



Bibliometric analysis of acupuncture/acupressure publications used for the prevention/treatment of nausea and vomiting in children

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Abstract

Aim: The aim of the present study is to analyze the literature on acupuncture/acupressure used in the prevention/treatment of nausea and vomiting in children and to guide future research.

Materials and Methods: Between 01.01.1990 and 31.12.2022, publications on acupuncture/acupressure used for the prevention and treatment of nausea and vomiting in children were searched in the Web of Science Core Collection. The keywords used during this search were [“acupuncture OR acupressure” (All Fields) and “nausea OR vomiting” (All Fields) and “pediatric OR paediatric OR child OR children” (All Fields)]. The publications obtained after this search were scanned one by one and it was determined whether they were appropriate for the present study. The organizations, authors, countries, journals, publication languages and types, distribution of publications by years, Web of Science categories and the most used keywords in these studies were obtained from the Web of Science Core Collection. Descriptive analyzes were conducted in the light of the data obtained from the Web of Science Core Collection.

Results: There are 117 publications on acupuncture/acupressure, which is used in the prevention/treatment of nausea and vomiting in children. 63.2% of all publications were published in the last 10 years. Of all publications, only 2 (French, German) were not in English. These 117 publications have been published in 64 different journals. The most active authors; Kelly KM (5 publications), Liodden I (5 publications), Norheim AJ (5 publications), Vohra S (5 publications), the most active country; USA, which has 46.1% of all publications, the most active journal; 40 (34.1%) “Pediatrics” and the most active organization; 8 (6.8%) “Harvard University”. The most frequently used keywords were “acupuncture, nausea, vomiting, pediatrics and chemotherapy”. Looking at the distribution of publication types, almost 90% of all articles were research articles, 73 (62.3%) and reviews 32 (27.3%).

Conclusion: All articles on acupuncture/acupressure used for the treatment/prevention of nausea and vomiting in the field of pediatrics published to date in the Web of Science Core Collection were analyzed in the present study. It is obvious that there is a large literature on this subject in pediatric patients, although it is not as extensive and comprehensive as in adults. Especially in the last 10 years, the number of publications has increased significantly, and it is possible to expect a wider range of literature on this subject in the coming years.



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Introduction

The use of Traditional and Complementary Medicine (T&CM) has increased in recent years. It has been reported that T&CM methods such as acupuncture and phytotherapy are used by 2% to 30% of pediatric patients [1,2]. As a result of the growing interest among pediatric and

adult patients, the National Center for Complementary and Alternative Medicine (NCCAM) was established in the United States, thus investing substantial funds for the integration of T&CM into mainstream medical practice [3]. In the United States, in 2006, \$122.7 million was allocated to NCCAM to fund T&CM research [3]. Acupuncture is among the most commonly recommended T&CM treatments by clinicians to their patients worldwide [4-6]. It was reported that acupuncture was applied in more than

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140 hospitals in the United States in 2003 [7].

It has been known that acupuncture has been an integral part of Traditional Chinese Medicine (TCM) for over 2 centuries. TCM assumes that people have a fundamental energy force called "Qi" that constantly flows through the body in pathways called "meridians" [8,9]. Imbalances or interruptions in flow are believed to cause illness and pain. Acupuncture and related treatments are believed to regulate the flow of Qi when stimulated with needling, pressure, electricity, heat, or laser stimulation at specific points along the meridians, called "acupuncture points" [8, 10]. Acupuncture, used for the treatment of many medical conditions in adults, is being increasingly integrated into pediatric care. It is stated that one third of pediatric pain centers in the USA use acupuncture for their patients [11].

The exact mechanisms explaining the effects of acupuncture are still debated. The predominant explanation for its mechanism of action is that neurochemicals such as beta endorphins, enkephalins and serotonin are stimulated and released by acupuncture [12]. In animal studies, it has been reported that acupuncture produces changes in neurotransmission activities in various parts of the central nervous system (such as the brain stem, thalamus, pituitary, and hypothalamus) [13]. Another view on the mechanism of action mentions the strong effects of acupuncture on the autonomic nervous system [14]. Apart from all these mechanisms of action, it has also been reported that acupuncture mediates the production of nitric oxide and the increase in local blood flow [15]. The most extensively studied and used acupuncture point in children is P6 (Neiguan), located on the anterior surface of the wrist [16]. According to T&CM, surgery interrupts the balanced state of the human body by disturbing the movement of both Qi and blood, leading to stomach Qi going upward to cause nausea and vomiting [17]. By regulating the function of the stomach to reduce the adverse flow of Qi, P6 (Neiguan) stimulation may prevent nausea and vomiting [17].

Bibliometric analysis has emerged as one of the most widely used methods to evaluate the quality and impact of scientific studies [18]. One of the criteria used for bibliometric analyzes is the number of times the article is cited by researchers, and the most frequently cited article is probably the article that has had the most impact on the scientific community. Although bibliometric analysis is not an infallible technique, it is considered a valuable tool to identify potentially under-researched areas in a discipline [19].

Since prevention/treatment of nausea and vomiting is the most common use of acupuncture/acupressure in children, we planned to conduct a bibliometric on this subject. The purpose of the present study is to analyze the literature on acupuncture/acupressure used for the prevention/treatment of nausea and vomiting in children and to guide future research.

Materials and Methods

Web of Science (WoS) Core Collection was used in this bibliometric citation study. The Web of Science (WoS) Core Collection was preferred because it has easier access and higher interaction. Between 01.01.1990 and

31.12.2022, the WoS Core Collection was searched for publications related to acupuncture/acupressure used for the prevention/treatment of nausea and vomiting in children. The keywords used during this search were ["acupuncture OR acupressure" (All Fields) and "nausea OR vomiting" (All Fields) and "pediatric OR paediatric OR child OR children" (All Fields)]. These preferred keywords were scanned in the WoS Core Collection to include title, abstract and keywords to identify relevant publications that could be included in the present study. No exclusion criteria were chosen during the search in the Web of Science (WoS) Core Collection. Through this advanced search in the WoS Core Collection, the identified publications were reviewed one by one and it was determined whether they were suitable for this study. Publications not related to pediatric acupuncture/acupressure used for the prevention/treatment of nausea and vomiting were excluded from the study. The organizations, authors, countries, journals, publication languages and types, distribution of publications by years, WoS categories and the most used keywords in these studies were obtained from the WoS Core Collection. Graphical mapping of keywords was done via VOSviewer software to assess the current research focus. And also, Google Scholar and MEDLINE/PubMed databases were also used to provide missing data when necessary.

Statistical analysis

Data were downloaded in .csv format from the WoS Core Collection, exported to Microsoft® Excel and analyzed quantitatively and qualitatively. Descriptive analyzes were conducted in the light of the data obtained from the WoS Core Collection.

Results

In total, 117 publications on acupuncture/acupressure used for the prevention/treatment of nausea and vomiting in children were identified. Distribution of publications on acupuncture/acupressure used for the preven-

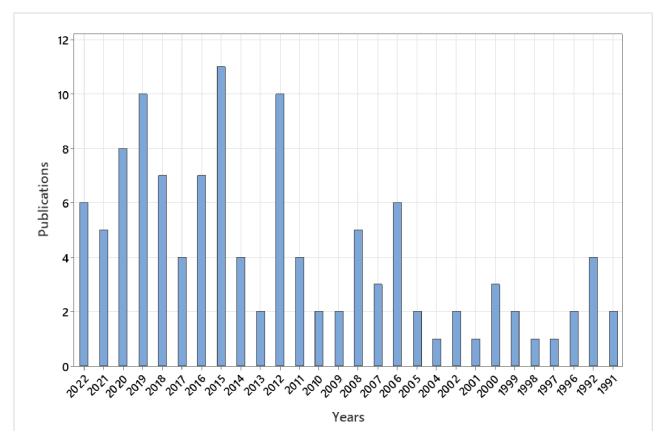


Figure 1. Distribution of publications on acupuncture/acupressure used for the prevention/treatment of nausea and vomiting in children by years.

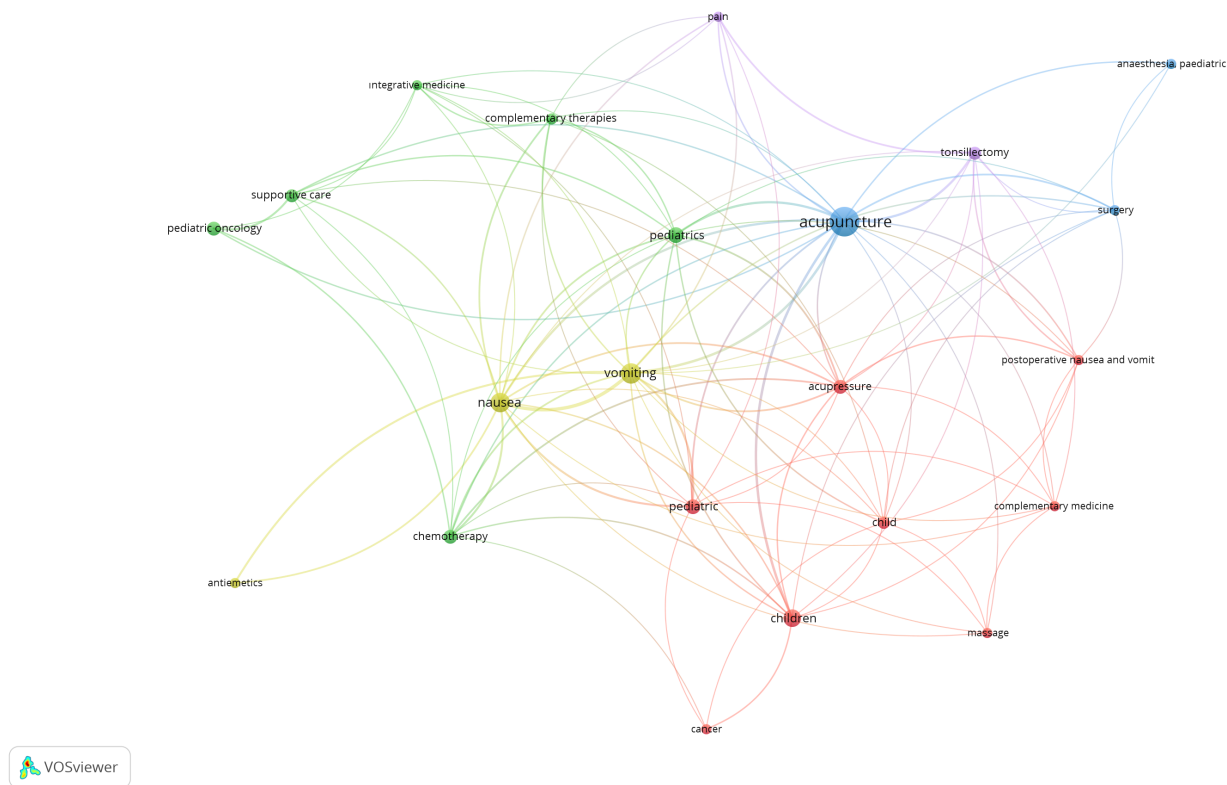


Figure 2. Most used keywords in publications on acupuncture/acupressure used for the prevention/ treatment of nausea and vomiting in children.

tion/treatment of nausea and vomiting in children by years are presented in Figure 1. It is noteworthy that 63.2% of all publications were published in the last 10 years. The 3 years in which the most publications were published were as follows: 2015 (11 publications), 2012 (10 publications), 2019 (10 publications).

The ten most active organisation, author, and country of acupuncture/acupressure and nausea/vomiting pediatric publications are listed in Table 1. The authors with the most publications were Kelly KM from Columbia University [5 (4.27%) publications and 46 citations], Liodden I [5 (4.27%) publications and 70 citations], Norheim AJ [5 (4.27%) publications and 70 citations] and Vohra S [5 (4.27%) publications and 129 citations]. Scientific contributions were made in this regard from 26 countries and 224 different centers. The countries with the most publications are the USA, with 54 (46.1%, with 1253 citations), Canada, with 12 (10.2%, with 395 citations), and Peoples Republic of China, with 11 (9.4%, with 83 citations). The organisation with the most publications is Harvard University, with 8 (6.8%, with 221 citations).

The ten most active WoS Research Categories, Journals, and Document Types of acupuncture/acupressure and nausea/vomiting pediatric publications are listed in Table 2. The 117 publications included in the present study were published in 64 different journals. The journals with the most publications are British Journal Of Anaesthesia with 9 (7.6%, with 444 citations), Medical Acupuncture with 7 (5.9%, with 7 citations) and Pediatric Anesthesia with 7

(5.9%, with 74 citations). Pediatrics, anesthesiology, integrative complementary medicine were the largest WoS research category, with 40 (34.1%) publications and 891 citations, 32 (27.3%) publications and 873 citations and 29 (24.7%) publications and 261 citations, respectively. The most active document types were research articles 73 (62.3%), and review articles 32 (27.3%). In the evaluation made in the Research articles, it was determined that nausea and vomiting were evaluated as the primary outcome in 32 (27.3%) of them.

Most used keywords in publications on acupuncture/acupressure used for the prevention and treatment of nausea and vomiting in children are shown in Figure 2. The most commonly used keywords were "acupuncture, pediatric/pediatrics, vomiting, nausea, acupressure and pediatric oncology".

The language distribution of the publications was as follows: English, 115 (98.3%); German, 1 (0.85%); and French, 1 (0.85%).

In the evaluation of research articles, it was seen that acupressure was the subject of 10 (8.5%) of them and acupuncture was the subject of 63 (53.8%) of them.

Discussion

A bibliometric analysis of acupuncture/acupressure publications used for the prevention/treatment of nausea and vomiting in children published in the period from 1990 to the end of 2022 was performed.

Table 1. The ten most active author, country and organisation of acupuncture/acupressure and nausea/vomiting pediatric publications.

	Number of publications (n, %)	Count of citations (n)
Authors, (first author/co-author)		
Kelly KM, (0/5)	5 (4.27%)	46
Liodden I, (4/1)	5 (4.27%)	70
Norheim AJ, (1/4)	5 (4.27%)	70
Vohra S, (2/3)	5 (4.27%)	129
Dupuis LL, (3/1)	4 (3.41%)	146
Jou H, (0/4)	4 (3.41%)	105
Golianu B, (1/2)	3 (2.56%)	35
Gottschling S, (2/1)	3 (2.56%)	100
Ladas EJ, (1/2)	3 (2.56%)	55
Lewis IH, (2/1)	3 (2.56%)	76
Countries		
USA	54 (46.1%)	1253
Canada	12 (10.2%)	395
Peoples R China	11 (9.4%)	83
Norway	6 (5.1%)	73
Egypt	5 (4.2%)	23
England	5 (4.2%)	181
Germany	5 (4.2%)	115
Japan	4 (3.4%)	26
Turkey	4 (3.4%)	50
Austria	3 (2.5%)	111
Organisations		
Harvard University	8 (6.8%)	221
Boston Children S Hospital	7 (5.9%)	201
Harvard Medical School	7 (5.9%)	219
Hospital For Sick Children Sickkids	7 (5.9%)	23
University of Toronto	7 (5.9%)	273
Columbia University	6 (5.1%)	81
Stanford University	6 (5.1%)	41
UIT The Arctic University of Tromso	6 (5.1%)	73
Egyptian Knowledge Bank EKB	5 (4.2%)	23
Mcmaster University	5 (4.2%)	163

The number of adult publications on acupuncture/acupressure is incomparably greater than publications on children. While there are hundreds of publications on the use of acupuncture/acupressure in adults even on a relatively specific issue such as pain [20-22], both the variety and number of publications in the pediatric population are limited. The results of the present study reveal that acupuncture/acupressure publications used for the prevention/treatment of nausea and vomiting in children have increased especially after 2010. We believe that the reason for the limited publications on acupuncture/acupressure in the pediatric population is the fear of needles in children and the clinicians' refusal to practice it as a result. It is widely accepted that acupuncture would not be accepted in the pediatric population, assuming that children are generally afraid of needles. However, as a result of the increase in applications, the

applicability and acceptability of acupuncture in the pediatric population has been demonstrated [23,24]. In addition, it was concluded that the adverse events associated with acupuncture needle in children are mild and safe when administered by trained professionals [25]. The increase in the evidence on safety and applicability suggests that the publications on acupuncture/acupressure used for the prevention/treatment of nausea and vomiting in children after 2010 are effective in the increase.

In this study, when the ten most active authors, countries and institutions in the publications related to acupuncture / acupressure used for the prevention / treatment of nausea and vomiting in children are evaluated, the dominance of the USA on this issue emerges. The fact that

Table 2. The ten most active Journals, Web of Science Research Categories and Document Types of acupuncture/acupressure and nausea/vomiting pediatric publications.

	Number of publications (n, %)	Count of citations (n)
Journals, 2022 Impact Factor		
British Journal of Anaesthesia, 9.8	9 (7.6%)	444
Medical Acupuncture, 1.1	7 (5.9%)	7
Pediatric Anesthesia, 1.7	7 (5.9%)	74
Anesthesiology, 8.8	4 (3.4%)	195
Journal Of Pediatric Hematology Oncology, 1.2	4 (3.4%)	161
Pediatric Blood Cancer, 3.2	4 (3.4%)	148
Acupuncture in Medicine, 2.5	3 (2.5%)	63
Children Basel, 2.4	3 (2.5%)	18
Evidence Based Complementary And Alternative Medicine,NA	3 (2.5%)	55
Explore The Journal Of Science And Healing, 2.4	3 (2.5%)	39
Web of Science Research Categories		
Pediatrics	40 (34.1%)	891
Anesthesiology	32 (27.3%)	873
Integrative Complementary Medicine	29 (24.7%)	261
Oncology	17 (14.5%)	448
Hematology	(7.6%)	309
Nursing	6 (5.1%)	67
Medicine Research Experimental	5 (4.2%)	93
Otorhinolaryngology	4 (3.4%)	63
Pharmacology Pharmacy	4 (3.4%)	61
Gastroenterology Hepatology	3 (2.5%)	38
Document types		
Article	73 (62.3%)	1365
Review Article	32 (27.3%)	806
Letter	6 (5.1%)	5
Proceeding Paper	4 (3.4%)	127
Editorial Material	3 (2.5%)	19
Meeting Abstract	2 (1.7%)	0
Book Chapters	1 (0.8%)	0
Note	1 (0.8%)	60

six of the ten most active authors and organizations are from the USA, and almost half of the publications are from the USA, reveals this dominance in detail. Of course, the most important thing needed to establish this dominance is adequate support. The National Center for Complementary and Integrative Health (NCCIH) was established in 1998 for the integration of T&CM into mainstream medical practice in the USA [26]. The NCCIH funding of \$159.37 million in 2022 reveals the magnitude of the support and the reason for the US dominance in publications [3].

When the ten most active journals and WoS research categories in the present study are reviewed, the dominance of anesthesia practice in the use of acupuncture/acupressure in the pediatric population is striking. Of the 117 publications identified for this bibliometric analysis, 54 were directly related to the use of acupuncture/acupressure for the prevention/treatment of nausea and vomiting in children in the perioperative period. We believe that the reason for this dominance in anesthesia practice is that acupuncture/acupressure can be applied more easily in children under anesthesia. Since medical agents used for postoperative nausea-vomiting in children have undesirable effects, acupuncture/acupressure has been suggested as a good alternative for the prevention/treatment of postoperative nausea-vomiting [27-29].

Although acupuncture has a very long history, as with many T&CM methods, its integration into mainstream medical practice has begun to take place in the last few decades. The steps taken in this regard, especially in developed countries, were found encouraging in many other countries and the acceptance of T&CM methods became easier. Acupuncture, which is perhaps the most popular and widely accepted method among T&CM methods, seems to be increasingly used in children as well as in adults.

Limitations

There are some limitations of this study. The main limitation is the use of only the WoS database. The number of citations is a variable and dynamic value, and therefore bibliometric analysis studies are like taking a snapshot of the ever-evolving literature. Also, articles published in previous years appear more in the literature and are therefore more likely to collect more citations than articles published more recently. One may also note that, "Web of Science" may not show the exact number of citations due to its nature. However, bibliometric analysis of acupuncture/acupressure publications used for the prevention/treatment of nausea and vomiting in children provides insight into trends in the use of acupuncture for nausea and vomiting in the pediatric population.

Conclusion

In conclusion, we believe that the use of acupuncture in children will become more widespread in the future, especially with the decrease in the concerns about the use of acupuncture in children and the increase in support from health systems. The results of this bibliometric analysis suggest that more publications on acupuncture in the pediatric population will be published.

Ethical approval

It is a study that does not require an Ethics Committee.

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