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Top-100 cited articles on headache disorders: A bibliometric analysis

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ABSTRACT

Objective: The purpose of this study was to identify and characterize the most-cited articles on headache disorders published in journals that have made key contributions in the field.
Patients and methods: We performed a search of journals and selected the top-100 cited articles by utilizing the Institute for Scientific Information database available under the banner of the Web of Science, which provides the most relevant bibliometric information on scientific articles published since 1950.
Results: The top-100 cited articles were published in 20 journals. The most frequently cited journal was *Neurology* (19 articles), and followed by *Cephalagia* (15 articles) and *Headache* (15 articles). Migraine was the most common topic subject (81 articles), and original articles predominated (91 articles). The topics of the classic articles had varied from decade to decade. The most common topic subject was epidemiology (37 articles), followed by pathophysiology (20 articles), treatment (18 articles), review (10 articles), neuroimaging (11 articles), genetics (3 articles), and diagnostic tools (2 articles).
Conclusion: The present study has produced a detailed list of the most-cited articles on headache disorders, which is the first such study in this field. This list makes it possible to recognize the classic articles on headache disorders as well as research trends and academic achievements in this field.

1. Introduction

Headache is one of the most common disorders of the nervous system, and it has several subtypes: primary headache such as tension-type headache (TTH), migraine, and cluster headache; secondary headache; and other headaches [1]. Headache has a high prevalence, with worldwide epidemiology studies having found the global prevalence rates of current headache, migraine, and TTH to be 47%, 10%, and 38%, respectively, with corresponding lifetime prevalence rates of 66%, 14%, and 46% [2]. Headache disorders are highly burdensome at both the individual and societal levels, with a substantial penalty in lost production [3], and hence they are important targets for public health interventions.

The Science Citations Index was initiated at the Institute for Scientific Information (ISI), which is now owned by the Thomson Corporation of Toronto. It maintains a systematic ongoing measurement of the citation counts for scientific journals [4]. The ISI database, via the Expanded version of the Science Citation Index and the Journal Citation Reports, contains more than 11,000 international journals and provides the complete bibliographical information of these indexed publications [4]. It is a multidisciplinary index to the scientific journal literature. The number of citations an article receives after publication is considered to reflect its impact on the scientific community [5–7]. Reviewing articles that are cited frequently can provide information about the dominant areas of a discipline, as well as indicate the growth of particular fields.

Several studies have analyzed the most-cited articles in various medical fields, including general surgery [8], anesthesiology [9], emergency medicine [10], plastic surgery [11], dermatology [12], obstetrics and gynecology [13], orthopedic surgery [14], critical-care medicine [15], and various aspects of neurology such as essential tremor [16], neuroimaging [17] and epilepsy [18]. However, to the best of our knowledge, no previous study has comprehensively analyzed the most-cited articles on headache disorders.

The purpose of this study was to identify and characterize the most-cited articles on headache disorders published in journals that have made key contributions in the field.

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2. Material and methods

We performed a citation analysis of headache disorders. Citation analysis is a bibliometric method that examines the frequency and patterns of citations in articles. The processing stream of citation analysis consisted of several stages as described below.

First, we performed a search of journals and selected the most-cited articles by utilizing the ISI database available under the banner of the Web of Science. Based on the Science Edition 2014 of Journal Citation Reports, journals covering the following 3 topics were included: 192 journals on "clinical neurology," 252 journals on "neuroscience," and 110 journals on "medicine, general & internal." Because an article that has been cited more than 100 times is usually considered a "classic," we retrieved all articles that were cited more than 100 times at the time of the search (February 2016) using the "cited reference search" facility of the Expanded version of the Science Citation Index of the ISI Web of Science for each included journal. Classic articles tend to represent historical landmarks in the evolution of a specific area.

Second, to identify headache disorders-related articles, we searched for the terms "headache," "migraine," and "cephalalgia" in the selected articles that have been cited more than 100 times.

Third, we identified and selected the top-100 cited articles related to headache disorders. We then manually reviewed the contents of these articles by examining characteristics such as the number of citations, ranking, authorship, article title, year of publication, publishing journal, publication type, and topic categories. The publication types were categorized into original article, case series, and systemic review, and the topic subjects were subtyped as epidemiology, review, pathophysiology, treatment, neuroimaging, genetics, and diagnostic tools. We excluded articles regarding guidelines because they were not research articles. When the authors of an article had more than one affiliation, the department, institution, and country of origin for the article were defined by the affiliation of the first author. Data are presented using descriptive statistics, and no tests of statistical significance were performed. This study did not need to be reviewed by an ethics committee because it performed a bibliometric analysis of existing published studies and did not involve any additional human subjects.

3. Results

Five hundred and thirty articles directly related to headache disorders and cited more than 100 times in the ISI database were retrieved. We selected the 100 most frequently cited articles for further analysis, and ranked them according to the number of citations (Table 1). The most- and least-cited articles were cited 1059 and 209 times, respectively, with 21 articles being cited 400 times.

The top-100 cited articles were published in 20 journals (Table 2). The most frequently cited journal was *Neurology* (19 articles), followed by *Headache* (16 articles), and *Cephalagia* (12 articles). About half of the articles (49 articles) were retrieved from these three journals.

Migraine was the most common topic subject (81 articles). There were three articles on trigeminal autonomic cephalalgias, and only one article regarding TTH was found. In addition, there was an article related with internal carotid and vertebral artery dissections, and an article about orthostatic headache with magnetic resonance imaging.

The top-100 cited articles originated from institutions in 12 countries, with the United States of America (USA) contributing 44 articles, followed by Denmark (16 articles), the United Kingdom (UK) (10 articles), and the Netherlands (8 articles) (Table 3).

Tables 4 and 5 list the top-ranked institutions and authors for the published headache-disorder citation classics associated with three or more articles. Eight institutions provided three or more most-cited articles. The institutions associated with the largest number of headache-disorder citation classics were Leiden University in the Netherlands (eight articles), followed by the University of Copenhagen in Denmark (seven articles) and Albert Einstein College of Medicine in the USA (seven articles). The first authors who appeared most frequently in the headache-disorder citation classics were Olesen J and Lipton RB, being the first authors of six articles each.

The publication decades are listed in Table 6, which indicates that 41 and 44 of the citation classics were published during the 2000s and 1990s, respectively. The earliest recorded article was published in 1960, and the most recent article was published in 2010. Regarding article types, 90 were original articles and 10 were systemic review articles, and there were no case series. The most common topic subject was epidemiology (37 articles), followed by pathophysiology (20 articles), treatment (18 articles), review (10 articles), neuroimaging (11 articles), genetics (3 articles), and diagnostic tools (2 articles) (Table 6). Most of the studies concerning epidemiology and diagnostic tools were conducted before 2000, whereas the researches about treatment and genetics were performed after 2000.

4. Discussion

This study has identified and characterized the top-100 cited articles on headache disorders. These citation classics may facilitate the identification of academic advances and provide a historical perspective on the scientific progress and emerging topics in a particular field [6,7]. The present study utilized the ISI database to identify the important works in the field of headache disorders.

A particularly interesting finding was migraine being the most common topic subject in the top-100 cited articles on headache disorders (81 articles). This might be due to most studies of headache disorders focusing on migraine, perhaps due to its high prevalence and disabling nature. The top-ranked article, which was authored by Lipton RB in 2001, was on migraine [19]. This article was cited 1059 times and it described the prevalence, sociodemographic profile, and the burden of migraine in the USA in 1999. This article reported on the American Migraine Study II, which found that the prevalence of migraine was 18.2% among females and 6.5% among males, and increased from an age of 12 years up to an age of about 40 years, after which it declined in both sexes. It also revealed that work or school productivity was reduced by at least 50% in 51% of the respondents. Thus, that article concluded that migraine was a highly prevalent headache disorder that has a substantial impact on both the individual and society. The reported study also compared results with the original American Migraine Study performed in 1989 as a population-based epidemiologic study employing identical methods as those in the American Migraine Study II, which was surprisingly the second most frequently cited article in the field of headache disorders [20], being cited 1050 times. These two articles could be most frequently cited because the reported studies successfully demonstrated how important headache disorders are for public health. The third most frequently cited article was also related to migraine [21]. It was a review article describing the epidemiology, pathophysiology, and treatment of migraine, and was cited 934 times.

There were three articles on trigeminal autonomic cephalalgias [22–24], two of which were specific to cluster headache [23,24]. Cluster headache is an uncommon form of primary headache compared with migraine or TTH, but it is an important neurologic problem due to it being associated with prolonged disabling and distressing episodic pain [23]. Bahra et al. prospectively studied the clinical and epidemiologic characteristics of a large population of patients with cluster headache [23]. They found that patients with cluster headache were equally likely to be prescribed antimigraine prophylaxis that had not been shown to be effective in the treatment of cluster headache despite there being existing effective prophylactic options. The other study investigated the pathophysiology of cluster headache using positron-emission tomography [24]. Activation in the hypothalamus was seen solely in the pain state of cluster headache, suggesting central nervous system dysfunction in the region of the hypothalamus as the main pathological mechanism underlying cluster headache.