Relationship between citation metrics and the characteristics of article titles in dermatology journals

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Received: 10 February 2022
Accepted: 16 February 2022

Background: Evidence shows that article titles might affect citation metrics. This study aimed to evaluate the association between selected citation metrics and the title characteristics in dermatology journals.

Methods: We enrolled 305 reviews and original articles published during 2016 from four dermatology journals consisting of the "Journal of the American Academy of Dermatology," "Journal of the European Academy of Dermatology and Venereology," "Indian Journal of Dermatology, Venereology and Leprology," and "International Journal of Dermatology" using a stratified and simple random sampling method. The list of articles was extracted from Scopus; then, the title characteristics were reviewed. Moreover, we extracted the citation metrics, including the citation count, Field-Weighted Citation Impact (FWCI), and citation benchmarking percentile of the articles until the end of October 2021 using Scopus. For statistical analysis, we used Stata software version 14.2.

Results: Overall, 239 (78.36%) original and 66 (21.64%) review articles were included. The citation count and FWCI significantly and positively correlated with the number of words, characters, and punctuation marks in the titles. By adjusting the covariates, linear logistic regression showed that the title length and the presence of acronyms in the title were the most effective factors in increasing the citation count and FWCI of the articles.

Conclusion: Using longer titles and including acronyms in the titles may help augment the citation of articles in dermatology journals.

Keywords: scientometrics, dermatology journals, title, citation

Iran J Dermatol 2022; 25: 345-355

DOI: 10.22034/IJD.2022.329134.1506

INTRODUCTION

The article title is the first thing that any researcher will read. Therefore, it must be contemplated well to make an article stand out from millions of published articles. Researchers often try to obtain principal information about an article from a quick glance at the title. In addition, the article title is the first tool used to compare and screen articles among a pool of scientific documents [1-3]. Furthermore, the title of an article is an instrument used by databases, indexing systems, libraries, journals, etc., to categorize them into related fields [4]. Therefore, selecting a suitable and attractive article title could be the simplest way to increase article visibility.

The citation of articles is one of the most important indicators that researchers and policymakers

consider in any field of research, representing one of the most straightforward tools to judge the quality of an article. Moreover, citing a journal's articles affects that journal's impact factor. For researchers, citations lead to receiving grants, awards, and promotions from academic institutions during certain competitions and festivals [5,6]. Universities and research centers also push researchers to publish high-quality articles with a high chance of receiving citations. Therefore, many universities prioritize studying factors effective in increasing the citation rate [7].

Various indices have been considered for evaluating the visibility and importance of articles and article citations. These metrics allow article readers to evaluate the impact of citations and the degree of community participation around an article [8]. In this regard, the citation count indicates how many times a publication has been cited. Moreover, the Field-Weighted Citation Impact (FWCI) shows how well this document is visited and cited compared with similar documents. In this criterion, a value greater than 1 means citing the document more than expected [9-11]. Furthermore, the citation benchmarking percentile demonstrates how citations received by the document compare with the average for similar documents [12,13]. Finally, the Topic Prominence Percentile (TPP) is another index for evaluating an article's momentum according to its topic. This parameter is calculated by SciVal [11,14].

Researchers have so far discovered a number of factors that affect citation counts. The four main factors (domains) that affect the number of citations to an article are the article's authors, journal, study field, and characteristics [15]. Citation counts are affected by the first and last authors' rank, name of the first author's university mentioned in affiliations, country of residence of the first author, quality or ranking of the university where the authors work, number of organizational affiliations mentioned in articles, and number of citations of the first and last authors of the articles [7,16,17].

The citation count may also be affected by the characteristics of the article title. For instance, evidence revealed that longer titles often received more citations, and this association was more prominent in journals with higher impact factors [18]. However, others showed that the shorter the length, the greater the citations [19]. Moreover, according to the literature, the title type and the inclusion of the year of study, study design, acronyms, punctuation marks, etc., could predict the citation rate [1,7,20], though findings have been inconsistent.

To the best of our knowledge, the relationship between the title characteristics of dermatology journal articles and their citation indices is yet to be examined. Therefore, this study aimed to address this gap in the literature.

PARTICIPANTS AND METHODS

Study design and sample size

This cross-sectional study was conducted on articles published in 2016 in four general English-language dermatology journals:

1. Journal of the American Academy of Dermatology (from USA) with 477 articles
2. Journal of the European Academy of Dermatology and Venereology (from Europe) with 246 articles
3. Indian Journal of Dermatology, Venereology and Leprology (from Asia) with 59 articles
4. International Journal of Dermatology (An independent journal from the International Association of Dermatology) with 328 articles

The Scopus search results were limited to "Articles" and "Reviews" in terms of the document type. Following a similar article [20], the minimum sample size of 304 was estimated by considering a first-type error (alpha) of 0.05, a power of 0.8, and a correlation coefficient between citation counts and title length of -0.16.

Data collection

Stratified and random cluster sampling was used to select articles from each journal. In this regard, we extracted the "articles" and "reviews" of 2016 from each journal separately in a the .CVS file format. After reviewing the titles in the list, if the documents were incorrectly categorized as "articles" and "reviews," they were excluded from the study. Then, four random numbering lists made by SPSS software version 25 separately for each journal were used to enroll articles into the study.

The authors read the titles one by one to define the title type: descriptive, informative, or question. Then, the title was evaluated for the number of

words, characters with and without spaces, simple or compound status, mentioning of study details (design, year, and place), and punctuation marks. Microsoft Word version 2016 was used to assess the number of words and characters. We recorded all data in a researcher-made data collection form.

Data related to citation indices until the end of October 2021 were extracted from the Scopus database. The measures included the citation count, self-citation count, FWCI, citation benchmarking percentile, and TPP. To control the biases made by self-citation, the number of self-citations was subtracted from the actual number of citations in the additional analysis. The FWCI and citation benchmarking percentile were evaluated in both continuous numerical and categorical data. In this regard, the FWCI was divided into two categories consisting of < 1 and ≥ 1, according to its well-known cut-off point, and the citation benchmarking percentile was divided into two categories based on < 75 and ≥ 75 as a cut-off point to define the top-quartile articles as highly cited ones. P-values equal to and less than 0.05 were considered significant.

Statistical analysis

We used Stata software version 14.2 (StataCorp LLC, 4905 Lakeway Drive, College Station TX77845, USA) for statistical analyses. We used the frequency and percentage to describe categorical data and the mean, standard deviation, and median to present quantitative data. In addition, we used the independent t-test, analysis of variance (ANOVA), chi-squared test, and Pearson correlation to find the association between the variables. The mean difference (MD), standardized mean difference (SMD), and odds ratio (OR) with a 95% confidence interval (CI) were used to estimate the effect size of variables affecting citation metrics. Furthermore, based on the search in similar studies, we considered the potentially influential variables as predictors and ran a linear regression model using the enter method. We entered factors such as compound title type and mentioning of the study design, study place, and acronyms in the title into the regression model, accompanied by some characteristics of articles that probably affect this model, including the article type (reviews vs. original research), level of accessibility (open access vs. non-open access), and topic prominence percentile (defined as an indicator that reveals the current momentum and encouragement of a topic according to Scopus).

Ethical considerations

The protocol of this study was approved by the

Table 1. Characteristics of the articles and article titles enrolled in the study

Variable	Frequency (%) N= 305
Journal name	
Journal of the American Academy of Dermatology	119 (32.02)
International Journal of Dermatology	92 (30.16)
Journal of the European Academy of Dermatology and Venereology	75 (24.59)
Indian Journal of Dermatology, Venereology and Leprology	19 (6.23)
Open access article	
Yes	69 (22.62)
No	236 (77.38)
Article type	
Original	239 (78.36)
Review	66 (21.64)
Title type	
Descriptive	241 (79.02)
Informative	49 (16.07)
Question	15 (4.92)
Compound title	
Yes	169 (55.41)
No	136 (44.59)
Presence of year (s) of study	
Yes	3 (0.98)
No	302 (99.02)
Presence of place of study	
Yes	48 (15.74)
No	257 (84.26)
Presence of study design	
Yes	100 (32.79)
No	205 (67.21)
Presence of acronyms	
Yes	85 (27.87)
No	220 (72.13)
Presence of at least one punctuation mark	
Yes	239 (78.36)
No	66 (21.64)
Type of punctuation mark	
Colon (:)	156 (51.15)
Hyphen (-)	113 (37.05)
Parenthesis ()	64 (20.98)
Comma (,)	45 (14.75)
Question mark (?)	15 (4.92)
Slash (/)	5 (1.64)
Quotation mark (‘ ’)	3 (1.98)
Semicolon (;)	1 (33)

Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (Ethics Code: IR.SUMS.REC.1400.087).

RESULTS

Characteristics of the articles and their titles

Overall, we enrolled 305 articles, including 239 (78.36%) original articles and 66 (21.64%) review articles from four selected dermatology journals. In this regard, 236 (77.38%) articles were subscription-based, and 69 (22.62%) were open-access articles. Moreover, 241 (79.02%) titles were of the descriptive type, followed by informative and question types with frequencies of 49 (16.07%) and 15 (4.92%), respectively. Only 100 (32.79%) and 48 (15.74%) articles mentioned the type and place of the study in the title, respectively. Additionally, the colon was the most punctuation mark the authors used in the titles. In addition, 169 (55.41%) titles were of compound type. The median title word count was 14 (IQR: 10, 18). Tables 1 and 2 present the characteristics of the articles studied and their titles.

Relationship between citation metrics and title characteristics

Table 3 demonstrates that the article title word and character counts (with and without spaces) had weak to moderate positive correlations with the total citation count, citation count excluding self-citations, FWCI, and citation benchmarking percentile.

Table 4 shows that the mean differences of both total citation counts and citation counts after excluding the authors' self-citations were statistically significant in titles including at least an acronym in comparison with those without an acronym (MD = 9.85, 95% CI: 2.95 to 16.75, $P = 0.027$ and MD = 8.45, 95% CI: 0.71 to 16.19, $P = 0.033$, respectively). The presence of the study design in the title was associated with higher citation counts before (MD = 6.49, 95%CI: 0.20 to 13.07, $P = 0.057$)

Table 2. Measures of central tendency and dispersion of the length of the titles, number of punctuation marks in titles, and citation metrics of the selected articles published in dermatology journals

Variables	Mean ± SD	Median (IQR)	Min	Max
Title word count	14.22 ± 5.35	14 (10, 18)	1	29
Title characters count (with spaces)	106.45 ± 37.76	103 (80, 133)	14	228
Title characters count (without spaces)	93.21 ± 32.76	91 (70, 116)	13	201
Total citation count	21.46 ± 27.76	14 (7, 27)	0	263
Number of punctuation marks in the title	1.619 ± 1.45	1 (1, 2)	0	7
Self-citation excluded citation count	18.91 ± 24.85	11 (5, 23)	0	232
Field-Weighted Citation Impact (FWCI)	2.04 ± 3.10	1.31 (0.58, 2.44)	0	34.19
Benchmarking percentile	71.75 ± 21.62	78 (57, 90)	0	99

SD = standard deviation; IQR = interquartile range; min = minimum; max = maximum

Table 3. Correlation of title length and number of punctuation marks with citation metrics

Variable	Total citation count	Citation count after self-citation exclusion	Field-Weighted Citation Impact (FWCI)	Citation benchmarking percentile
Title word count				
Pearson r	0.14	0.12	0.23	0.11
P-value	0.017*	0.032*	< 0.001*	0.054
Title characters count (with spaces)				
Pearson r	0.12	.10	0.20	0.10
P-value	0.043*	0.075	< 0.001*	0.073
Title characters count (without spaces)				
Pearson r	0.11	0.10	0.20	0.10
P-value	0.047*	0.082*	< 0.001*	0.084
Number of punctuation marks in the title				
Pearson r	0.19	0.19	0.21	0.07
P-value	0.001*	0.001*	< 0.001*	0.240

* $P \leq 0.05$

Table 4. Association between some categorized characteristics of the title of articles in dermatology journals and the citation count

Characteristic	N	Total citation count				Citation count after excluding self-citations			
		Mean ± SD	MD (95% CI)	*P*-value	SMD (95% CI)	Mean ± SD	MD (95% CI)	*P*-value	SMD (95% CI)
Title type									
Descriptive	241	22.42 ± 29.96	Base		Base	19.80 ± 26.74	Base		Base
Informative	49	18.45 ± 18.32	-3.97 (-14.69 to 6.74)	0.480	-0.22 [b] (-0.53 to 0.09)	16.18 ± 17.05	-3.62 (-13.20 to 5.96)	0.446	-0.21 [b] (-0.52 to 0.10
Question	15	15.87 ± 10.72	-6.56 (-24.75 to 11.63)		-0.61 [b] (-1.17 to -0.03)	13.46 ± 8.76	-6.33 (-22.61 to 9.94)		-0.72 [b] (-1.30 to -0.13)
Compound title									
No	136	19.65 ± 27.64	3.28 (-3.07 to 9.57)	0.306	-0.12 [a] (-0.34 to -0.11)	17.15 ± 24.90	3.17 (-2.46 to 8.80)	0.269	-0.13 [a] (-0.10 to 0.35)
Yes	169	22.92 ± 27.85				20.32 ± 24.78			
Presence of the place of study in title									
No	257	22.47 ± 28.84	-6.38 (-14.96 to 2.19)	0.068	-0.31 [b] (-0.62 to 0.004)	19.76 ± 25.86	-5.43 (-11.51 to 0.65)	0.079	-0.30 [d] (-0.61 to 0.01)
Yes	48	16.08 ± 20.48				14.33 ± 18.01			
Presence of the study design in title									
No	205	19.35 ± 27.65	6.49 (-0.20 to 13.07)	0.057	0.23 [a] (-0.01 to 0.47)	16.96 ± 24.85	5.94 (0.01 to 11.88)	0.049*	0.24 [a] (0.00 to 0.48)
Yes	100	25.79 ± 27.61				22.91 ± 24.48			
Presence of acronyms in title									
No	220	18.72 ± 22.01	9.85 (2.95 to 16.75)	0.027*	0.45 [b] (-.70 to -0.19)	16.55 ± 19.97	8.45 (0.71 to 16.19)	0.033*	0.42 [b] (0.17 to 0.68)
Yes	85	28.56 ± 38.15				25.01 ± 33.80			
Presence of punctuation marks in title									
No	66	19.09 ± 20.25	3.02 (4.57 to 10.63)	0.337	0.15 [b] (-0.13 to 0.42)	16.22 ± 18.73	3.43 (-2.24 to 9.09)	0.234	0.18 [b] (-0.09 to 0.45)
Yes	239	22.12 ± 29.50				19.65 ± 26.27			

SD = standard deviation; MD = mean difference; * $P \leq 0.05$; a. Cohen's d; b. Glass's delta

and after (MD = 5.94, 95% CI: 0.01 to 11.88, $P = 0.049$) excluding self-citations. Furthermore, the mean total citation count and citation count after excluding self-citations were significantly lower in articles that included the study location in the title (MD = -6.38, 95%CI: -14.96 to 2.19, $P = 0.068$, and MD = -5.43, 95%CI: -11.51 to 0.65, $P = 0.079$, respectively). Table 5 indicates that the behaviors of the FWCI and citation benchmarking percentile were similar to those of self-citation-excluded citation counts when an acronym was added or the study design was clarified in the title of the articles.

On the other hand, Table 6 reveals that 76 (76%) titles included the study design, and 65 (76.47%) titles contained at least one acronym. Articles with a title including the study design or at least one acronym were categorized in the FWCI > 1 group about 2.84 and 2.76 times more, respectively, in comparison with those titles that lacked these features ($P < 0.001$, OR = 2.84, 95%CI: 1.67 to 4.85 and $P < 0.001$, OR = 2.76, 95%CI: 1.56 to 4.86, respectively). Likewise, the majority of articles with titles that included the study design or at least one acronym were categorized into the first quartile of the citation benchmarking percentile index ($P = 0.005$, OR = 2.03, 95%CI: 1.24 to 3.32 and $P = 0.003$, OR = 2.19, 95%CI: 1.30 to 3.70, respectively). Although there was no association between the presence of at least one punctuation mark in the article title with citation metrics, there was a positive correlation between the number of punctuation marks used in article titles with citation counts and FWCI indices, as shown in Table 3.

Linear regression model to determine factors affecting the citation metrics

After adjusting the covariates, the total citation count and FWCI had statistically significant positive correlations with the title word count and the presence of acronyms in the titles. Furthermore, the review type of articles, open-access type of articles, and TPP could significantly affect the citation rate and FWCI. Moreover, according to this model, it seems that articles with descriptive titles received considerably more citations. Table 7 presents more details about linear logistic regression of the factors related to the article title that might affect the citation metrics of articles in dermatology journals.

DISCUSSION

This study showed that inserting at least one acronym and clarifying the study design in the title of dermatology articles are associated with receiving more citations, thus raising the FWCI and citation benchmarking percentile indices. Also, increasing the title length amplified the chance of receiving citations; however, these correlations were weak to moderate. On the contrary, clarifying the study location in the titles was a negative factor in receiving citations.

Falahati Qadimi Fumani *et al.* showed that article citation counts did not correlate with the title length [21]. Some documents claimed that articles with shorter titles, on average, often received more citations. They argued that shorter titles might be simpler to read, making them more citable [20,22,23]. On the contrary, the study of Habibzadeh *et al.* demonstrated that the longer the title, the higher the citation count in general medicine and multidisciplinary scientific journals, and this relationship was statistically significant [18]. Similarly, Jacques *et al.*'s study revealed that the articles with higher word count often received significantly more citations [24]. Our results also revealed that articles with longer titles often received more citations in dermatology journals, which could increase the FWCI and citation benchmarking percentiles. This correlation may be due to some factors; for example, longer titles might be more informative and include keywords or repetitive words, which make the article more findable, searchable, and attractive to read and cite.

Although our study revealed that articles with compound titles and those with at least one punctuation mark were cited more than simple (one-part) titles, these differences were insignificant. However, we found that if there were punctuation marks in the title, and the number of punctuation marks increased, the number of citations would increase. Further, we found that the colon and then the hyphen were the most punctuation marks that the authors used in the titles. Otherwise, Jacques *et al.*'s study demonstrated a positive correlation between the articles' citation count and the presence of a colon in the title, as well as choosing a compound title instead of a simple type [24]. Likewise, Shekhani *et al.* reported a strong relationship between the presence of punctuation

Table 5. Association between some categorized characteristics of the title of articles in dermatology journals and their Field-Weighted Citation Impact (FWCI) and citation benchmarking percentile

Characteristics	N	Field-Weighted Citation Impact (FWCI)				Citation benchmarking percentile			
		Mean ± SD	MD (95% CI)	*P*-value	Effect size (95% CI)	Mean ± SD	MD (95% CI)	*P*-value	Effect size (95% CI)
Title type									
Descriptive	241	2.15 ± 3.40	Base		Base	71.98 ± 21.68	Base		Base
Informative	49	1.70 ± 1.61	-0.45 (-1.65 to 0.75)	0.47	-0.28 [b] (-0.59 to 0.03)	70.80 ± 22.67	-1.19 (-9.55 to 7.17)	0.933	-0.054 [a] (-0.36 to 0.25)
Question	15	1.40 ± 1.01	-0.76 (-1.29 to -2.78)		-0.74 [b] (-1.32 to -0.14)	71.06 ± 18.24	-0.92 (-15.11 to 13.28)		-0.04 [a] (-0.56 to0 .48)
Compound title									
No	136	1.90 ± 3.15	0.25 (-0.45 to 0.96)	0.483	0.08 (-0.15 to 0.31)	71.76 ± 21.63	-0.02 (-4.92 to 4.89)	0.994	0.001 [a] (-0.23 to 0.23)
Yes	169	2.15 ± 3.07				71.74 ± 21.67			
Presence of the place of study in title									
No	257	2.10 ± 3.21	-0.37 (-1.17 to 0.43)	0.364	-0.15 [b] (-0.46 to 0.16)	72.27 ± 21.84	-3.31 (-9.10 to 3.38)	0.331	-0.15 [a] (-0.46 to 0.16)
Yes	48	1.73 ± 2.43				68.96 ± 20.39			
Presence of the study design in title									
No	205	1.80 ± 3.09	0.72 (-0.09 to 1.47)	0.056	0.23 [a] (-0.01 to 0.47)	69.65 ± 21.54	6.40 (1.25 to 11.55)	0.015*	0.30 [a] (0.06 to 0.54)
Yes	100	2.53 ± 3.09				76.05 ± 71.84			
Presence of acronyms in title									
No	220	1.69 ± 2.20	1.25 (0.22 to 2.28)	0.018*	0.57 [b] (0.31 to 0.82)	69.53 ± 21.36	7.97 (2.60 to 13.33)	0.004*	0.37 [a] (0.12 to 0.63)
Yes	85	2.94 ± 4.60				77.49 ± 21.32			
Presence of punctuation marks in title									
No	66	1.68 ± 1.33	0.47 (-0.08 to 1.01)	0.092	0.35 [b] (-0.07 to 0.63)	73.03 ± 19.15	-1.63 (-7.56 to 4.29)	0.587	-0.076 [a] (-0.35 to 0.20)
Yes	239	2.14 ± 3.43				71.39 ± 22.27			

SD = standard deviation; MD = mean difference; * $P \leq 0.05$; a. Cohen's d; b. Glass's delta

Table 6. Association between some categorized characteristics of the title of articles in dermatology journals and their Field-Weighted Citation Impact (FWCI) and citation benchmarking percentile using the indices' cut-off points

Characteristics	Field-Weighted Citation Impact (FWCI)				Citation benchmarking Percentile			
	FWCI < 1 (N = 121) No. (%)	FWCI ≥ 1 (N = 184) No. (%)	*P*-value	Odds Ratio (95% CI)	Benchmarking < 75 (N = 142) No. (%)	Benchmarking ≥ 75 (N = 163) No. (%)	*P*-value	Odds Ratio (95% CI)
Title type								
Descriptive	93 (38.59)	80.43 (61.41)		Base	109 (45.23)	132 (54.77)		Base
Informative	21 (42.86)	28 (57.14)	0.729	0.84 (0.45 to 1.56)	24 (48.98)	25 (51.02)	0.503	0.86 (0.47 to 1.59)
Question	7 (46.67)	4.35 (53.33)		0.72 (0.25 to 2.05)	9 (60.00)	6 (40.00)		0.55 (0.19 to 1.59)
Compound title								
No	55 (40.44)	81 (59.56)	0.805	1.06 (0.66 to 1.68)	63 (46.32)	73 (53.68)	0.941	0.98 (0.63 to 1.55)
Yes	66 (39.05)	103 (60.95)			79 (46.75)	90 (53.25)		
Presence of the place of study in title								
No	99 (38.52)	158 (61.48)	0.342	0.74 (0.40 to 1.38)	117 (45.53)	140 (54.47)	0.403	0.77 (0.41 to 1.43)
Yes	22 (45.83)	26 (54.17)			25 (52.08)	23 (47.92)		
Presence of the study design in title								
No	97 (47.32)	108 (52.68)	< 0.001*	2.84 (1.67 to 4.85)	107 (52.20)	98 (47.80)	0.005*	2.03 (1.24 to 3.32)
Yes	24 (24.00)	76 (76.00)			35 (35.00)	65 (65.00)		
Presence of acronyms in title								
No	101 (45.91)	119 (54.09)	< 0.001*	2.76 (1.56 to 4.86)	114 (51.82)	106 (48.18)	0.003*	2.19 (1.30 to 3.70)
Yes	20 (23.53)	65 (76.47)			28 (32.94)	57 (67.06)		
Presence of punctuation marks in title								
No	24 (36.36)	42 (63.64)	0.535	0.84 (0.48 to 1.47)	30 (45.45)	36 (54.55)	0.839	0.94 (0.55 to 1.63)
Yes	97 (40.59)	142 (59.41)			112 (46.86)	127 (53.14)		

* $P \leq 0.05$; CI = confidence interval

Table 7. Association between the title characteristics of the articles and citation metrics after controlling the probable covariates by linear regression

Variables	Total citation count			Citation count without self-citations			Field-Weighted Citation Impact (FWCI)			Citation benchmarking percentile		
	Beta (SE) [a]	SBC [b]	*P*-value	Beta (SE)	SBC	*P*-value	Beta (SE)	SBC	*P*-value	Beta (SE)	SBC	*P*-value
Title word count	0.68 (0.31)	0.13	0.031*	0.55 (0.28)	0.12	0.055	0.11 (0.04)	0.19	0.002*	0.25 (0.25)	0.06	0.306
Compound title	0.86 (3.53)	0.02	0.804	1.03 (3.18)	0.02	0.746	-0.04 (0.39)	-0.01	0.917	-2.97 (2.77)	-0.07	0.285
Presence of the place of study in the title	-6.61 (4.30)	-0.09	0.125	-5.54 (3.89)	-0.08	0.154	-0.66 (0.48)	-0.08	0.172	-4.16 (3.38)	-0.07	0.219
Presence of the study design in the title	1.37 (3.77)	0.02	0.717	1.59 (3.40)	0.03	0.641	0.15 (0.42)	0.02	0.726	6.03 (2.96)	0.13	0.043*
Descriptive title type [c]	6.67 (3.80)	0.10	0.080	6.10 (3.43)	0.10	0.076	0.63 (0.43)	0.08	0.139	1.11 (2.99)	0.11	0.710
Presence of acronyms in the title	8.56 (3.59)	0.14	0.018*	7.50 (3.23)	0.14	0.021*	0.85 (0.40)	0.12	0.034*	5.13 (2.81)	0.02	0.710
Open-access modality [d]	7.47 (3.67)	0.11	0.042*	5.85 (3.30)	0.10	0.078	0.96 (0.41)	0.13	0.020*	-0.49 (2.88)	-0.01	0.865
Article type [e]	13.63 (3.86)	0.20	0.001*	12.01 (3.50)	0.20	0.001*	0.37 (0.43)	0.05	0.400	0.98 (3.05)	0.02	0.748
Topic Prominence Percentile (TPP)	0.23 (0.09)	0.14	0.011*	0.18 (0.08)	0.12	0.025*	0.03 (0.01)	0.16	0.005*	0.31 (0.07)	0.25	< 0.001*
Adjusted R^2	0.10			0.09			0.10			0.09		

a. Standard error; b. Standardized beta coefficients; c. Descriptive title vs. informative and question title types; d. Open-access articles vs. non-open access, e. Review articles vs. original articles, * $P \leq 0.05$

marks in the titles of articles and the citations received by radiology articles [25]. In this regard, Piva *et al.* showed that the articles with titles that included a question mark, colon, and hyphen were cited less than other articles [20]. Otherwise, Jamali *et al.*'s study revealed that the articles with a colon in the title received fewer citations and downloads [1]. Furthermore, some studies demonstrated that the application of a colon in the article titles was different in various disciplines, but there was no correlation between the presence of a colon in the title of academic articles and their future citation count [26,27]. Finally, Falahati Qadimi Fumani *et al.* revealed that the number of punctuation marks in the article title could not predict the citation rate, though at least one punctuation mark was usually present, with the colon and hyphen being most frequently used [21].

The literature indicates that the type of article title can affect the citation rate, but there is inconsistency in this regard. Generally, article titles are divided into three categories in terms of type: informative, descriptive, and interrogative. Informative titles, also called declarative titles, are those in which the main result of the article is mentioned in the title of the article. Descriptive titles, also called neutral titles, describe what is going on in this study but does not reveal the study's main result. Question titles, also called interrogative titles, are those in which a question is posed that arouses the reader's curiosity. Another classification is simple (one-part) and compound (two-part) titles, where the latter commences with a question phrase and continues with a noun phrase or begins with a short noun phrase followed by a question or another phrase (e.g., states the main finding) [1,28].

The study of Piva *et al.* on articles published by the Public Library of Science (PLoS) and Biomed Central (BMC) journals revealed that articles with titles that clarified some parts of the study results were cited more in comparison with the other types of titles [20]. Moreover, Jamali HR *et al.* found that although the articles with question titles were downloaded more in comparison with other types of titles, they received lower citation counts [1]. Our findings demonstrated that articles with interrogative and informative titles, in order, received lower citation counts in comparison with articles with descriptive titles. In addition, dermatology articles with informative and interrogative titles were categorized 16% and 28% less in the FWCI > 1 group and 14% and 45% less, respectively, in the group of articles with a citation benchmarking percentile > 75%, in comparison with the articles with descriptive titles. Although these differences were not statistically significant, the value of the odds ratios indicated that this factor might have a small to moderate effect on the citability of dermatology articles. Accordingly, it might be probable that ambiguous titles are more attractive for authors to read the text of the article more carefully, so the chance for citation would increase.

Hafeez *et al.* showed that clarification of the study design in the title of the articles in psychiatry journals was associated with increased citations [29]. On the other hand, Piva *et al.* demonstrated that the articles whose study design was clarified in their title were cited less than those that clarified the study results [20]. In our study, there was a considerable positive association between the presence of the study design in dermatology article titles with a moderate effect size. The discrepancy between the results of different studies in this issue can be due to the diversity of studies in different fields of science.

Abramo *et al.*'s study revealed that titles mentioning the name of a country systematically received fewer citations [30]. Similarly, Jacques *et al.*' showed that articles with titles mentioning the country of origin received significantly fewer citations [24]. On the other hand, Alimoradi *et al.*'s study demonstrated no association between featuring the country name in the title and the citation count [31]. Our study showed that those articles that clarified the geographic area in their title were cited, on average, at least six times less. It seems that mentioning a specific location in the title suggests to other researchers that these results are specific to that geographic area and do not possess sufficient generalizability to other contexts, eventuating in fewer citations.

Articles with titles that include acronyms appear to be cited more by others, especially in medical journals [24,32]. The prevalence of using acronyms in the title has increased by about 3.5 folds from 1995 to 2019, and up to 19% of scientific article titles include at least one acronym [33]. In line with the literature, we found that articles with acronyms in their title received about ten more citations,

on average, in comparison with other articles. Additionally, the articles that included acronyms were categorized more as highly cited ones in the viewpoint of the FWCI and citation benchmarking percentile (by 2.76 and 2.19 folds, respectively) in comparison with those that lacked acronyms. In this context, Sagi *et al.* indicated that acronyms were linguistic tools that psychologically create linguistic simplicity, rendering a text more attractive [34]. It seems that adding acronyms to titles makes them easier and faster to read; then, readers select them to read the full text and later cite the data and information of the article.

Linear regression analysis of our study's data revealed a weak positive correlation of both citation rate and FWCI indices with the title word count and the presence of acronyms in article titles. In addition, it demonstrated that open-access articles, review articles, and TPP played significant roles in the acceleration of the citation rate and FWCI. Accordingly, previous studies have reported different results on the effect of the characteristics of the article on the rate of citations and visibility [35-37]. One challenge is that the literature possesses few points of comparison in terms of the effects of FWCI and citation benchmarking percentile on citation metrics.

To our knowledge, this is the first study to evaluate the impact of the title characteristics of dermatology articles on the citation metrics. Selecting journals affiliated with four important organizations in the world from different continents, considering the authors' self-citation counts in the statistical analysis, and investigating the FWCI and citation benchmarking percentile in addition to the citation count were the most important strengths of our study. However, there were some limitations. First, the journals surveyed in this study were the more general dermatology journals, so it is recommended to design future studies by considering more dermatology journals and greater sample size to increase the generalizability. Next, this study was conducted according to information extracted only from the Scopus database. It is recommended that future studies be conducted using other databases which estimate the scientometric information of articles differently, such as Clarivate Analysis (Web of Sciences) and Google Scholar, and the degree of compatibility of the results from different databases should be examined. Finally, due to conflicting results from various studies, a systematic review and meta-analysis should be performed to conclude on the association between citation metrics and the characteristics of article titles.

CONCLUSION

Our study indicates that longer titles, using acronyms and some punctuation marks, mentioning the study design, and not clarifying the place of study in the title were the most effective factors that might improve the citation metrics of dermatology articles. Moreover, according to the linear regression model, the title word count and the presence of acronyms in titles, along with open-access modality, review article type, and top level of TTP, could help dermatology journals to improve their ranking. Further studies are suggested to determine more factors that could affect the citation metrics of articles in dermatology journals.

Acknowledgments

This study was extrapolated from the thesis written by Dr. Mohammad Mahdi Parvizi as partial fulfillment of the requirements for obtaining his MSc in Medical Journalism (project number: 22059). The authors thank the Research Vice-Chancellery of Shiraz University of Medical Sciences for providing financial support.

Conflict of interest: None declared.

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