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# Understanding of International Committee of Medical Journal Editors Authorship Criteria Among Faculty Members of Pharmacy and Other Health Sciences in Jordan

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#### **Abstract**

Authorship represents a critical element of scientific research. This study evaluated the perceptions, attitudes, and practices of Jordanian researchers toward the International Committee of Medical Journal Editors (ICMJE) authorship criteria. An anonymous questionnaire was distributed to health sciences faculty (n = 986), with 272 participants completing the questionnaire. Only 27.2% reported awareness of ICMJE guidelines, yet, 76.8% agreed that all ICMJE criteria must be met for authorship, and 55.9% believed that it is easy to apply the guidelines. Unethical authorship practices were reported by 16.5% to 31.3% of participants. A majority (73%) agreed that violation of authorship criteria is scientific misconduct. Well- defined criteria for authorship need to be disseminated and emphasized in less developed countries through training to avoid authorship disputes and unethical conduct.

#### **Keywords**

research ethics; authorship; ICMJE criteria; health sciences; Jordan

#### Introduction

Scientific authorship presents an important ethical challenge for researchers. Authorship gives credit to people who have contributed to the scientific research efforts, reflects the responsibility and accountability of the published work, and dictates promotion and credit to authors (Wager, 2009). Multidisciplinary research teams are becoming increasingly common, with multiple persons being assigned as authors to the same research article (Lissoni & Montobbio, 2015). Issues and conflicts concerning appropriate authorship are prevalent and generate significant debate (Kornhaber, McLean, & Baber, 2015). This is

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**Declaration of Conflicting Interests** 

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Both authors contributed substantially to the conception of study design, drafting, and revising the article for important intellectual content. Authors approve the final draft and agree to be accountable for all aspects of the work.

attributed in part to the proliferation of research collaborations, as well as the lack of implementation of standards and consensus on who qualifies as an author, especially the lack of such criteria at the institutional level (Smith & Williams-Jones, 2012; Teixeirada, Silva, & Dobranszki, 2016).

Inappropriate authorship practices include, but are not limited to, honorary (guest/gift) authors, ghost authors, and problems in the order of listing authors (Hamilton et al., 2016; Hicks & Harris, 2016). Honorary authors are those individuals who are included in the author list despite limited or negligible contribution to the manuscript (Teixeirada et al., 2016). On the contrary, ghost authorship refers to excluding persons who have contributed substantially to the research, and, for example, those who are usually paid to write a manuscript for a fee, especially in industry (Lissoni & Montobbio, 2015). A survey of six major high impact journals showed that honorary authors were more common than ghost authors (17.6% vs. 7.9%; Wislar, Flanagin, Fontanarosa, & Deangelis, 2011). To minimize such ethical dilemmas, multiple criteria have been developed that assist with the authorship process such as those of the European Medical Writers Association (EMWA; Jacobs & Wager, 2005), Committee on Publication Ethics (COPE; 2011), and the more widely known International Committee of Medical Journal Editors (ICMJE; 2016) document on Uniform Requirements. The ICMJE (2016) guidelines, which have been adopted by hundreds of health sciences journals, provide advice on how to select eligible authors and clarify criteria for authorship. ICMJE recommends four conditions that must be met to merit authorship that reflects substantial intellectual contribution, responsibility, and accountability for all aspects of the work (ICMJE, 2016). However, not all researchers are familiar with, nor accept, these criteria and do not routinely apply them in their authorship practice (Dhaliwal, Singh, & Bhatia, 2006).

Nonadherence and breach of authorship criteria may create multiple ethical issues and problems (Teixeirada et al., 2016). The frequency of authorship malpractice has been documented in multiple investigations. For instance, a survey conducted in Pakistan that included 208 faculty members, of whom 96% had one to five published articles, demonstrated that only 51% of researchers were aware of the existence of ICMJE criteria (Jawaid & Jawaid, 2013). Furthermore, 43% of participants reported that they were deprived of being authors even though their contributions warranted it. Gift authorship was reported in about 30% of the sample. Another study showed that most Norwegian researchers were knowledgeable about the ICMJE criteria, but found it hard to put them into practice even though they supported such criteria (Nylenna, Fagerbakk, & Kierulf, 2014). This study also revealed that experience with authorship disputes and issues was proportional to the number of articles a researcher published (Nylenna et al., 2014). There are also reports of authors being pressured regarding listing the order of authors not based on merit and in breach of authorship criteria (Hofmann, Helgesson, Juth, & Holm, 2015). A recent review explored issues of appropriate authorship in 20 research articles and revealed that the ICMJE criteria were not widely implemented by different health sciences journals (Kornhaber et al., 2015), raising the concern of validity of authorship in the published literature. Clearly, there are variations among researchers with respect to perception and practice of authorship guidelines. To our knowledge, there is no data about perceptions and adherence to ICMJE criteria in the Middle East region; thus, the goal of this study was to comprehensively

evaluate the current knowledge, views, and experience of Jordanian academics in pharmacy and health sciences toward ICMJE authorship criteria.

#### Method

This study was an anonymous cross-sectional survey conducted among faculty members at various health sciences schools in 13 public and private Jordanian universities. All faculty members at schools of pharmacy, medicine, nursing, dentistry, and applied medical sciences, and who have an email address listed on the school website were eligible and invited to participate during the period June 10 and August 15, 2017. After receiving the approval of the Research Ethics Committee at Jordan University of Science and Technology, an email was sent to each faculty member with an invitation to answer a web-based questionnaire regarding authorship. Researchers were contacted over phone or visited by a research assistant to remind them of the survey. A printed copy was distributed to faculty who were not able to complete the web-based version. The survey started with a brief description of the major objectives of the study and a statement of agreement to participate. We considered completing the online or the printed version of the survey as consent to participate in the study.

In addition to participants' demographic and professional characteristics, survey questions covered three major areas regarding authorship guidelines, which included (A) perception and views of contributions to authorship and author order, (B) inappropriate practice and experiences with authorship, and (C) knowledge and attitudes with regard to ICMJE criteria. In part C, participants were asked to indicate their level of agreement with the recently published four criteria (statements) of (ICMJE 2016). These four requirements are (1) substantial contribution to design and data analysis and interpretation, (2) drafting the manuscript or revising it critically for important intellectual content, (3) final approval of the manuscript version to be submitted for publication, and (4) author agreement to be accountable for all aspects of the work conducted. The structured questionnaire statements were generated from surveys of previous studies (Dhaliwal et al., 2006; Jawaid & Jawaid, 2013; Nylenna et al., 2014), from ICMJE (2016), and other published authorship criteria such as EMWA guidelines (Jacobs & Wager, 2005). Statements were in the form of either dichotomous (Yes, No, or uncertain) or as Likert-type scale (strongly agree, agree, neutral, disagree, strongly disagree, or don't know) as appropriate. The survey was reviewed by expert researchers and piloted and tested among a group of faculty for understandability and clarity of the questions.

Descriptive statistics were used to summarize relevant data. The results concerning knowledge, views, perception, and practice were primarily expressed as percentages of responders who agreed/disagreed with each statement. SPSS Statistics package 23 (IBM Inc.) was used for data analyses.

#### Results

A total of 986 faculty members (775 and 211 from public and private universities, respectively) were invited to participate in the survey. Of these, 272 (56.3% males and

43.8% females) completed the questionnaire with a response rate of 27.6%. The majority were between 30 and 45 years old (59.9%), married (85.3%), and from public universities (78.3%). A majority (114 [41.9%]) of participants were from a school of pharmacy, and 155 (57%) ranked as assistant professors. Only 24 (8.8%) participants were from a school of dentistry. Most participants (201 [73.9%]) had more than 5 years of research experience, had published at least six scientific articles (177 [65.1%]), and had six or more articles as first author (125 [46%]). The demographic and professional characteristics of the participants are detailed in Table 1.

Regarding general perceptions and views of authorship, the following criteria showed the highest agreement among faculty in support of individual contributions that merit authorship: (a) generating the research idea (73.2% of agreement including agree and strongly agree), (b) designing the study (82.3%), (c) conducting the literature review (68.8%), (d) obtaining the grant or funding (62.5%), (e) analyzing or interpreting the data (73.2%), (f) conducting experiments (72.5%), (g) drafting and revising the manuscript (74.6%), or (h) supervising the research team (61.8%). The percentage of agreement for strongly agree or agree with any single criterion ranged from 11.8% to 82.3%. On the contrary, the following criteria showed the highest support among faculty as factors not meriting authorship: (a) being a head of department or head of a faculty (72.8% of disagreement including strongly disagree and disagree), (b) being a colleague (69.5%), or (c) personal relationships (63.6%). The percentage of disagreement for strongly disagree or disagree for any single criterion ranged from 9.9% to 72.8%. The responses of other individual contributions such as collecting or entering data, providing technical or writing assistance, or access to research facilities were distributed between agreement, disagreement, and neutral responses. More details regarding participants' response to these criteria are presented in Table 2.

For authorship order, 216 (79.4%) of respondents felt that this should be based on their respective contributions that is usually decided among authors. Also, 197 (72.5%) believed that the person with the highest contribution should be listed as the first author. Other authorship views are shown in Figure 1.

Regarding the question about authorship practice and experiences that respondents experienced, ghost, gift or guest author, the incorrect placing of authors, and disagreement on authorship were reported by a quarter to a third of participants, with the most commonly reported experience being that they were forced to add an underserving author (30.5%; Figure 2). None of these authorship problems or disputes were dependent on the number of published articles by respondents (data not shown).

Finally, we asked specific questions about ICMJE authorship criteria. Only 74 (27.2%) of respondents were aware of and had knowledge about the presence of these guidelines. Of those 74, 35 (47.4%) knew that there were four ICMJE criteria. Regarding what they thought of the ICMJE criteria, levels of agreement were highest for Statement 1 (89%), which states that "the substantial contribution to design and data analysis and interpretation is required for authorship," followed by Statement 2 (85%), "drafting the manuscript or revising it critically for important intellectual content is required for authorship," and lower for

Statement 3 (72.1%), which states that "the final approval of the manuscript version to be submitted for publication is required for authorship." Surprisingly, 209 participants (76.8%) agreed that all four criteria must be met to justify authorship. However, only 152 (55.9%) believed that it is easy to practice and apply these criteria (Figure 3). In fact, 61 (22.4%) of respondents admitted that they have been authors in publications that do not meet the four criteria. Despite limited knowledge of the criteria, a majority (199 [73.2%]) regarded the breach of authorship guidelines as scientific misconduct (Figure 1).

#### **Discussion**

This survey was intended to evaluate knowledge, views, and practices regarding authorship criteria among professionals and researchers in university health sciences departments in Jordan. To the best of our knowledge, this is the first study on authorship criteria knowledge and attitudes conducted in an Arab country or the Middle East and North African region. Overall, the results were discouraging because they suggest that the level of knowledge of faculty members about ICMJE authorship criteria is poor. However, when the ICMJE criteria were read to participants, the level of agreement with the criteria was high, although only approximately half thought that it would be easy to put them into practice. Furthermore, inappropriate authorship practices were relatively common among researchers participating in our study. The results therefore inform important new directions and training in research ethics in this region.

Authorship is a critical issue in scientific research (Marusic, Bosnjak, & Jeroncic, 2011). Standard recommendations and approaches are available to guide authorship practices. However, researchers may have different perceptions and views that might not match these criteria, and controversies frequently arise. In our sample, a high proportion of researchers believed that individual contributions related to the generation of the research idea, the design of the study, or the execution of experiments were enough to guarantee authorship. This, in part, concurs with surveys conducted in Pakistan (Jawaid & Jawaid, 2013) and India (Dhaliwal et al., 2006) and showed that conceiving the research idea, designing the study, drafting/revising the manuscript, and data collection or analysis are contributions that merit authorship. This is in general agreement with the ICMJE guidelines if they are all done together rather than individually. According to the ICMJE, none of these contributions alone qualify a person for authorship unless the four previously mentioned criteria are fulfilled. Yet many respondents still applied these individual criteria in practice. We also observed a variable response toward the statement that the last author should normally be the principal investigator, with only 42% of respondents in agreement. This might be related to the common practice in Jordan where the principal investigator, who supervised and initiated the study and led the study team, is usually the first author, which in most cases, denies first authorship to junior researchers.

Only 27% of survey respondents had knowledge of the existence of ICMJE guidelines, and only approximately half of those who were aware of these guidelines knew that there are four authorship criteria. This low level of awareness and lack of familiarity with the guidelines make authorship fulfillment difficult and challenging to standardize at the international level. The proportion of participants who were aware of the presence of

authorship criteria is comparable with studies conducted on Pakistani (23.9%; Jawaid & Jawaid, 2013) and Indian (44%; Dhaliwal et al., 2006) researchers but is much lower than findings from a study conducted on Norwegian researchers (97%; Nylenna et al., 2014), which had a larger sample size (n = 654) and included faculty, researchers, and doctoral students (Nylenna et al., 2014). This indicates the difference in knowledge of formal authorship criteria among researchers in different regions and in more developed countries such as Norway. When participants in the current study were asked about the detailed criteria of the ICMJE, a high proportion supported and showed agreement with them. These percentages were comparable to those reported by Nylenna et al. (2014). However, an earlier study by Pignatelli, Maisonneuve, and Chapuis (2005) showed that French investigators did not agree with the obligation to meet all the criteria to justify and questioned its applicability. Our study found that although the majority of participating Jordanian researchers supported the ethical standards of authorship, almost a quarter did not believe that the ICMJE criteria were acceptable to authors. In fact, about half thought that criteria were difficult to apply in practice. Similarly, it has been shown that 61% of authors did not meet all ICMJE criteria in 186 manuscripts submitted to *Biochemia Medica* (Hwang et al., 2003) nor did 32% of authors in 1,068 articles published in Radiology journals (Hwang et al., 2003; Supak-Smolcic et al., 2015). The perceived difficulty in applying the criteria may be explained in part by researchers' beliefs that these authorship criteria are too restrictive, rigid, and hard to follow (Pignatelli et al., 2005).

Our study found that inappropriate authorship practices were not uncommon among sample of Jordanian researchers. About one third of respondents reported that they had disagreements regarding authorship, 22.4% believed that they had been excluded from a deserved authorship, and 16.5% reported having granted gift/guest authorship. The percentage of participants who had disagreements about authorship was similar to that reported by Nigerian researchers (31% vs. 36%; Okonta & Rossouw, 2013). We were surprised to find that the number of these malpractices was not related to the number of articles that study participants had published. In Jordan and elsewhere in the region, the driving forces for these ethical issues may be related to the pressure on faculty to publish to maintain their academic position, keeping good relationships with fellow academics, as well as the need for promotion, recognition, research rewards, and incentives. At higher ranking public research universities and most private universities, publications are for promotion and to receive salary increases. In Pakistan, ghost, guest/gift authorship, and incorrect author order were prevalent in 42.7%, 28.9%, and 23.9% of respondents to the Jawaid survey (Jawaid & Jawaid, 2013). Authorship issues, conflicts, and disputes were also common among academics and researchers from France (Pignatelli et al., 2005), New Zealand (Mitcheson, Collings, & Siebers, 2011), India (Dhaliwal et al., 2006), Bangladesh (Ahmed, Hadi, & Choudhury, 2010), and British medical faculty (Bhopal et al., 1997). A recent review by Kornhaber and colleagues (2015) suggested that the ICMJE criteria are not consistently implemented in the current authorship practice of multiple biomedical journals, and authorship issues are clearly apparent. This prevalent and unfair authorship practice, even in more developed countries, is of great concern and needs critical management as it affects research integrity and might need a revisiting of these criteria or their

implementation. Interestingly, 73% of our participants believed that these deviations from the criteria are examples of scientific misconduct.

Discussion about ethical authorship practices is ongoing (Marusic et al., 2011; Smith & Master, 2017). Our research highlights the inconsistency in the opinions of researchers about authorship and ICMJE guidelines. As authorship represents a central aspect of research integrity, controversies have to be mitigated and consensus has to be reached about a formal guideline that helps with authorship. Many have suggested that local guidelines should be developed to reflect regional practices, and that the criteria have to be prepared not only by journal editors but also by authors, professionals, and representatives of biomedical journals and public research institutes (Bhopal et al., 1997; Pignatelli et al., 2005). It is worth mentioning that ICMJE does not provide a recommendation about author order. Recently, Smith and Master (2017) have suggested a new procedure that incorporates authorship and contributorship, with the latter being a system where authors report their specific and detailed contributions as a way to enhance accountability and transparency of research (Allen, Scott, Brand, Hlava, & Altman, 2014). This "best practice" approach comprises five steps as follows: (a) outline roles and responsibilities, (b) determine authorship order based on the initial contribution, (c) continuous dialogue and discussion on the order throughout the research, (d) final decision on contributor- ship and authorship order, and (e) draft a declaration on the order (Smith and Master, 2017). This dynamic protocol seems to be a reasonable starting point to engage researchers in resolving authorship disputes and issues and to facilitate consensus on authorship order.

#### Limitations

Our study has limitations. A large proportion of participants were assistant professors (57%) who had less than five first author articles to their credit (54%). This may partially explain the low awareness of authorship criteria because junior researchers may not have yet been exposed to complicated authorship issues. To improve response rate, we used an anonymous survey. However, the response rate was still quite low (27.6%), although similar to previous online surveys (Mitcheson et al., 2011; Nylenna et al., 2014; Tse-Hua Shih & Fan, 2008). Nevertheless, the sample was largely representative, as it included faculty from diverse disciplines and academic ranks, and who had published a wide variety of research articles. Note that there was an overrepresentation of pharmacy faculty probably because the first author belongs to this discipline.

## Conclusion

Awareness of the existence of authorship criteria was low among Jordanian health sciences faculty, but this seems to be a worldwide problem reported even in more developed countries. A large proportion of participants agreed with structural authorship criteria and believed that their breach was an unethical practice. However, inappropriate authorship practices were common among respondents and half considered it difficult to adhere to the guidelines. Well- defined criteria that are widely accepted and universally applied need to be generated to avoid authorship issues. Part of the effort of the Fogarty International Center Training Programs in Responsible Conduct of Research, supported by the U.S. National

Institutes of Health, is to develop local capacity building in this field that could be one way to address ethical values and develop relevant ethical guidelines for Jordanian researchers that would be implemented and followed to resemble international criteria.

#### **Best Practices**

This survey may have implications for enhancing and promoting researchers' awareness and understanding of authorship guidelines. We therefore recommend that researchers and academics become better exposed to the authorship process starting in graduate school, and also that generaliz- able, transparent, and clearly communicated guidance that is uniformly applied be a requirement. Specifying the contribution of each person in the initial phase of the research, having authorship agreement with continuous dialogue, and having effective and open communication throughout all phases of the study are very helpful tips to overcome any conflict of authorship.

#### Research Agenda

Although this study adds to the current knowledge of scientific authorship, more research is needed to further enhance our understanding of authorship and its ethical issues. Our results provide descriptive data about what Jordanian researchers believe, know, and practice regarding authorship. Thus, more quantitative information about researchers' attitudes and practice is warranted. For instance, a quantitative measure of the number of Arab researchers who fulfill the ICMJE criteria for biomedical journals can be investigated. The elucidation of factors that drive unethical authorship practices among researchers is essential, before action can be taken to minimize them. Jordan is a good candidate country to start with to achieve these objectives and to improve the responsible conduct of research with regard to authorship. To confidently compare knowledge and attitudes among researchers at different institutions and to extend the current results, uniform international questionnaires about authorship need to be developed and validated.

#### **Educational Implications**

The results of our study reveal that Jordanian academics had relatively poor knowledge of authorship criteria, and that authorship malpractice is relatively common. This indicates an urgent need to change the attitudes and practices of authorship among researchers in this country. Regular educational and training workshops on authorship can be arranged through the university's office of research integrity. Research integrity training may help clarify and protect the rights of researchers and would facilitate the development of multidisciplinary research teams and partnerships that apply to international authorship criteria. Training should start at graduate level and be further solidified for faculty members. Integrating research ethics into academic curricula would ensure that researchers learn the foundations before they are engaged in research. Institutional policies toward authorship must be clarified and effectively communicated among researchers. It is also important that researchers realize that trust and honesty in scientific research are essential and fundamental in developing a successful academic career.

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# **Biography**

**Osama Y. Alshogran** is an assistant professor of clinical pharmacy at Jordan University of Science and Technology (JUST) and just completed a fellowship in responsible conduct of research through the University of California, San Diego (UCSD) in collaboration with JUST. He has conducted this research as part of his fellowship program.

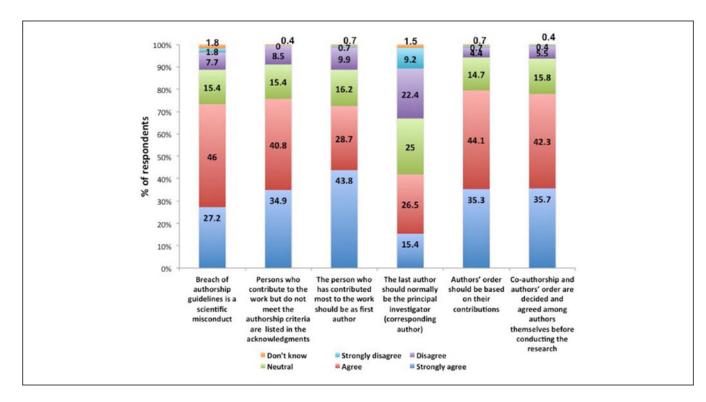
**Wael K. Al-Delaimy** is a professor of epidemiology and global health at UCSD. He teaches and conducts research in ethics, bioethics, and scientific misconduct. He is the principal investigator and director of the research ethics program in Jordan.

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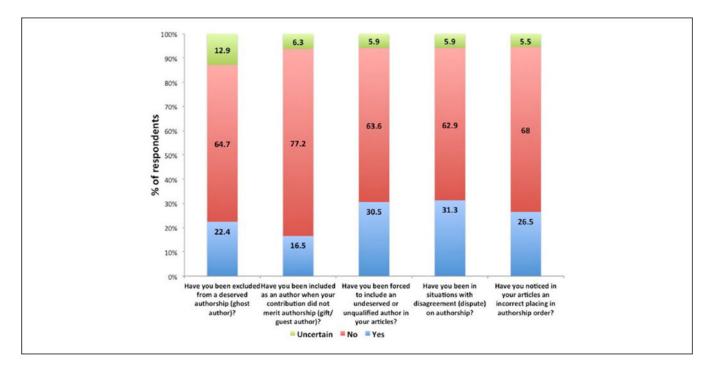
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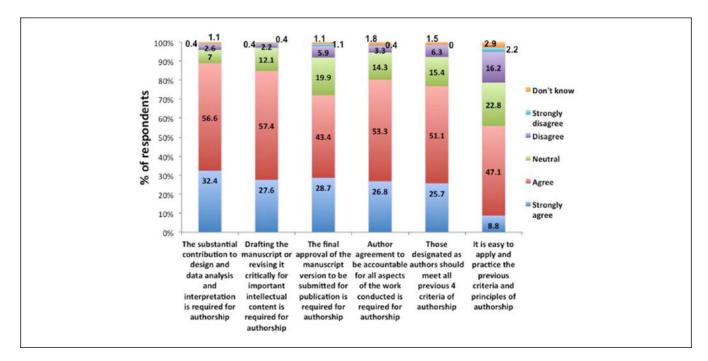
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**Figure 1.** Perceptions and views about authorship process (data are shown as %).



**Figure 2.** Practices and experiences with authorship issues and problems (data are shown as %).



**Figure 3.** Attitudes about ICMJE criteria (data are shown as %). *Note.* ICMJE = International Committee of Medical Journal Editors.

**Table 1.**Demographics and Professional Characteristics of Respondents.

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Character	<i>n</i> (total = 272)	%
Age (years)		
<30	5	1.8
30–45	163	59.9
45–60	79	29
>60	25	9.2
Gender		
Male	153	56.3
Female	119	43.8
Marital status		
Single	28	10.3
Married	232	85.3
Divorced	8	2.9
Widowed	4	1.5
Academic institution		
Public	213	78.3
Private	59	21.7
Faculty		
Pharmacy	114	41.9
Medicine	51	18.8
Dentistry	24	8.8
Nursing	48	17.6
Applied Medical Sciences	35	12.9
Academic rank		
Assistant professor	155	57
Associate professor	71	26.1
Professor	46	16.9
No. of years in current position		
1 to 3	107	39.3
3 to 7	95	34.9
>7	70	25.7
No. of years as a faculty member		
1 to 5	112	41.2
5 to 10	59	21.7
>10	101	37.1
Length of research experience		
<5	71	26.1
5 to 10	98	36
>10	103	37.9
No. of published articles		

Character	n  (total = 272)	%
Zero	4	1.5
1 to 5	91	33.5
6 to 20	94	34.6
>20	83	30.5
Articles as first author		
Zero	19	7
1 to 5	128	47.1
6 to 20	102	37.5
>20	23	8.5
Articles as coauthor		
Zero	20	7.4
1 to 5	111	40.8
6 to 20	107	39.3
>20	34	12.5

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Table 2.

Perceptions and Views About Individual Contributions That Merit Authorship

Designing and generating the research idea         91 (33.5)         108 (35)           Designing the study         101 (37.1)         123 (45)           Conducting the literature review         56 (20.6)         131 (48)           Obtaining the grant or funding         62 (22.8)         108 (35)           Collecting data (e.g., through questionnaires)         38 (14)         89 (32)           Entering data (e.g., to Microsoft Excel)         27 (9.9)         57 (2           Analyzing and interpreting data         85 (31.3)         114 (41)           Providing technical help         37 (13.6)         81 (29)           Conducting experiments         88 (32.4)         109 (46)           Drafting and revising the manuscript         90 (33.1)         113 (41)           Providing proofreading and writing assistance         44 (16.2)         82 (30)           General supervision (being a head) of the research         59 (21.7)         109 (46)	(a) 108 (39.7) (b) 123 (45.2) (c) 131 (48.2) (d) 108 (39.7) (e) 89 (32.7) (e) 57 (21) (f) 114 (41.9) (g) 81 (29.8) (h) 109 (40.1)	31 (11.4) 21 (7.7) 42 (15.4) 55 (20.2) 67 (24.6) 74 (27.2) 37 (13.6) 65 (23.9)	35 (12.9) 22 (8.1) 38 (14) 34 (12.5) 64 (23.5) 91 (33.5) 74 (27.2)	7 (2.6) 5 (1.8) 5 (1.8) 10 (3.7) 14 (5.1) 23 (8.5)	3 (1.1)
101 (37.1) 7 56 (20.6) 62 (22.8) 62 (22.8) 83 (14) 72 (9.9) 85 (31.3) 37 (13.6) 88 (32.4) 6 (22.8) 88 (32.4) 6 (33.1) 6 (33.1) 6 (33.1) 6 (33.1) 7 (16.2) 8 (30.4) 8 (30.4) 9 (30.1) 9 (30.1)		21 (7.7) 42 (15.4) 55 (20.2) 67 (24.6) 74 (27.2) 37 (13.6) 66 (23.9)	22 (8.1) 38 (14) 34 (12.5) 64 (23.5) 91 (33.5) 29 (10.7) 74 (27.2)	5 (1.8) 5 (1.8) 10 (3.7) 14 (5.1) 23 (8.5)	3 (1.1)
restionnaires) 56 (20.6) 62 (22.8) 38 (14) 27 (9.9) 85 (31.3) 37 (13.6) 88 (32.4) cript 90 (33.1) ting assistance 44 (16.2) ad) of the research 59 (21.7)		42 (15.4) 55 (20.2) 67 (24.6) 74 (27.2) 37 (13.6) 65 (23.9)	38 (14) 34 (12.5) 64 (23.5) 91 (33.5) 29 (10.7)	5 (1.8) 10 (3.7) 14 (5.1) 23 (8.5)	3 (1.1)
estionnaires) 8 (12.8) (Excel) 27 (9.9) (St. 31.3) (St.		55 (20.2) 67 (24.6) 74 (27.2) 37 (13.6) 65 (23.9)	34 (12.5) 64 (23.5) 91 (33.5) 29 (10.7) 74 (27.2)	10 (3.7) 14 (5.1) 23 (8.5)	3 (1.1) 0 0 0
Excel) 38 (14) 27 (9.9) 85 (31.3) 37 (13.6) 88 (32.4) cript 90 (33.1) ing assistance 44 (16.2) ad) of the research 59 (21.7)		67 (24.6) 74 (27.2) 37 (13.6) 65 (23.9)	64 (23.5) 91 (33.5) 29 (10.7) 74 (27.2)	14 (5.1) 23 (8.5)	0 0 0
Excel) 27 (9.9) 85 (31.3) 37 (13.6) 88 (32.4) cript 90 (33.1) ting assistance 44 (16.2) ad) of the research 59 (21.7)		74 (27.2) 37 (13.6) 65 (23.9)	91 (33.5) 29 (10.7) 74 (27.2)	23 (8.5)	0 0
85 (31.3) 37 (13.6) 88 (32.4) 88 (32.4) ing assistance 44 (16.2) ad) of the research 59 (21.7)		37 (13.6) 65 (23.9)	29 (10.7)		0 0
37 (13.6) 88 (32.4) and writing assistance 44 (16.2) ong a head) of the research 59 (21.7) ork		65 (23.9)	74 (27.2)	7 (2.6)	4
88 (32.4) 90 (33.1) 44 (16.2) 59 (21.7)		(7.47)		14 (5.1)	I (0.4)
90 (33.1) 44 (16.2) 59 (21.7)		(11) 01	29 (10.7)	4 (1.5)	2 (0.7)
44 (16.2) 59 (21.7)	113 (41.5)	37 (13.6)	24 (8.8)	7 (2.6)	1 (0.4)
59 (21.7)	2) 82 (30.1)	63 (23.2)	65 (23.9)	16 (5.9)	2 (0.7)
team conducting the work	7) 109 (40.1)	54 (19.9)	39 (14.3)	11 (4)	0
Being a head of department/faculty 7 (2.6) 25 (9.	25 (9.2)	39 (14.3)	99 (36.4)	99 (36.4)	3 (1.1)
Being a colleague on the same department/faculty 12 (4.4) 35 (12	35 (12.9)	34 (12.5)	88 (32.4)	101 (37.1)	2 (0.7)
Providing access to research subjects (such as 22 (8.1) 65 (23	) 65 (23.9)	76 (27.9)	71 (26.1)	34 (12.5)	4 (1.5)
patients) or research resources and facilities					
Personal relationships 18 (6.6) 45 (16	) 45 (16.5)	35 (12.9)	73 (26.8)	100 (36.8)	1 (0.4)

Note. Data are presented as n (%).