REVIEW ARTICLE

The differences between highly cited and uncited publications related to substance abuse

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Abstract

Objective: Substance abuse has a significant impact on global health and socioeconomic condition in most countries. This study aim was to identify and compare characteristics of the highly cited publications with those of uncited publications in the field of drug abuse and misuse.

Methods: All of publications and citations related to substance abuse in the year 2007 and also the trend of publications related to substance abuse from 2000-2009 was studied, through the ISI web of science were recorded. One percent of highly cited publications with equal number of un-cited publications were compared. The number of authors, journals, impact factor of the journals, citation rates, number of references, number of pages, document type, language, first author's affiliation, first author's country, publisher, and subject category, type of drug, first author's gender and study design and type were compared.

Results: There was 60.4% increase in the number of publications from 2000 to 2009. Among highly cited publications, the average number of citation was 84.9 (+40.0). 75.5% of highly cited publications discussed the mechanism of action or pathways that resulted in drug addiction while among uncited publications, epidemiological and population based studies were the approach of 92.8% of the articles. Neuroscience and experimental studies were the main subject area and type of study in highly cited articles.

Conclusion: This study showed that study design, subject area and topic influence citation rate. Also impact factor of the publishing journals, language of publications and geographic distribution of publications, number of authors, type of articles and number of references could influence the citation rate.

Key words: Substance abuse, highly cited, Uncited,

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Introduction

Substance abuse has a significant impact on global health and socioeconomic condition in most countries. It has been estimated that globally, 155 to 250 million people (3.5 to 5.7% of the population aged 15-64) used illicit substances at least once in the year 2008 (1). The Global Burden of Diseases project has estimated a total burden of 32108 Disability Adjusted Life Years (DALYs) for alcohol and drug use disorder (27740 DALYs for males and 4368 for females) for the year 2004 (2).

Citation indexes are used as criteria for recognition of greater academic status and, in some areas, as the currency of the academic performance (3). Evaluation of scientific literature is an essential method for acquiring new information to guide clinical decision making and research direction. On the other hand, citation of a published work by other authors is an important factor considered in the analysis of relevance and importance of the scientific contribution (4).

However the number of citations that one article receives is not always and necessarily a measure of its quality or even its influence on clinical practice patterns (5), also many scientific publications are never cited (6, 7).

Citation and other data related to academic impact have been collected by and available from Thomson Reuters Institute for Scientific Information (ISI). ISI is a multi-disciplinary citation database that has coverage of more than 10,000 high-impact journals in the field of sciences, social sciences, and arts and humanities.

In the present study, we used ISI Web of Science database to compare the highly cited publications with those of uncited publications in the field of drug abuse and misuse in order to identify the characteristics which attract more attention of scientific and academic community and also to know the interest areas in the field of drug/substance abuse.

Methods

All of publications and citations related to substance abuse in the year 2007 and also the trend of publications related to substance abuse from 2000-2009 was studied, through the ISI web of science were recorded. The year 2007 was selected because it was the most recent year which allows an acceptable duration to reflect the citation rate. One year is also an acceptable period of time to avoid time interference bias in citation rate. A search was performed on Web of Science. The search keywords included"drug abuse" OR "substance abuse" OR "drug misuse" OR "substance misuse" OR "drug dependen*" OR "substance use disorder "OR "drug addiction" OR "substance dependen*".

One percent of the highly cited articles plus 15% estimated exclusion rate were selected from highly cited articles. There were a total of 300 uncited articles, and to get an equal number of uncited publications; a systematic random sampling with interval of 9 was performed to select 34 publications. Wide range of characteristics was used for the purpose of comparative analysis. The variables used for data extraction from the publications in details were the number of

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authors, name of journal, impact factor of the journal, citation rates, numbers of references, number of pages, document type, languages, first author's affiliation, first author's country, publisher, and subject category, type of drug, first author's gender, study design and type. All these data were collected from information available in ISI except the author's gender. To find the author's gender, author's name and affiliation were searched in Google and author's gender was identified by using author's CV or any reference to his/her gender. Impact factor of the journals was recorded according to the journal impact factor in 2008. In 15 cases that some required information could not be extracted from abstract of the article, full text article was used to extract the information. In case of recording drug type, the term "general" was used when the article was dealing with substance abuse generally. Considering different guidelines for publications in different journals, number of keywords and abstract word count were deleted from final analysis.

We excluded the publications, which were not usually citable or peer reviewed like letters, editorials and books. Any of publications which were not directly related to the topic of the drug/substance abuse/misuse were excluded from the study for example when the name of drug was used in the abstract as part of a name of an institute but the topic and subject were irrelevant to drug. Statistical analyses consisted of descriptive and analytical analysis of characteristics of study. Nominal data were presented as counts or proportions, and continuous data as mean ± standard deviation (SD). In a subsequent analytic phase, Fisher exact tests were used to examine the difference between highly cited and uncited publications for nominal variables like type of article, gender of first author, affiliation of the first author etc. Mann-Whitney U-test were applied to examine the difference between highly cited and uncited publications for continuous data like number of authors, IF of the journals etc. All data were entered in excel sheets and then transferred and analyzed with SPSS software version 15.0.

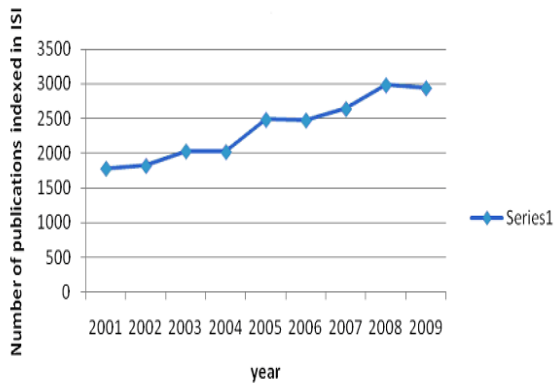
Results

Articles, reviews and conference proceeding published in 2007 related to substance abuse were retrieved from ISI web of science. Totally, 2639 publications including articles, reviews and conference proceeding were retrieved. The other publications like abstracts of meetings, editorial materials, letters, bibliographies, notes and corrections were not retrieved.

Figure 1 shows the trend of the number of publications in the field of substance abuse (using the similar search terms of this study as the topic) in the previous 10 years duration (2000-2009). This figure shows a steady increase in number of publications from 1775 publications in 2000 to 2940 in 2009 (60.4% increase).

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Figure1: Trend of number of publications in the field of substance abuse (2000-2009)



The total citation of all related publications was 19111. Thirty five highly cited publications with the highest citation and 33 publications which were not cited until July 2010, were randomly selected. Two of highly cited publications and 5 of uncited were excluded because they were not directly related to the topic of substance abuse. Behavioral change models and child and sexual abuse were the topics of articles that were excluded. Therefore, 33 highly cited and 28 uncited publications were analyzed to assess factors which may influence citation rate.Among highly cited publications the number of citation ranged from 214 to 47 with an average citation of 84.9 (SD=40.0). The most top cited publication belonged to the study of Berridge and Kent from University of Michigan entitled "The debate over dopamine's role in reward: the case for incentive salience". Considering broad topic which was covered by the publications, 25 of highly cited publications (75.5%) discussed the mechanism of action or pathways that resulted in drug addictions. Epidemiologic and population based studies of drug addiction was the approach of four of these publications (12.1%). However among uncited publications, epidemiological and population based studies where the approach of 26 out of 28 uncited publications (92.8). Among highly cited papers, neurosciences was the subject of 14 of publications (42.4%), pharmacology related field was the subject of 7 publications (21.2%), Psychology and Psychiatry was the subject of 5 publications (15.1%), multidisciplinary sciences was the subject of 4 publications (12.1) and genetics was the field of 2 publications (6.0%). Among uncited publications, psychiatry/psychology was the main subject of study in 12 cases (42.9%), public health and social related fields were subject of 9 cases (37.5%).

Twenty two out of 32 cases (68.7%) in highly cited publications, discussed topic of substance abuse in general without referring to any specific type of substance. Alcohol, group of cigarette, nicotine and tobacco and group of cocaine, amphetamines, morphine, and methadone were the substance of interest in three publications in each group (9.1% vs.10.7%). Cannabis was discussed in two publications. Among uncited publications, 21 out of 28 cases (75.0%) discussed the topic of substance abuse in general without reference to a specific substance. Methamphetamine and other pharmaceutical stimulants, crack, cocaine, club drug were discussed in 3 papers, alcohol abuse, Cannabis and Tianeptine was discussed in one publication each (Table 1).

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The study design was significantly different among highly cited and uncited publications (p= 0.014). . Study design highly cited articles was neuroscience/genetic laboratory in 16 cases (48.5%) ,experimental studies in five cases (15.1%), animal studies and cohort studies in four cases each (12.1%) and population based cross sectional studies in two cases (6.1%). Study design uncited publication was descriptive analytical studies in 11 cases (39.3%), retrospective studies in three cases (10.7%), prospective studies in two cases (7.1%), qualitative and exploratory studies in 5 cases (18.5%), interventional studies and case report each in one case (3.6%). Among highly cited publications, average sample size for those studies which were conducted on human subject (9 studies) was 6267, which ranged from 40 to 43093 individuals. Among uncited publications, average sample size for those studies which were conducted on human subject (16 studies) was 683, ranged from 12 to 5169 individuals. However this difference was not found to be significant (p=0.245).

Among highly cited publications, seven studies were multinational studies (21.2%) and 22 (66.7%) were multicenter studies, while there was no case of multinational studies and only one case of multicenter studies among uncited publications (3.6%).

Considering journals which published the highly and uncited publications. 33 highly cited publications were published in 24 journals. Maximum number of publications was published in Archives of General Psychiatry (three publications) followed by Current Opinion In Pharmacology, Lancet, Pharmacology & Therapeutics, Psychopharmacology, Science and Trends In Neurosciences, with two publications in each journal. Twenty eight uncited publications were published in 24 journals, Journals of Addiction Nursing, Journal of Psychoactive drugs, Journal of Social Service Research and Journal of substance use and misuse each published two of publications (Table 2).

According to the impact factors (IF) of the journals in 2007, IF of highly cited publications varied from 2.4 to 28.4 with an average of 10.7 (+8.7), while the average IF for journals which published uncited publication was 1.2 (+ 1.1), which was significantly lower (p= 0.000), however among highly cited publications, no significant correlation was found between IF of journals and number of citations (r=0.242, p value=0.189).

Publisher of highly cited publications were Elsevier / Pergamon-Elsevier group in nine of publications (27.3), American Medical Association in four publications and Nature Publishing Group in three publications, American Association of advancement of Science, Blackwell Publishing, Lancet Ltd and Springer were publisher of two publications each (6.1). Publisher of uncited publications were Taylor and Frances in 7 cases (25.0%), Elsevier / Pergamon-Elsevier group and Blackwell publisher in three cases each (10.7), Haworth Press Inc and Masson Editeur in two cases each (7.1%).

Among highly cited publications, affiliations of the first author were universities in 24 cases (72.2%) and the rest were affiliated to

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research institutes or hospitals. Five of first authors were affiliated to NIH and two to University of Texas. Name of highly reputable universities of US were among main list of affiliations of first authors. Among uncited publications affiliations of first author were universities in 19 cases (67.8%).

The USA was country of first author affiliation in 24 highly cited publications (72.2%) followed by England in three cases (9.1%), Italy in two cases (6.1%) , Denmark, France, Germany and Estonia each in one case (3.1%). Among uncited publications, The USA in 15 cases (53.6%) , Australia in 3 cases (10.7%) , Canada, Finland, France, India, Italy, New Zealand, Spain, Sweden, Switzerland, and Turkey in one case each (3.6%) were countries of affiliation of first authors. US as country of affiliation of authors was significantly higher among publications with highly citation (p=0.035)

Among highly cited publications, first author of 14 publications (42.4%) were females and this proportion was approximately equal for uncited publications (n=13, 46.4%).

Type of article for highly cited publications was equal number of original articles and reviews (n=16, 48.5%) and one case was conference proceeding with 85 times citation. Type of document for uncited publications were mainly original articles (n=26, 92.9%), there was one case of review and one case of conference proceeding (3.6% each). There was a significant difference in type of document between uncited and highly cited publications, number of reviews were significantly more among highly cited publications (p=0.499).

All highly cited publications were published in English, and most of uncited publications also were published in English (n=26, 92.9%), there was one case of publication in French and one case in Spanish (3.6% each).

There was a wide variation in number of authors among highly cited papers (range 1 to 22). The average number of author was 5.4/publication (+5.2). There was a significant difference (p=0.042) between number of authors among highly cited publications and uncited publications (average number of authors for uncited publications was 3.3/publication (+ 2.1).

There was a significant difference between number of references among highly cited and uncited publications (p<=0.001). Average number of references of highly cited publications were 115.3 (+115.0) ranged from 24 to 564), while average number of references of uncited publications was 35.2 (+16.8). Average number of pages of highly cited publications was 14.4 (+10.6), ranged from 4 to 46 pages and average number of pages of uncited publications were 10.4 (+ 4.8) , this difference was not found to be significant (p=0.065).

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Table 1: Type of drug in highly cited and uncited publication

Name of publisher highly cited Publications	Number	Uncited Publications	Number
alcohol	3	psychoactive substance, cannabis	1
cannabinoids and marijuana	1	alcohol	1
cigarette	1	cocaine	1
cocaine	1	general	21
cocaine (COC), amphetamine (AMPH), methamphetamine (METH) and 3,4-methylenedioxymethamphetamine ("Ecstasy", MDMA)	1	methamphetamine	1
cocaine, amphetamines, morphine, cannabinoids, methadone	1	methamphetamine, pharmaceutical stimulants, crack, cocaine, club drug	1
general	22	opioid, buprenorphine, methadone	1
nicotine	1	tianeptine	1
Tobacco	1	Grand Total	28
Grand Total	32		

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Table 2: Top journals publishing more than one number of most cited and uncited publications

Name of Journal Mostly cited Publications	Number	Uncited Publications	Number
Archives Of General Psychiatry	3	Journal Of Addictions Nursing	2
Current Opinion In Pharmacology	2	Journal Of Psychoactive Drugs	2
Lancet	2	Journal Of Social Service Research	2
Pharmacology & Therapeutics	2	Substance Use & Misuse	2
Psychopharmacology	2		
Science	2		
Trends In Neurosciences	2		

Discussion

Substance abuse is common among most societies and is not only a major public health problem but also a social threat. In recent years, there is an increase in the number of the publications on substance abuse.

The mechanism and pathway of dependence at the cellular level, clinical trials of treatment for patients, pattern and mechanism of behavioral changes for prevention, and epidemiological studies of international patterns of drug dependence are the main issues which were investigated by the researchers.

The impact of the publications that is reflected by the number of citation is a matter of concern. It is important for all authors that their publication appears useful by examining how often their publication cites in other articles. Citation count is a very essential measure of success for academic authors and has been shown to correlate with lots of factors in addition to novelty and impact of the research topic. In this study, we compared not only the common factors which may influence citation of each publication like study design, international and multicenter studies, journal of publication and etc, but also specific factors which may influence citation rate of articles in the field of drug abuse

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including the type of drug or approach of study or subject category of publications.

The result of our study showed that topic is an important criterion for citation rate. Evaluating the mechanisms and possible pathway of drug dependence were the favorable topics in highly cited publications. In contrast, uncited publications highly were epidemiologic studies which identify the prevalence or explore the behavioral factors influencing risk of drug dependence. This finding may be a reflection of a sense of failure in measures that try to prevent substance abuse by intentional active measures and increase tendency to find passive measures of preventions like genetic or neuro-science interventions. The importance of topic as a predictor of citation has been reported before, Filion and Pless reported that in the field of cardiovascular diseases, those epidemiological papers which investigated risk factors were more cited compared to other epidemiological papers in this field (8).

No difference was observed in substance type among highly and uncited publications. Most publications in both groups were concerned with general substance abuse. The specific drugs, which highly were discussed, were alcohol, nicotine and tobacco and cocaine derivatives, amphetamines, morphine, methadone and cannabis. However according to the report of World drug, cannabis users comprise the largest number of illicit drug users (129-190 million people). Amphetamine- group substances rank as the second most commonly used drug, followed by cocaine and opiates (1). This pattern was not observed even among highly cited publications. In this study we found that the number of multicenter and multinational publications was significantly higher among highly cited publications compared to uncited publications even among papers with first affiliation to the US. This finding is in contrast with finding of Small which indicates that international papers are not related to being highly cited but for small countries or cities (9).

An impact factor is a main characteristic of the journals. This study like most other studies (8-10) found that impact factors of journals are significantly higher among highly cited publications compared to uncited publications. Callaham et al. study showed that impact factor was the most important predictor of citation (11). However in this study we found that in highly cited articles, there was not significant correlation between Impact factors of journals and the number of citation of publications.

Studies have shown that different characteristics of authors may influence the chance of their papers to be highly cited. Parker et al., believe that there is multiple pathways for authors to become highly cited and have discussed social characteristics of authors of highly cited publications like geographic distribution, gender, social characters like drinking behaviors, age, size and ownership of laboratory of work place, working time distribution between research and other services (12). In this study, we examined factors which can be obtained about the first author from the abstract of the publication. The affiliation of first author of

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highly cited and uncited publications was mainly universities whilst the proportion of affiliation to the top ranking universities compared to other research institutions was more among publications with highly citation. The US was the country of affiliation of most authors in highly and uncited publications whilst the proportion of the US as country of affiliation of the first authors was significantly less in uncited publications. Other studies also have shown that highly cited publications are more likely to be published by authors from the US institutions (8-12).

This study did not find significant difference in gender of authors among highly cited and uncited articles and approximately half of the authors in both groups of publications were females. This finding is in contrast with the finding of Parker et al. (12) which found that only 5.5% of authors of highly cited publications were females. However the difference in this finding may be due to the difference in the field of study. Bhattacharyya and Shapiro in their study on female authorship over the past three decades in the field of otolaryngology has noticed that there was an increasing trends in female authorship in scientific publications (13).

Among other general factors influencing citation, we investigated the number of authors, number of references, number of pages of article, type of publication and language of publication. Except for average number of pages of article, the other factors were found to be significantly different between highly cited and uncited publications. In this study we found that the average number of authors per publication was 1.5 times more among highly cited publications. Kostoff (10) showed that this proportion was 15 to 20 times more for highly cited compared to poorly cited articles which is much more than this result. Also number of references was 3.5 times more among highly cited publications compared to uncited publications; this proportion was approximately similar to the finding of Kostoff (10). Reviews were significantly predominant among highly cited publications compared to uncited publications and English was the sole language of highly cited publications.

Relying solely on information available on Web of Science database, was the limitation of this study, also self-citation was not considered. Abhaya et al. in his study (14) has reported the limitations of ISI as a database for citation information. Scopus and Google scholar, the two other citation databases, have more limitations compared to ISI (15,16).

Conclusion

This study showed that study design, subject area and topic influence citation rate of publication in the field of substance abuse. In addition impact factor of the publishing journals, language of publications and geographic distribution of publications, number of authors, type of documents and number of references could be the other predictors of citation rate.

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