramzan et al., 2012). If plagiarism became a normal practice by researchers and students, this may disturb the scientific integrity of researches and would destroy the scientific basis of any country (Denisova-Schmidt, 2018).

But why do students plagiarize during their scientific writings and what are the different factors that may contribute to this irresponsible and unethical act. No previous studies were conducted in Jordan to answer this question. Thus, we targeted a specific subgroup of pharmacy postgraduate students to evaluate their knowledge, behavior, and perception about plagiarism and why do they commit such research misconduct.

Methods

Study design, participants, and setting

This is a cross-sectional survey that was conducted through social media networks in Jordan during the period between June and July 2019. The study aimed to evaluate knowledge,

behavior, and perception about plagiarism among pharmacy postgraduate students and to assess factors contributing to this research misconduct.

The survey was distributed electronically through social media networks including Facebook, Telegram, and WhatsApp. The questionnaire was posted on these media platforms daily for two weeks (20th June-4th July). The study targeted pharmacy postgraduate students from all Jordanian Universities. Recruited students were asked to fill out the questionnaire after being informed of the nature of the research and signing an electronic consent form.

The Study Instrument

Following an extensive literature review on students' perception of plagiarism and factors influencing plagiarism (Jereb et al., 2018; Howard et al., 2014), a draft questionnaire was designed. Afterward, the draft questionnaire was tested for face and content validity by the authors.

The questionnaire contained a number of closed-ended questions that were divided into six sections as follows: (i) electronic informed consent form, (ii) students socio-demographic data (gender, age, postgraduate degree, postgraduate program, years spent in the program, current university, nationality, if the student started writing his/her thesis, and if the student has attended any course about plagiarism), (iii) students' knowledge and behavior about plagiarism, (vi) students' perception regarding plagiarism, (v) students perceived preference on the actions to be taken by the university against postgraduate students who plagiarize, and (vi) factors influencing plagiarism. Regarding sections (iv) and (vi), a 5-point Likert scale was used to evaluate students' perceptions and opinions. The 5-point Likert scale ranged from strongly agree to strongly disagree.

Then, the questionnaire was uploaded on an electronic data collection platform (Google Forms). At the onset of the questionnaire, the participants were informed about the purpose of the study, the time required to complete the questionnaire, the potential benefits of the study, data confidentiality protections, and the voluntariness of participation. At this stage, the questionnaire would not open unless respondents agreed to take part in the study by ticking the approval box at the end of the consent form.

For the knowledge section, students were asked to classify 12 actions through the selection of one of three answers: yes, this is plagiarism, no this is not plagiarism, or I don't know. For each correct recognition, the students gained 1 point, while in the case of incorrect recognition they gained "zero points". Then, a knowledge score out of 12 was calculated for each student.

Regarding the perception section (Section 4), for each statement that described plagiarism as a good or justified practice, the following scoring system was used: strongly agree (0), agree (25), neutral (50), disagree (75), and strongly disagree (100). For statements that described plagiarism as a bad practice, the scoring system was reversed. Finally, a mean perception score (out of 100) was calculated for each student.

The reasons that may lead students to plagiarize were divided into four types as following: (i) computer technology and Internet, (ii) regulation, (iii) teaching factors, and (vi) academic skills.

Ethics Approval

Ethical approval was obtained from the Institutional Review Board (IRB) at Jordan University Hospital (JUH) (Reference number 152/2019). The study was conducted following the ethical standards outlined in the World Medical Association Declaration of Helsinki guideline (World Medical, 2013).

Statistical Analysis

Statistical Package for Social Science (SPSS) version 22.0 (IBM Corporation, Armonk, NY, USA) was used to conduct statistical analysis. The descriptive statistics were used to analyze quantitative and qualitative variables using mean/standard deviation (SD) and frequency/percentages, respectively.

Checking for normality was carried out using Shapiro–Wilk test (with p-value > 0.05 indicating a normally distributed continuous variable). Independent sample t-test was used to evaluate the difference in knowledge and perception scores between plagiarists and non-plagiarists. For all statistical analysis, a p-value of less than 0.05 was considered statistically significant and all tests were two-tailed.

Results

Socio-demographic characteristics of the study participants

A total of 103 pharmacy postgraduate students participated in this survey with a mean age of 27.5 ($\pm$4.4) years, where the overwhelming majority of them were females (n=86, 83.5%).

Most of the participants (n=93, 90.3%) were enrolled in Master programs, and 76.7% (n=79) are currently in their 1st—2nd year of their studies and 55.3% (n=57) have started writing their thesis. Students holding Jordanian nationality constituted 72.8% (n=75) of the participants, and those who belong to private universities were predominant (n=56, 54.4%). As shown in Table 1, 49.5% (n=51) of postgraduate students did not even receive any preparatory course/workshop that promotes their awareness about plagiarism.

Postgraduate students' admitting plagiarism

As shown in Fig. 1, the majority of postgraduate students (n=72, 69.9%) reported that they had committed plagiarism during their studies, but this was unintentional according to 76.4% (n=55) of the plagiarists. Most of them (n=54, 75.0%) believed that the extent of this fraud was minor.

Table 2 shows the plagiarism action committed by postgraduate students during their studies. Summarizing text without acknowledgment and presenting or citing the secondary source as a primary source were the most commonly committed actions (28.2% (n=29) and 21.4% (n=22), respectively). Whereas, using a lecture from the internet and putting your name on the lecture without mentioning the original author was the least committed behavior by the students (n=2, 1.9%).

Table 1 Socio-demographic Characteristics of the Study Participants (n = 103)

Variable		Mean ± SD	n (%)
Gender	Female		86 (83.5)
	Male		17 (16.5)
Age	Years	27.5 ± 4.4	
Postgraduate degree	Masters		93 (90.3)
	PhD		10 (9.7)
Academic study year in postgraduate program	1st-2nd year		79 (76.7)
	3rd-5th year		24 (23.3)
Your current university	Public University		47 (45.6)
	Private University		56 (54.4)
Nationality	Jordanian		75 (72.8)
	Others		28 (27.2)
Did you start writing your thesis?	No		46 (44.4)
	Yes		57 (55.3)
Did you take any course/workshop that cover plagiarism?	No		51 (49.5)
	Yes		52 (50.5)

Postgraduate students' awareness and knowledge about plagiarism behavior

Postgraduate students were asked about 12 items that represented plagiarism actions and they were requested to determine if each action is plagiarism or not (Table 3). Less than half of the students (n = 44, 42.7%) were aware that submitting work as an individual work while written as a group is considered plagiarism. Also, around half of the students (n = 51, 49.5%) believed that fabricating references is considered as plagiarism. Overall, the mean knowledge score for students was 8.6 ± 2.6 (out of 12).

Postgraduate students' perception of plagiarism

Regarding students' perceptions towards plagiarism (Table 4), results showed that the majority of students (n = 99, 96.1%) believed that plagiarism is as bad as to steal from someone and 92.2% (n = 95) reported that plagiarism is considered against their ethical values. The overall students'
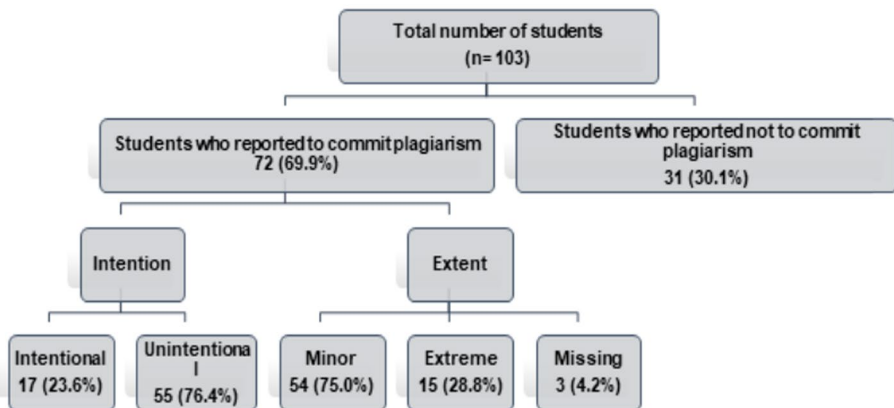

Fig. 1 Postgraduate students' commission of plagiarism actions, (n = 103)

Table 2 Plagiarism Actions Committed by Postgraduate Students during their Studies Ordered by Frequency (n = 103)

Action	Number (%) of Students Who Commit this Action
Summarizing text without acknowledgement	29 (28.2)
Presenting or citing the secondary source as a primary source	22 (21.4)
Copying from friends with their knowledge	21 (20.4)
Written an assignment for friend	17 (16.5)
Fabricating references (invented references or bibliography)	15 (14.6)
Copy work from internet and submit it as your own	11 (10.7)
Copy and paste without quotes and acknowledging the primary source	10 (9.7)
Submitted work as an individual while written as group work	8 (7.8)
Translating a work to another language without citing the original source	6 (6.8)
Copying from friends without their knowledge	5 (4.9)
Submitting work done by a friend	5 (4.9)
Using a lecture from the internet and putting your name on the lecture without mentioning the original author	2 (1.9)

perception score was 71. 8 ± 16.4. On the other hand, few students perceived plagiarism as a necessary practice (n = 18, 17.5%) and to be acceptable in certain situations (n = 27, 26.2%).

Postgraduate students' perceptions towards penalties to be taken for plagiarism

When postgraduate students were asked about their perceived preference for the actions to be taken by their University against postgraduate students who plagiarize, forty-three students (41.7%) believed that punishments should be executed when students committed plagiarism for the first time. The rest of the students preferred that the punishment should be imposed when the mistake is committed for the second time.

Table 3 Postgraduate Students' Awareness and Knowledge about Plagiarism Behavior (n = 103)

Action	Number (%) of Students Who are Aware that this Action is Plagiarism
Summarizing text without acknowledgement	96 (93.2)
Presenting or citing the secondary source as a primary source	55 (53.4)
Copying from friends with their knowledge	75 (72.8)
Written an assignment for friend	88 (85.4)
Fabricating references (invented references or bibliography)	51 (49.5)
Copy work from internet and submit it as your own	75 (72.8)
Copy and paste without quotes and without acknowledging the primary source	47 (45.6)
Submitted work as an individual while written as group work	44 (42.7)
Translating a work to another language without citing the original source	96 (93.2)
Copying from friends without their knowledge	70 (68.0)
Submitting work done by a friend	89 (86.4)
Using a lecture from the internet and putting your name on the lecture without mentioning the original author	96 (93.2)
Knowledge score (out of 12)	8.6 (± 2.6)

Table 4 Postgraduate Students' Perception of Plagiarism (n = 103)

Statements	Strongly Agreed/Agreed n (%)
Plagiarizing is as bad as to steal from someone[*]	99 (96.1)
Sometimes it is necessary to plagiarize	17 (16.5)
A plagiarized paper does no harm to the value of a university degree	8 (7.8)
Sometimes I'm tempted to plagiarize, because everyone else is doing it	18 (17.5)
I keep plagiarizing because I haven't been caught yet	9 (8.7)
Plagiarism can be justified if I currently have more important obligations or tasks to do	12 (11.7)
Plagiarism is acceptable if I have permission from a friend to copy his or her work	27 (26.2)
Plagiarism is against my ethical values[*]	95 (92.2)
Plagiarism is only a big deal if a substantial portion of the paper has been plagiarized	25 (24.3)
I am tempted to plagiarize because, even if caught, the punishment will be light	14 (13.6)
Perception score (out of 100)	71.8 ± 16.4

[*]Reverse statements that describe plagiarism as a good and justified practice

Figure 2 indicates students' perception towards a range of penalties to be imposed in response to plagiarism. The most preferred penalty chosen by the student to be imposed for the first and second occurrence of plagiarism was to ask the student to rewrite and resubmit the work/assignment (47.6% (n = 49), 33.0% (n = 34), respectively).
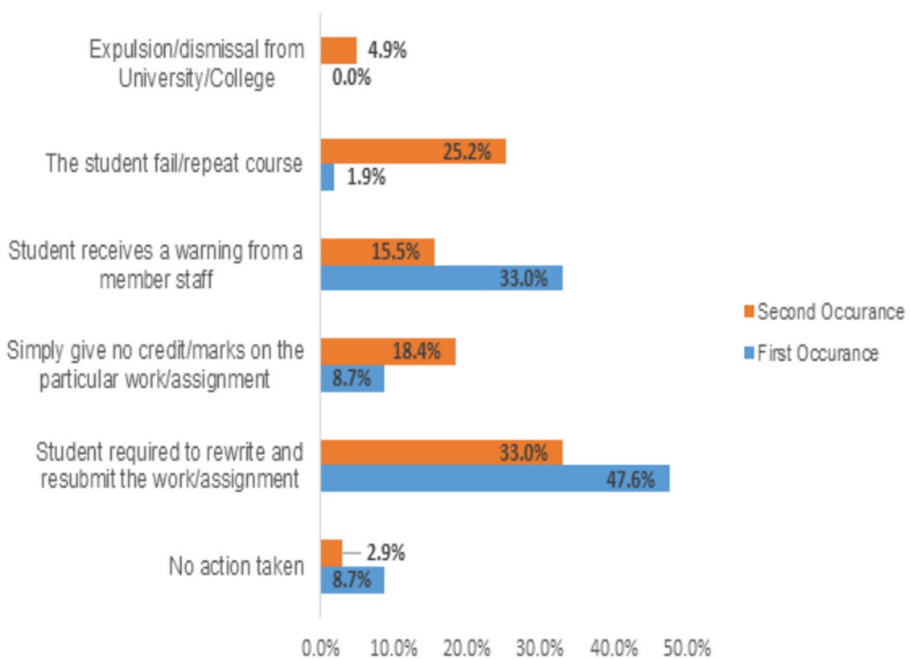

Fig. 2 Postgraduate students' choice of penalties for a first and a second occurrence of plagiarism, (n = 103)

Table 5 Reasons Postgraduate Pharmacy Students' Plagiarize During Their Postgraduate Study (n = 103)

Statements	Strongly Agreed/ Agreed n (%)
Computer technology and Internet	
It is easy for me to copy/paste due to modern technology	73 (70.9)
I do not know how to cite electronic information	27 (26.2)
I can easily translate information from other languages	46 (44.7)
I can easily combine information from multiple sources	71 (68.9)
Regulation	
There is no supervisors control on plagiarism	40 (38.8)
There is no faculty regulation against plagiarism	33 (32.0)
There is no university regulation against plagiarism	30 (29.1)
There are no penalties	32 (31.1)
There are no electronic systems to detect plagiarism	20 (19.4)
Teaching factors	
Poor explanation/bad teaching	40 (38.8)
Plagiarism is not explained	40 (38.8)
Supervisors do not read students' assignments	37 (35.9)
Academic skills	
I do not know how to cite	23 (22.3)
My reading comprehension skills are weak	39 (37.9)
My writing skills are weak	44 (42.7)
I sometimes have difficulty expressing my own ideas	52 (50.5)

Reasons postgraduate pharmacy students' plagiarize during their postgraduate study

The reasons that may lead students to plagiarize were presented in Table 5. Students showed the highest level of agreement to computer technology and Internet causes, where 70.9% (n = 73) believed that modern technology facilitates plagiarism through a simple copy/paste option. Also, 68.9% (n = 71) of the students reported that modern technology makes it easy to combine information from multiple sources. The least possible cause for committing plagiarism as perceived by the students was related to regulations, where 80.6% (n = 83) disagreed that they may plagiarize because there are no electronic systems to detect plagiarism

Association between students' knowledge and perception of plagiarism on their behavior

The influence of students' knowledge and perception on their behavior was compared between plagiarists and non-plagiarists (Fig. 3). There was no significant difference between the two groups in term of their knowledge about plagiarism (p-value = 0.713), while the overall perception scores of the non-plagiarists (78.6 ± 12.8%) were significantly higher than those classified as plagiarists (68.8 ± 17.0%), (p-value = 0.005).
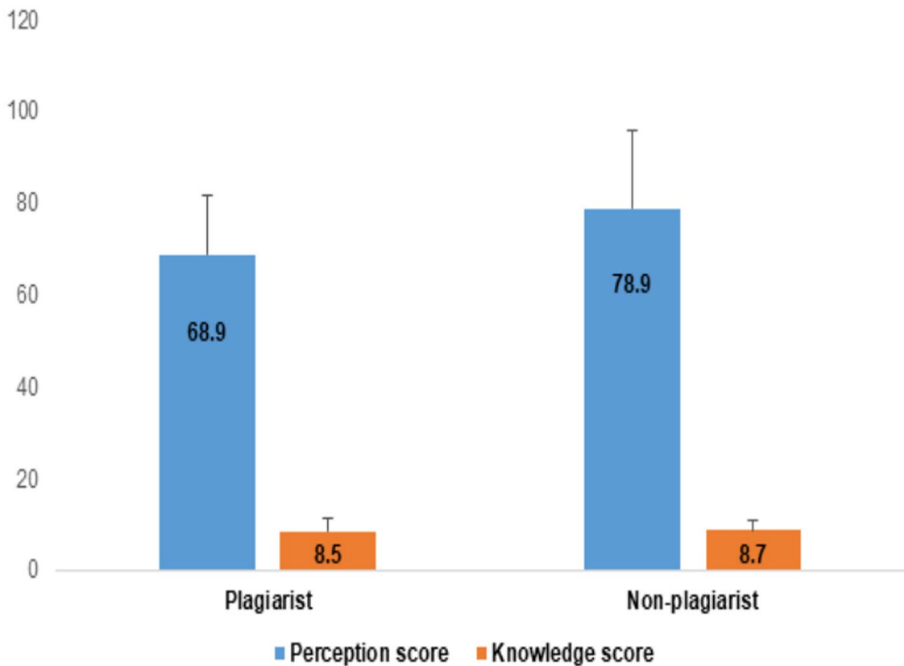
Fig. 3 Association between students' knowledge and perception of plagiarism on their behavior, (n = 103), (p-values = 0.713 for knowledge score and 0.005 for perception score)

Discussion

In this study, we evaluated postgraduate pharmacy students' knowledge, behavior, and perception regarding the concept of plagiarism and we assessed the factors that led them to commit plagiarism. Although about half of the students (50.5%) said that they had received courses or workshops that promote their awareness about plagiarism, the majority of them (69.9%) reported being plagiarists during their studies. Paradoxically, the large majority reported that plagiarism is against their ethical values and it is as bad as stealing despite the majority of the students committed such acts of plagiarism.

The results of this study are not unexpected as several previous studies have indicated a high rate of plagiarism among students globally (Ismail, 2018; Bilic-Zulle et al., 2005). A similarly high rate of plagiarism was reported from a study conducted in Croatia, where 91.0% of medical students were found to commit plagiarism during their studies (Bilic-Zulle et al., 2005). Also, a high prevalence of plagiarism (54.3%) was reported among undergraduate Iraqi medical and nursing students (Ismail, 2018).

Based on the theory of planned behavior, knowledge and perception of individuals are well- established predictors of their intended behavior (Ajzen et al., 2011). In this study, there was no significant association between student's knowledge about plagiarism and their plagiarizing behavior. Inco finding was reported by a study conducted by Leask et al. in 2006, which revealed that the lack of students' understanding and awareness about plagiarism may put students at a higher risk of plagiarizing actions (Leask, 2006). Improving students' knowledge of what constitutes plagiarism may affect

their behavior on committing plagiarism (Selemani et al., 2018). This is considered one of the primary responsibilities of teaching staff and supervisors in universities to raise awareness about the unethical practice of plagiarism.

On the other hand, there was a high agreement amongst students that plagiarism is considered a bad act. These results were contrary to previous results, where students did not view plagiarism as bad behavior, and they considered some of the behaviors related to plagiarism as an accepted behavior (Ryan et al., 2009; Murtaza et al., 2013). Perception is considered a predictor of individuals' intentions to perform different behaviors (Ajzen et al., 2011). Thus, this positive perception is supposed to have a positive impact on students' behavior during their academic work, which was evident in this study. Those students who were found to be non-plagiarists were found to have better perception scores compared to plagiarists, which supports the theory of planned behavior (Ajzen et al., 2011).

It is important to highlight that even though the majority of students agreed that plagiarism is bad, but still some of them commit it, which means that there is a mismatch between their perception and behavior. According to the theory of planned behavior, other factors are known to affect individual intention to perform a behavior, which includes individual perceived behavioral control and subjective norms (Ajzen et al., 2011). Students may believe that plagiarism is bad, but they perceived ease in performing this behavior (perceived behavioral control) or their behavior is affected by the judgment of significant others such as their families, friend or others (subjective norms) (Ajzen et al., 2011). Both factors were not assessed in our study.

Another important factor could be lacking English writing skills. Most of the research is published in English, while our study participants were postgraduate students with Arabic as their mother tongue and English would be a second language, making hard to express their thoughts and finings. Participants could seek similar publications and works where they could copy and edit rather than write from scratch. Plagiarism has been found to be more prevalent among non-native English-speaking individuals (Perkins et al., 2018).

Also, participants reported their practice prior participating in the study, where they were informed about plagiarism and informed of its different practices. It could be that participants were not aware that their practices prior this study counted as plagiarism and only thought they were being influenced by other works. Their participation in the study could have increased their awareness towards such practices making them confess they had undergone them previously.

Regarding the penalties that were chosen by our postgraduate students, it was clear that students sympathize with their colleagues when they commit these violations, and this was evident when they were asked to choose penalties to those who commit plagiarism. In this study, the most popular penalty suggested by students when a student found to be guilty of plagiarism for the first or for the second time was to ask the student to resubmit their work or assignment.

Students were lenient in choosing penalties, and this came in line with a study conducted in Cyprus, where students favored warning and counseling as a penalty for the first occurrence of plagiarism, followed by asking the student to resubmit another form of the assignment undertaken (Kokkinaki et al., 2015). Also, the same penalty was chosen by another cohort of Australian students who believed that asking the student to resubmit the assignment should be the penalty undertaken for the first occurrence of plagiarism while they preferred a referral to the head of the department once plagiarism was committed for the second time (Ryan et al., 2009).

In Jordan, the penalties of plagiarism issued by the largest university in Jordan and adopted by most of the universities stated that if the student plagiarizes in his/her thesis preparation, the examination committee has the right to prevent them from presenting the thesis for examination (UoJ, 2012). The regulation covers the cases where students plagiarize in their thesis writing, but no other regulation was found to cover other types of plagiarism. On the other hand, plagiarism is one of the most important ethical standards that students are alerted through the code of ethical conduct issued by the University of Jordan (UoJ, 2017).

One of the best ways to protect the academic community from such unethical acts is through prevention, and this can be achieved by educating the academic community, students and supervisors of such unethical practices in scientific research. Another way of prevention is through imposing harsh penalties that may prevent students from committing or re-committing such acts. To ensure this, decision-makers must provide clear and formal policies to raise awareness about this practice and how to handle penalties for those who intentionally commit such behaviors.

Looking at the reasons why students plagiarise, computer technology and Internet causes were found to be the most common causes agreed by the students. These findings were not surprising, as technological development and Internet availability made it easier for students to access scientific papers and to copy and paste while writing a research article, thesis or assignments. However, this does not justify this action. Previous studies have regarded the Internet among the main causative factors to commit plagiarism (Kokkinaki et al., 2015; Jereb et al., 2018; Selemani et al., 2018). On the other hand, students reported regulations related factors as the least important causes for committing plagiarism. Students disagreed that they may plagiarize because there are no regulations or electronic systems to detect plagiarism since many universities nowadays have electronic systems to detect plagiarism.

Finally, the main limitation of this study was the reliance on the self-administered questionnaire, which may underestimate the actual rate of plagiarism among postgraduate pharmacy students. However, given the high percentage of reported plagiarism, we don't believe this limitation undermined the findings and conclusions from this study. We also limited our sample to pharmacy students because the authors have access to the social media platforms that such students interact with and it also focused the results on a specific discipline to limit heterogeneity among student training and ethical codes.

Conclusion

In this study, we found a high rate of plagiarism among postgraduate pharmacy students. However, most of the students committed this behavior unintentionally. On the other hand, the majority of them agreed that plagiarism is a bad act and is not acceptable to the academic and scientific community. Interestingly, in this study, we found an inverse relationship between students' perception and their plagiarizing behaviors, where students who were found to be non-plagiarists showed a better perception score compared to those who were plagiarists.

Technological development and Internet availability were found to be the most popular cause why do students commit plagiarism, since it made it easier to copy and paste while writing a research article. Finally, students were lenient regarding the penalties chosen

to punish those who found plagiarists, where they favored re-writing and submitting the undertaken assignment as the main penalty for them.

To prevent plagiarism, academics must establish formal policies to raise students' awareness about plagiarism and to implement penalties for those who commit such behavior intentionally.

Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

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