

Probability of Publication Bias in Published Articles Resulting from Dental Dissertations of Medical Sciences Universities in Iran

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Abstract

Objective: To evaluate the association of publication bias with obtaining positive or negative results in the Doctoral thesis of Iranian dental schools. **Material and Methods:** In this cross-sectional study firstly we collected all the abstracts of Doctoral and post-doctoral thesis belonging to electronic archives of five Iranian dental schools there after the analytic abstracts were included and in the second phase, we try to search resulting articles with searching in Google Scholar. Data were analyzed using descriptive statistics and a Chi-squared test, Pearson's correlation coefficient, Fisher's exact test, and Logistic Regression. **Results:** Out of 483 reviewed thesis abstracts 269 cases were included (55.7%) 153 of which were accessible as papers (56.9%). In 67.7% of the reviewed thesis, positive results were obtained. There were significant relationships between publishing and publishing in international journals with two variables: Study type and field ($p < 0.05$). In vitro studies, clinical trials and studies in the field of oral diseases and periodontics had a higher rate of publication in the form of articles. Retrospective studies and those in the fields of endodontics and oral pathology had a higher rate of publication in journals with international indexes. Using regression logistic model showed that the probability of publishing positive data was greater (18-31%) than negative data. It was shown that the specialty field affected the relationship between the chance of publication of the article and the positive/negative results ($p = 0.008$), increasing the chance of publication to 31%. **Conclusion:** There was publication bias in reviewed dental articles.

Keywords: Dentistry; Dental Research; Publication Formats; Academic Dissertation.

Introduction

Testing the hypothesis and refuting the null hypothesis, in particular, are considered the principal factors for assessing the significance of the differences between statistical groups in research studies. Articles whose data refute the null hypothesis are considered articles with positive results and those whose data do not refute the null hypothesis are considered articles with negative results [1].

Publication bias (PB) is a known phenomenon in clinical tests and refers to the fact that research studies with positive results have a greater chance for publication, are published faster and are published in journals with higher impact factors [2]. The results of evaluations to date have shown that the majority of the main results in dental journals (82%) have been positive [3].

Publication bias has the potential for decreasing the quality and safety of the health-related outcomes of research studies. In this context, researchers believe that interventions will finally benefit the community, while the unpublished studies have in fact wasted the huge human resources used; more importantly, some assessments are repeated many times so that they will accidentally yield positive results to be published [1,4].

Therefore, due to PB, data that potentially can be very valuable become unavailable for the health authorities. PB might prompt physicians to make inappropriate decisions for the administration of medications, which might exert negative effects on patients. The deliberate lower rate of reporting negative results leads to bias in meta-analyses and finally leads to providing the wrong information for other researchers, clinicians, and health field policy-makers. The unpublished results of research studies finally become unavailable for the main users of these results, i.e. active academic community [5,6].

There are limited studies on PB in the dental literature all over the world, including Iran [7-13]. Therefore, since the main source of the dental articles published in Iran are dissertations for a degree in general dentistry and the specialty postgraduate courses in dental faculties all over the country, the present study was undertaken to evaluate the rate of publication of articles derived from these dissertations for the first time by considering their positive or negative results.

Material and Methods

Study Design

In the present cross-sectional study, first all the abstracts of dissertations for a degree in general dentistry and for different especially degrees in 2013 were collected with the use of Azarakhsh software program (Pars Azarakhsh Co., Iran). This software program can establish a link to library websites of universities in Iran that collect and register the abstracts of dissertations in the Word format. The software program was used to gain access to the abstracts of dissertations of undergraduate and postgraduate courses in 5 most valid dental faculties all over Iran.

Data Collection

At first the titles of the dissertations were reviewed and dissertations with “analysis” and “evaluation of relationship” in their titles were included in the study; in other words, descriptive dissertations (prevalence, review studies and those using questionnaires) were excluded. In the first phase of the study, a checklist was prepared for extracting data from the dissertations, which was designed based on similar studies and consisted of the following items [9-14]: keywords in Persian and English, the name of the city, the type of the study, the level of the dissertations (undergraduate or postgraduate), the study field, the sample size and the number of groups evaluated in the study, and the study results (according to the aims of the study, based on which the reporting of a significant relationships was considered a positive result and absence of such a relationship was considered a negative result).

At this stage, dissertations with erroneous or defective data were excluded from the study. This way the checklists were completed for the analytical dissertations of all the 5 dental faculties.

In the second stage of the study, the articles extracted from the dissertations included in the study were searched in the first phase in the Google Scholar database using the keywords of the studies, the cities in which the studies were performed and the authors' names. This search was carried out in the first 3-month period of 2018. When the article was not found with the use of the selected keywords, it was concluded that no article had been extracted from the dissertation in question and these studies were excluded from the second phase of the study. Only dissertations whose results had been published in the form of an article were finally analyzed.

Data Analysis

Data were analyzed using IBM SPSS Statistics for Windows Software, version 20 (IBM Corp., Armonk, NY, USA), using descriptive statistics and Chi-squared test, Pearson's correlation coefficient, Fisher's exact test and Logistic regression.

Ethical Aspects

Data on the dissertations' authors were kept confidential during the whole study procedures.

Results

Overall, the 483 abstracts of dissertations were reviewed in the present study, of which 269 dissertations were eligible, i.e. they were analytical and had positive or negative results (55.7%). An Internet search revealed that 153 articles were available for these dissertations, i.e. 56.9% of the dissertations were eligible to provide scientific articles for publication. Table 1 presents the characteristics of the eligible dissertations and the articles extracted from them. In vitro studies (36.1%), clinical trials (16%) and studies in the field of operative dentistry (13%) and periodontics (12.3%) had a higher rate of publication in the form of articles.

Table 1. Distribution of articles according to author's gender, university, type of study, field, results, published article and journal.

Variables	N	%
Author's Gender		
Male	95	35.4
Female	173	64.6
Dental School		
Kerman	20	7.4
Mashhad	76	28.3
Isfahan	38	14.2
Tehran	27	10.0
Shahid Beheshti	108	40.1
Study Type		
RCT	43	16.0
Laboratory	97	36.1
Intervention	42	15.6
Case-Control	38	14.1
Animal	10	3.7
Retrospective	11	4.1
Cross-Sectional	10	3.7
Validation of Tests	18	6.7
Field		
Periodontics	33	12.3
Endodontics	26	9.7
Oral Pathology	20	7.4
Oral Medicine	31	11.5
Operative Dentistry	35	13.0
Pediatric Dentistry	25	9.3
Community Dentistry	9	3.3
Oral Surgery	27	10.0
Oral Radiology	17	6.3
Orthodontics	24	8.9
Prosthodontics	21	7.8
Results		
Negative	87	32.3
Positive	182	67.7
Published Articles		
Yes	153	56.9
No	116	43.1
Journal Type		
Index	55	25.4
Non-Index	98	36.4

Table 2 shows the distribution of articles published according to university, type of study and field.

Table 2. Distribution of articles published according to university, type of study and field.

Variables	Published		No Published		Total	
	N	%	N	%	N	%
Dental School						
Kerman	10	50.0	10	50.0	20	7.4
Mashhad	38	50.0	38	50.0	76	28.3
Isfahan	29	76.3	9	23.7	38	14.1

Tehran	15	55.6	12	44.4	27	10.0
Shahid Beheshti	61	56.5	47	43.5	108	40.2
Study Type						
RCT	31	72.1	12	27.9	43	16.0
Laboratory	59	61.0	38	39.0	97	36.1
Intervention	15	35.7	27	64.3	42	15.6
Case-Control	28	73.7	10	26.3	38	14.1
Animal	6	60.0	4	40.0	10	3.7
Retrospective	5	45.5	6	54.5	11	4.1
Cross-Sectional	1	10.0	9	90.0	10	3.7
Validation of Tests	8	44.5	10	55.5	18	6.7
Field						
Periodontics	22	66.7	11	33.3	33	12.3
Endodontics	18	69.2	8	30.8	26	9.7
Oral Pathology	13	65.0	7	35.0	20	7.4
Oral Medicine	22	71.0	9	29.0	31	11.5
Operative Dentistry	15	43.0	20	57.0	35	13.0
Pediatric Dentistry	14	56.0	11	44.0	25	9.3
Community Dentistry	6	66.7	3	33.3	9	3.3
Oral Surgery	7	26.0	20	74.0	27	10.0
Oral Radiology	8	47.0	9	53.0	17	6.3
Orthodontics	15	62.5	9	37.5	24	8.9
Prosthodontics	13	62.0	8	38.0	21	7.8

It was observed an association between the variable "published article" and the type of study ($p = 0.002$) and field ($p = 0.009$). There were no associations with dental school ($p = 0.120$), thesis level ($p = 0.464$) and author's gender ($p = 0.140$).

Retrospective studies and those in the fields of endodontics and oral pathology had a higher rate of publication in journals with international indexes (Figures 1 and 2).

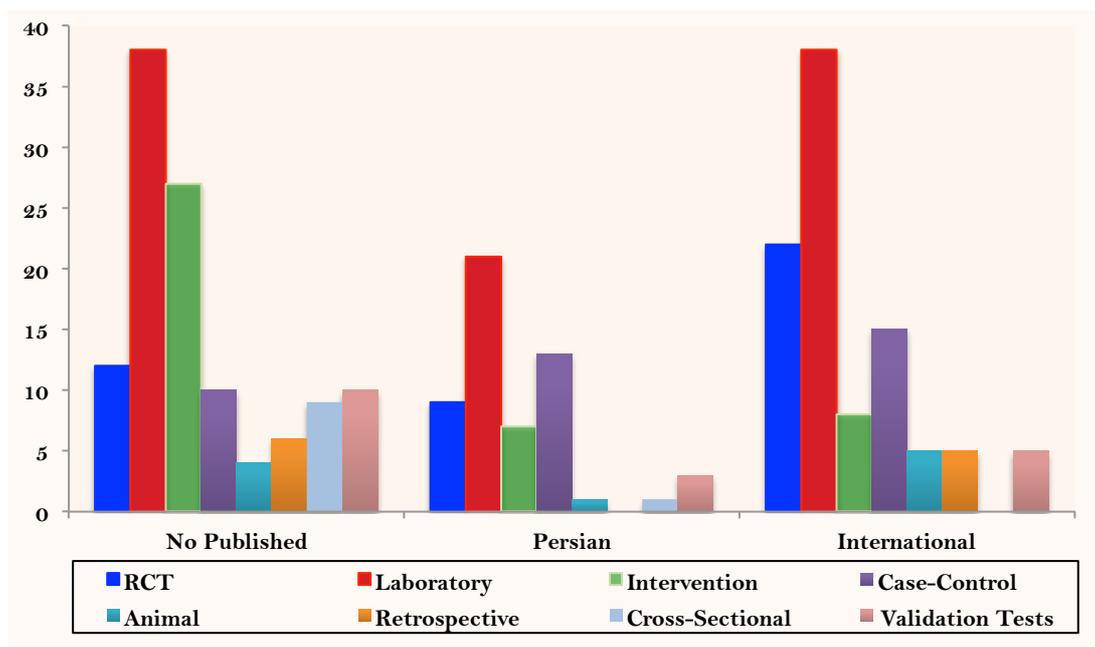


Figure 1. Distribution of Persian and international published articles according to the type of study.

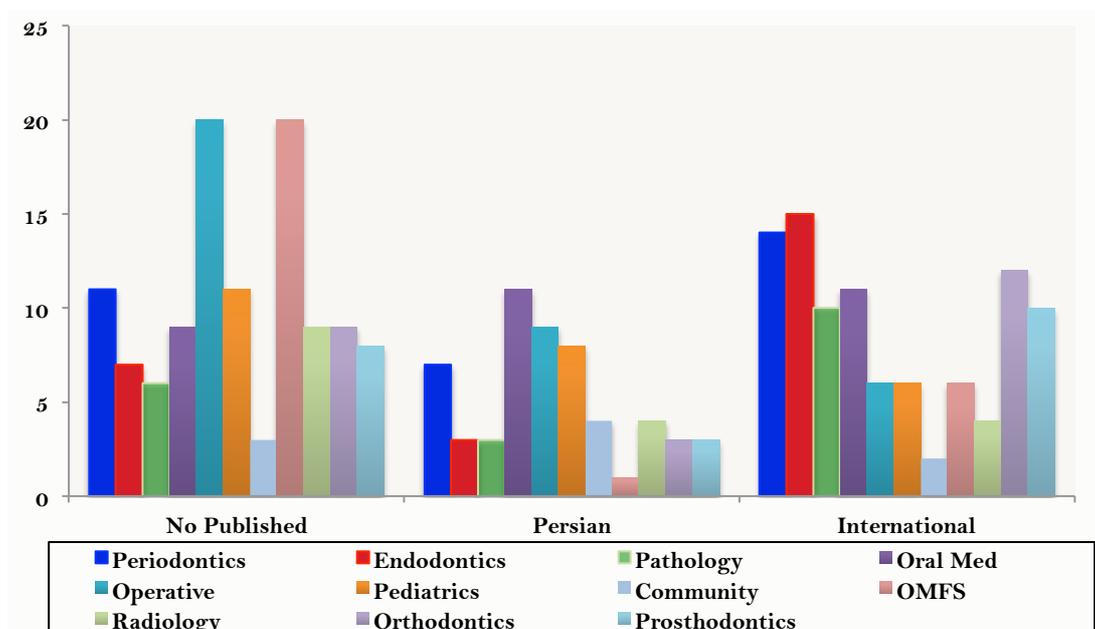


Figure 2. Distribution of Persian and international published articles according to the field.

Logistic regression model showed that the odds of publication of articles with positive results were 1.8% higher than those for articles with negative results, which increased to 26% by considering the effect of sample sizes in these studies. There was a significant relationship between the results (positive/negative) and the sample size ($p = 0.069$), i.e. more positive results were achieved with an increase in sample size. There was no significant relationship between the sample size in each group on one hand and the publication chance and dissertation level on the other hand ($p = 0.120$; $p = 0.836$); however, a significant relationship was found with the positive/negative results ($p = 0.034$).

In addition, by considering the variable in the equation, it was shown that the specialty field affected the relationship between the chance of publication of the article and the positive/negative results ($p = 0.008$), increasing the chance of publication to 31%. In other words, the specialty field variable was not equally distributed between the positive and negative results, affecting them as a confounding factor.

Discussion

Publication bias is a systematic error and is believed to be a widespread problem in research in the medical field [15]. In evidence-based dental treatments, it is necessary that the clinicians should seek the best evidence and after analyzing this evidence they should choose the best treatment modality for their patients. Of all the uncertainties and contradictions present in scientific evidence, PB is of particular importance [16]. It should be pointed out that Iranian dental practitioners are not adequately familiar with evidence-based principles and the majority of them still prefer to consult with their colleagues rather than search for evidence in electronic databases, which in itself might be considered an additional problem [17].

In this research, clinical trials comprised only 16% of the studies related to the dissertations evaluated; however, in the pyramid of studies in terms of the evidence-based approach, the highest validity is related to clinical trials. In a previous study, 5.7% of the published articles were clinical trials [9]. It should be pointed out that undertaking a valid and accurate clinical trial is associated with some specific challenges and critical evaluation of clinical trial reports published in Iranian dental journals from 2003 to 2010 showed a discrepancy between the quality of these reports and the recommended standards, necessitating promotion of the quality of these studies [18].

The results of the present study showed that 67.7% of the dissertations evaluated had positive results, almost consistent with the results of a dental study with 81.6% of the articles having positive results [11]. The methodology used in the present study for the evaluation of articles extracted from dental dissertations is different from that used in similar studies to some extent. In one study the researchers analyzed the reasons for delays and failures to publish dental articles. They followed the abstracts of lectures given in three international conferences and concluded that only 46.1% of these abstracts were published in the form of a scientific article 5 years after they were presented in the conference [19].

In the present study, 56.9% of the evaluated dissertation had led to a scientific article; the time limit for publication (from 2013 until this study was carried out) was almost similar to other previous studies. In one of them, investigators evaluated the publication of the abstracts of lectures given in the congresses of the British Association of Oral and Maxillofacial Surgeons from 2002 to 2006 and concluded that only 24% of these abstracts were published later in the form of a scientific article [19,20].

The results of the present study showed that 36.4% of the eligible dissertations evaluated finally resulted in the publication of valid international articles. Several key elements should be considered in order to increase this rate, one of which is the satisfaction of dental students with the procedures involved in the preparation of these dissertations. In this context, a group of researchers evaluated 62 graduates from Isfahan Faculty of Dentistry and reported a 33.9% satisfaction rate (moderate) in this area. Only 1.6% of the graduates exhibited a very high level of satisfaction with the dissertation preparation process [21].

An increase in the publication of the results of research studies in the field of dentistry in journals indexed in valid databases such as ISI and PubMed has always been one of the aims of universities and research centers in Iran. The results of an Iranian survey showed that a total of 75 dental articles from Iran has been indexed in PubMed, with 99.3% of the articles written in Persian [22]; however, assessing the output trend of dental research in Iran during a 20-year period (1990–2009) and 671 articles available in PubMed database with affiliations from Iran showed that the number of dental articles by Iranian researches indexed in PubMed database has increased significantly (from 0.01% to 1.4) [23].

Regarding gender, 64.3% of the undergraduate or postgraduate students whose dissertations were evaluated were female. In this review the genders of the first authors or the corresponding

authors were not evaluated; however, previous studies have been reported that the majority of first authors and corresponding authors in their studies were male (66.7% male authors) [10,23].

Evaluation of items such as the financial supporters and the number of authors open up new discussions such as conflict of interests; in this context, a recent report illustrated that the presence of a conflict of interests was pointed out by authors in 3.6% of articles written in English [24]. In relation to the reporting of negative results, ethical considerations make it necessary to report the results of human studies that expose humans to some risks. In addition, individuals who take part in such research studies voluntarily have the right for their participation to be used and the negative results should not subject them to tests again [5,6].

Observation of ethical considerations, especially in designing clinical trials, is another concern in this field and the majority of published clinical trials in Iranian dental journals from 2001 to 2011 had ignored important ethical principles and had not reported them [25]. The dissertations evaluated in the present study were categorized into 8 groups. In a recent similar study, researchers categorized the articles they evaluated in 4 groups: cross-sectional, case-control, interventional and cohort. There were no cohort studies in the present study, which is due to the inconsistency time of such studies and the dissertations. The researchers mentioned above also evaluated the impact factors of the journals; however, in the present study merely the publication of the study results in valid PubMed and ISI databases was evaluated [10].

In the present study, a relationship was detected between the results (positive/negative) and the sample size, which was close to the level of significance ($p=0.069$) and it appears more attention should be paid to the sample size in such studies. In this context, one evaluation showed that the method used to determine the sample size in clinical trials published in two valid, endodontic journals during 2000-2001 and 2009-2010, reporting that the sample size quality improved over time in such studies [26].

Conclusion

The majority of data available now on PB is retrospective and a lack of prospective surveys is evident in this respect and they seem to be necessary. It also appears that it is necessary to carry out clinical trials in this respect. Medical science journals should be encouraged to publish studies with negative results. In addition, to decrease PB it should be made sure that the results of all the clinical trials are available and hiding the key results of some studies should be prevented. Therefore, the unpublished articles should be traced and the sources to trace them might include databases, lecture abstract booklets of scientific congresses, doctorate and Ph.D. dissertations and even contacting the executors of research plans approved by the universities and research centers.

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Conflict of Interest: The authors declare no conflicts of interest.

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