

A Bibliometric Analysis and Visualisation of Research Trends in Disposable Infusion Pumps

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Abstract : Disposable infusion pumps are having the advantages of small size, lightweight, independence, and disposability. The bibliometric analysis had been conducted to understand the active authors, organizations, journals, and countries involved in the research domain of “Disposable infusion pumps”. All published articles related to “Disposable infusion pumps” from “Scopus”, were analyzed using the VOS viewer to develop analysis tables and visualization maps. This article had set the objective to consolidate the scientific literature regarding “Disposable infusion pumps” and also to find out the trends related to the same. The most active journals in this research domain were Anesthesia and Analgesia, and the European Journal of Cancer. The most active countries were the USA, France, and Austria. The leading organizations engaged in the research regarding disposable infusion pumps were Duke University Medical Centre of the USA and the Hospital Lapeyronie of France. The most active authors who had made valuable contributions related to disposable infusion pump was Klein S.M.

Keywords: Metamaterial, Disposable infusion pumps, Bibliometric analysis, VOS viewer,

INTRODUCTION

An Infusion pump is electro-medical equipment to introduce medications or nutrients (other than blood) into blood vessels efficiently [1][2]. Disposable infusion pumps are having the advantages of small size, lightweight, independence, and disposability. The pressure generated by disposable infusion pumps is of a range of 250-600mm Hg. There are various types of disposable infusion pumps and the major determinants of the accuracy of each type of disposable infusion pumps were identified as temperature, fluid viscosity, atmospheric pressure, back pressure, partial filling, and storage [3]. A disposable infusion pump is an important research niche in material engineering [4]–[6] in the medical field. This article points out the need for future research regarding the disposable infusion pumps, especially waste management during the time of pandemics. This bibliometric analysis will be a useful platform for future researchers by realizing the top researchers, organizations, and countries involved in research regarding the disposable infusion pump. This article is arranged in four sections. The first section is the introduction, followed by the discussion of the methodology by which the research was conducted. The third section deals with results and discussion. The fourth section deals with the conclusion.

1.1 Research Objectives

- a) To consolidate the literature regarding disposable infusion pumps

- b) To find out the trends related to research in disposable infusion pumps

The following research questions are framed for conducting bibliometric analysis systematically.

1.2 Research Questions

- Who are the active researchers working on disposable infusion pumps?
- Which are the main organizations and countries working on disposable infusion pumps?
- Which are the main journals related to disposable infusion pumps?

RESEARCH METHODOLOGY

Scopus files had been used for this article. For the article selection, the Boolean used was TITLE-ABS (disposable infusion pumps) on 13/01/2021. All the tables in this paper were created by using Microsoft Excel and VOS Viewer. Grammarly was used for spelling and grammar checks. Mendeley was used for article review and citation. This paper had been inspired by bibliometric analysis in its presentation style, analysis, and methodology from the works[7]–[13].

RESULTS AND DISCUSSION

1.1 Results

This first round of search produced an outcome of 158 documents, in nine languages, out of which 127 documents were in English. The classification of document categories is shown in Figure 1. For improving the quality of the analysis, we had selected only the peer-reviewed articles and all other documents had not been considered. Thus after using filters “Article” and “English” the second round search produced an outcome of 104 English articles (both open access and others) and had been used to conduct bibliometric analysis and visualization using VOS Viewer. The English research articles in this domain since 1971 had been shown in Figure 2.

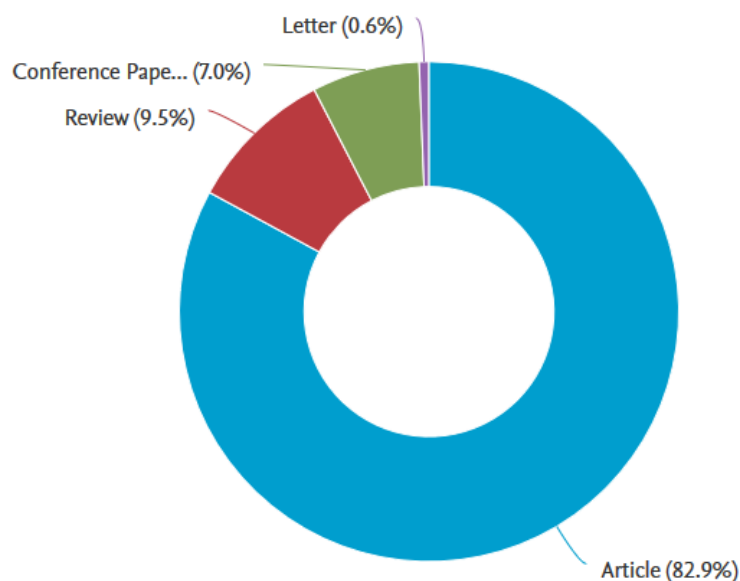


Figure 1: Classification of the documents on “Disposable infusion pumps”, Source: www.scopus.com

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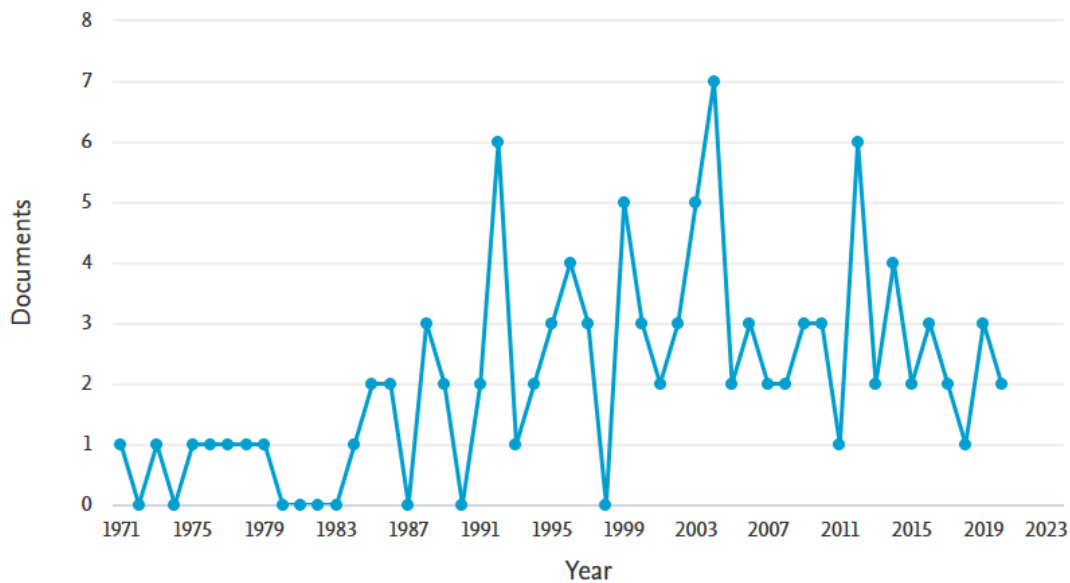


Figure 2: Period wise publication of articles, Source: WWW.scopus.com

Co-authorship analysis of top authors had been shown in figure 3. For a better presentation of the analysis, the parameters used were the minimum number of documents of an author as two and the minimum number of citations of authors as one. This combination plotted the map of 16 authors, in 6 clusters. The overlay visualization map of co-authorship analysis plotted in Figure 3, points out the major researchers with their strong co-authorship linkages and clusters involved.

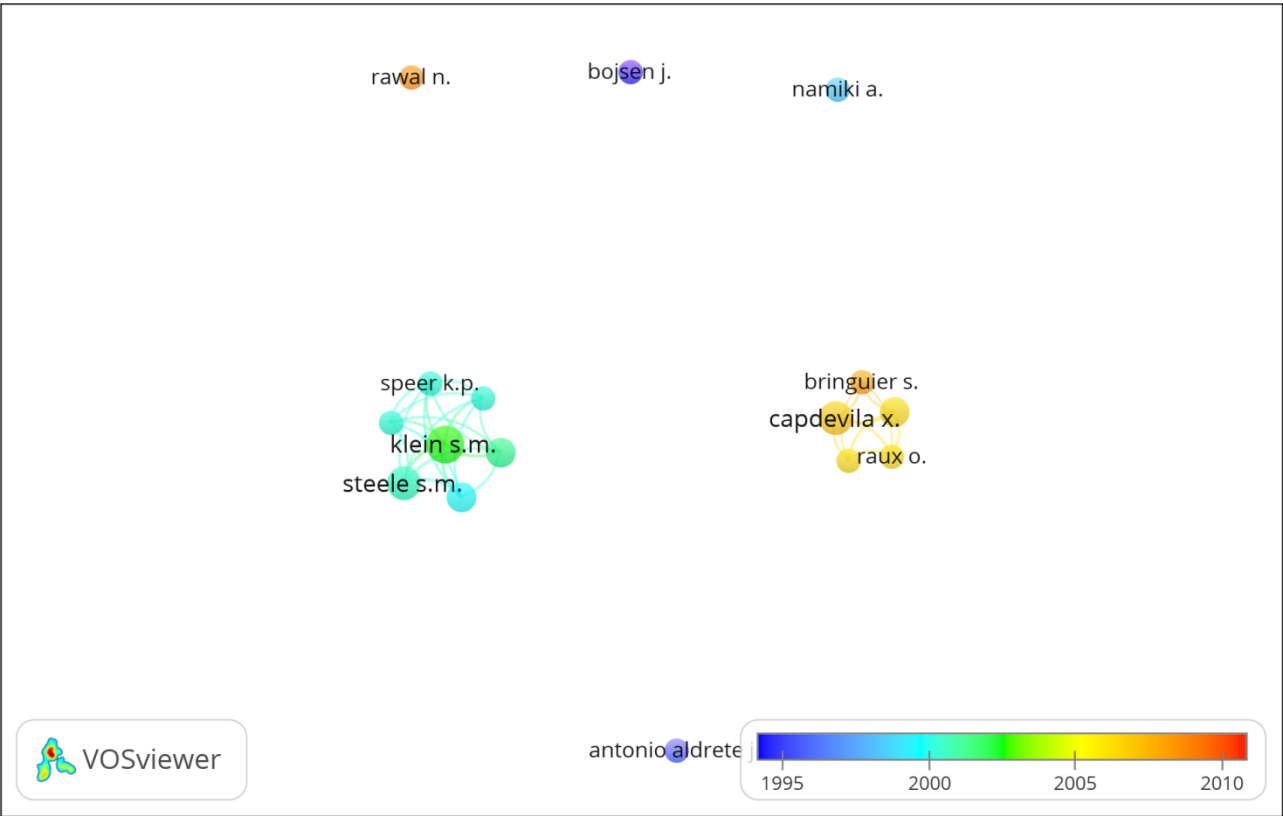


Figure 3: Co-authorship analysis on basis of authors

The citation analysis of top authors had been shown in table 1, along with co-authorship links. For the citation analysis, the parameters used were the minimum number of documents of an author as one and the minimum citations of an author as one.

Table 1: Highlights of most active authors

Description	Authors	Documents	Citations	Average citations per documents	Link strength
Authors with the highest publication, citations, and co-authorship links	Klein S.M.	5	384	76.8	24

In Co-occurrence analysis, we had used all keyword analyses, by keeping the minimum number of occurrences of a keyword as 15. This combination plotted the map of 21 thresholds, in three clusters. The overlay visualization of co-occurrence analysis of keywords has been shown in Figure 4.

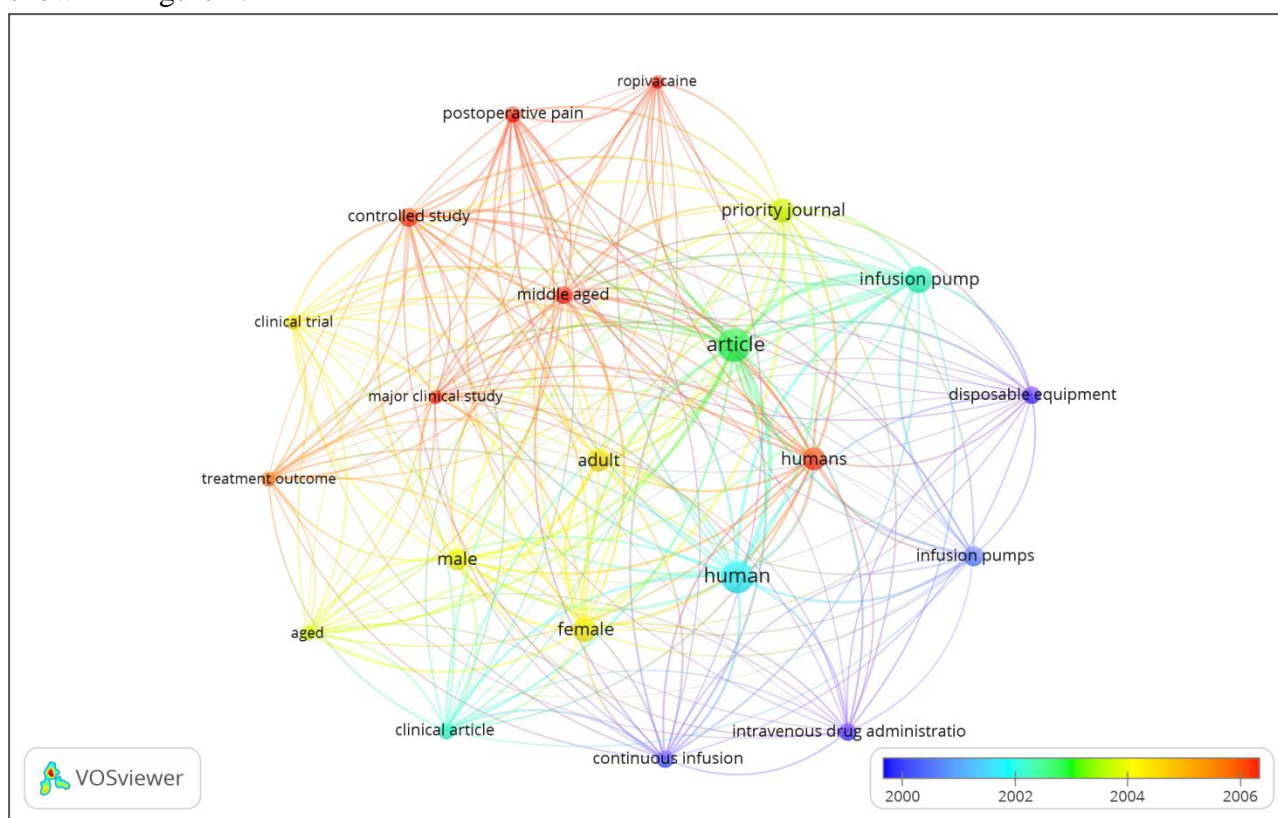


Figure 4: Co-occurrence analysis on basis of all keywords

The leading organizations engaged in research on “Disposable infusion pump” had been found out by the volume of publications and citation analysis, the parameters used are the minimum number of documents of an organization as one and the minimum number of citations of organizations as one. The leading organizations in the research regarding

“Disposable infusion pump”, with the highest number of publications and citations, were the Duke University Medical Centre of the USA and the Hospital Lapeyronie of France. The H-index figure had been drawn from Scopus analysis (Refer to table 2).

Table 2: Highlights of the most active organization

Organizations	Country	Documents	Citations	Average Citations per document	h-index
Duke University Medical Centre	United States of America	5	384	76.8	5
Hospital Lapeyronie	France	4	250	62.5	4

Co-authorship analysis of the countries engaged in the research on “Disposable infusion pump” had been shown in Figure 5. For a better presentation of the analysis, the parameters used were the minimum number of documents of an author as three and the minimum number of citations of authors as one. This combination plotted the map of 13 countries, seven clusters. The overlay visualization map of co-authorship analysis plotted in Figure 5, points out the main countries with their strong co-authorship linkages and clusters involved.

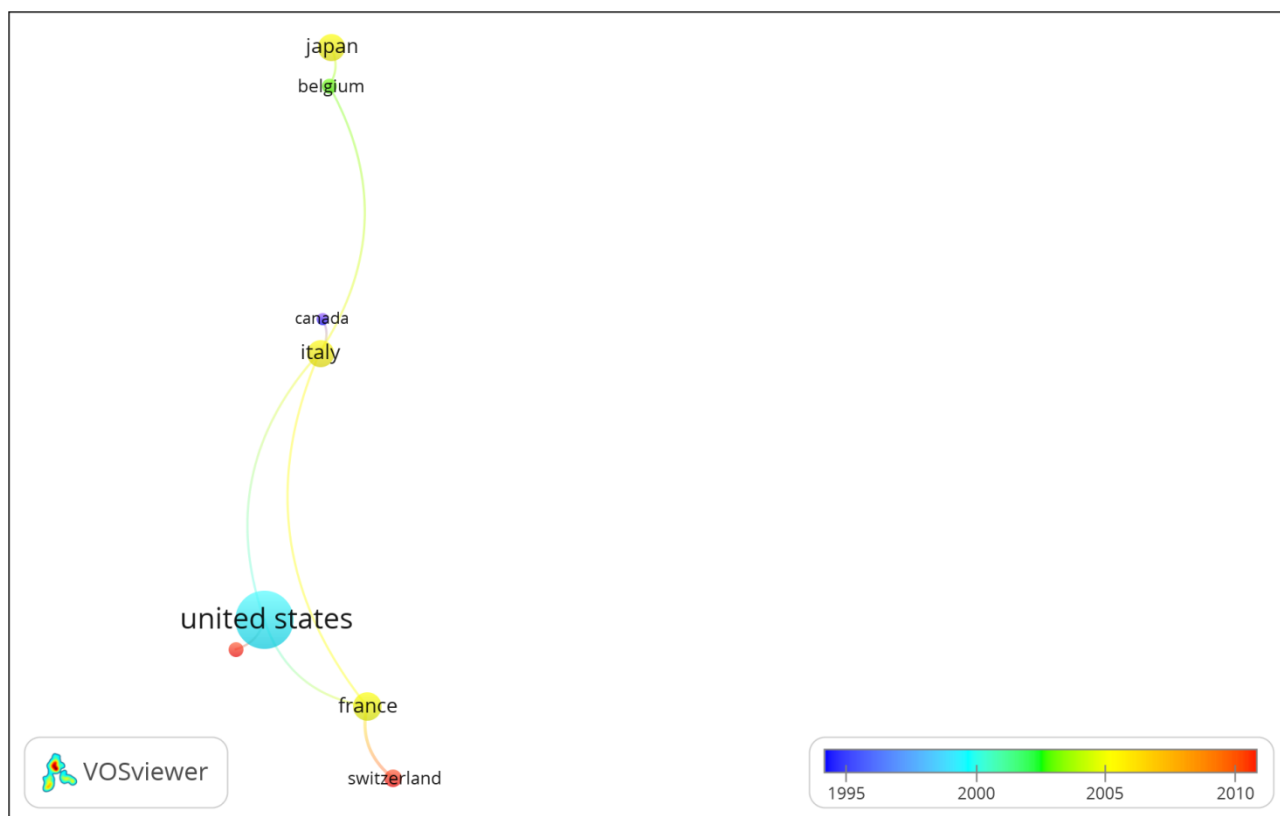


Figure 5: Co-authorship analysis on basis of countries

The citation analysis of top countries had been shown in table 3, along with co-authorship links. For the citation analysis, the parameters used were the minimum number of documents of a country as one and the minimum citations of the country as one.

Table 3: Highlights of Active Countries

Description	Country	Documents	Citations	Average citations per documents	Link strength
The country with the highest publication, citations,	United States of America	42	1119	26.64	3
The country with the highest average citations	Australia	1	63	63	1
The country with the highest co-authorship links	France	10	542	54.2	7

The most active countries in this research domain were the USA, with the highest number of publications and citations, Austria with the highest average citations and France is the country with the highest co-authorship links.

Link analysis and citation analysis were used to identify the most active journal in this research domain. We have taken the parameters of the minimum number of documents of a journal as one and the minimum number of citations of a journal as one for the link analysis and citation analysis. Highlights of the most active and relevant journals related to “Disposable infusion pump” are shown in table 4. Table 4 shows the journal activity of this research domain through parameters of publication volume, citations, and co-authorship linkages.

Table 4: Analysis of journal activity

Description	Journal details	Documents	Citations	Average citations per documents	Link strength
Journal with the highest publications, citations, and co-authorship links	Anesthesia and Analgesia	8	496	62	9
Journal with the highest average citations	European Journal of Cancer	1	236	236	0

From the above discussion regarding the bibliometric patterns in the research regarding disposable infusion pumps, this research had observed a gradual increase in research interest regarding disposable infusion pumps from the starting of the millennium and the momentum is going on positively. This points out the relevance and potential of this research domain (Refer to Figure 2). The most active authors in this research domain were Klein S.M. with the highest co-authorship links, citations, and (Refer to table 1). The overlay analysis of top countries researching disposable infusion pumps indicates that the USA, France, and Austria were the leading countries relating to the highest number of publications, citations, and co-authorship links (Refer to figure 5). The top journals of this research domain were identified as Anesthesia and Analgesia, and the European Journal of Cancer. From these wide sources of information, researchers can focus on top journals where they can identify the most relevant and highly cited articles regarding Nano ceramics.

CONCLUSION

A disposable infusion pump was an interesting research domain and the most active journals related to this research domain are Anesthesia and Analgesia, and the European Journal of Cancer. The most active countries were the USA, France, and Austria. The leading organizations engaged in the research regarding disposable infusion pumps were Duke University Medical Centre of the USA and the Hospital Lapeyronie of France. The most active authors who had made valuable contributions related to disposable infusion pump was Klein S.M. This research domain offers a new avenue for researchers and future research can be on Metamaterial [6], [14] and disposable infusion pump.

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