



Scope of Study of Human Tissues in Computer Engineering

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Abstract

This research paper is the visualisation of research trends in Aluminium and human tissues through Review analysis. This research will help to understand the active authors, organizations, journals, and countries involved in the research of “Aluminium human tissues”. All published articles related to “Aluminium human tissues” from “Scopus”, were analyzed using the Meta Analysis to develop analysis tables and visualization maps. This article had set the objective to consolidate the scientific literature regarding “Aluminium human tissues” and also to find out the trends related to the same. The leading Journals were the Journal of Biomedical Materials Research and Biomaterials. The most active country was the United States of America. The leading organization engaged in research regarding Aluminium tissue implants was the Gothenberg University. The most active authors who had made valuable contributions related to Aluminium tissue Simplants were Cook S.D, Meredith N., Boyan B.D

Keywords: Aluminium, Human tissues, Material engineering, Review analysis, Meta Analysis,

1. Introduction

Aluminium based orthopaedic implants are a popular type of implants. Aluminium implants are widely used for bone implants, knee and hip implants. Now, days Aluminium metal had been used for diversified applications for tissue engineering. Aluminium based tissues are used for medical purposes. The major challenge associated with Aluminium- implants is corrosion of the Aluminium implants (Bayer, Tiwari and Megaridis, 2008). However, the threat of corrosion of Aluminium implants can be handled by the advances in material engineering; surface coating; and by using Aluminium free implants.

The other challenges faced by the Aluminium implants are the allergy or hypersensitivity; and toxicity; high level of serum Aluminium level (Grübl *et al.*, 2006) and lead to various complicated health issues. But contradictory studies are highlighting that there is no evidence for high-level Aluminium content (Adams *et al.*, 2003). A higher level of Aluminium content in human tissues, especially the high level of Aluminium content in brain tissues and breast tissues can create many health disorders. Aluminium based materials were used for various types of tissue repairs and tissue



replacements (Alexander *et al.*, 1985). Aluminium foils were widely applied for tissue engineering (Bayer, Tiwari and Megaridis, 2008). Human soft tissue sarcoma is a type of cancer and Aluminium phthalocyanine ALPs-4-mediated photodynamic therapy can be used for the treatment of this disease.

Material engineering and surface engineering can play a significant role in improving the performance and life of Aluminium–implants along with measures for reducing toxicity and hypersensitivity of the metal. This Review analysis will be a useful platform for future researchers by realizing the top researchers, organizations, and countries involved in research regarding Aluminium -implants.

This article is arranged into 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. The following research objectives and research questions were framed for conducting Review analysis systematically.

1.1 Research Objectives

- a) To consolidate the literature regarding Aluminium for human tissues
- b) To find out the trends related to research in Aluminium for human tissues

1.2 Research Questions

- a) Who are the active researchers working on Aluminium for human tissues?
- b) Which are the main organizations and countries working on Aluminium for human tissues?
- c) Which are the main journals on Aluminium for human tissues?

2. Research Methodology

Scopus files had been used for this article. For the article selection, the Boolean used was TITLE-ABS (Aluminium tissue implant). All the tables in this paper were created by using Microsoft Excel and Meta Analysis. Grammarly was used for spelling and grammar checks. Mendeley was used for article review and citation. This paper had been inspired by Review analysis in its presentation style, analysis, and methodology from the works.

3. Results and discussion

3.1 Results

This first round of search produced an outcome of 332 documents, in 14 languages, out of which 305 documents were in English. The classification of document categories is shown in Table 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 234 English articles (both open access and others) and had been used to conduct Review analysis and visualization using Meta Analysis. The English research articles in this domain since 1938 had been shown in Figure 1.

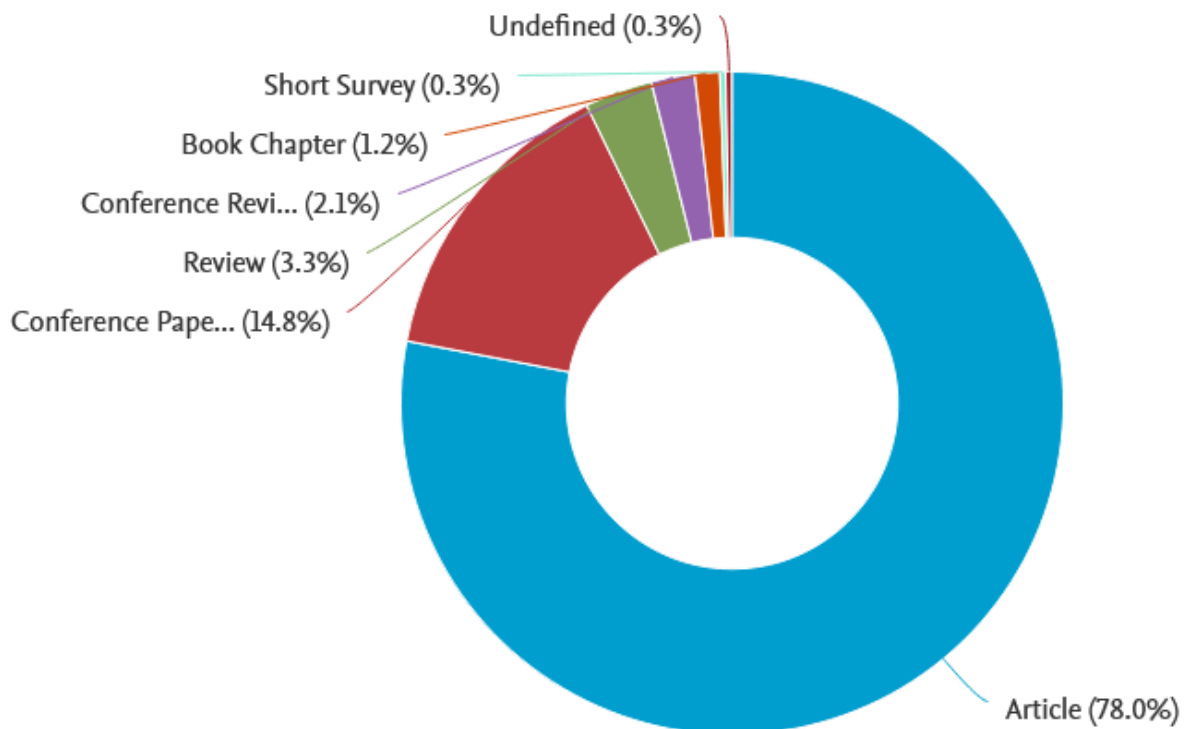


Figure 1: Classification of the documents on “Aluminium tissue implants”

Co-authorship analysis of top authors had been shown in Table 3. 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 21 authors, in 10 clusters. The overlay visualization map of co-authorship analysis plotted in Table 1, points out the major researchers with their strong co-authorship linkages and clusters involved. The citation analysis of top authors had been shown in table 1. 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	Cook S.D	9	426	47.3	21
Authors with the highest citations	Meredith N.	2	678	339	5
Authors with the highest links	Boyan B.D	5	344	79	27

In Co-occurrence analysis, we had used all keyword analyses, by keeping the minimum number of occurrences of a keyword as 30. This combination plotted the map of 27 thresholds, in three clusters. The overlay visualization of co-occurrence analysis of keywords has been shown in Table 2. The leading organizations engaged in research on “Aluminium tissue-implants” 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 organization in the research regarding “Aluminium tissue-implants”, with the highest number of publications and citations, was the Gothenberg University, Sweden (Refer to table 2).

Table 2: Highlights of the most active organization

Organizations	Country	Documents	Citations	Average Citations per document
Gothenberg University	Sweden	9	643	71.5

Co-authorship analysis of the countries engaged in the research on “Aluminium tissue-implants” had been shown in Table 3. The overlay visualization map of co-authorship analysis plotted in Table-3, points out the main countries with their strong co-authorship linkages and clusters involved. 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	Link strength
The country with the leading publication, citations, and co-authorship links	United States of America	77	4378	13

The most active country in this research domain was the United States of America, with the highest number of publications, and citations.



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 “Aluminium tissue-implants” are shown in table 4. Table 4 shows the journal activity of this research domain through parameters of publication volume and citations.

Table 4: Analysis of journal activity

Description	Journal details	Documents	Citations	Average citations per documents
Journal with the highest publications	Journal of Biomedical Materials Research	22	1149	52.2
Journal with the highest citations	Biomaterials	14	1304	10

From the above discussion regarding the Review patterns in the research regarding Aluminium tissue implants, this research had observed a gradual increase in research interest regarding Aluminium tissue implants 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 Table 2). The most active authors in this research domain were Cook S.D, Meredith N., Boyan B.D with the highest publication, citations and links respectively (Refer to table 1). The overlay analysis of top countries researching Aluminium tissue implants indicates that the United States of America was the leading country relating to the highest number of publications and citations (Refer to Table 5). The top journals of this research domain were identified as the Journal of Biomedical Materials Research and Biomaterials. From these wide sources of information, researchers can focus on top journals where they can identify the most relevant and highly cited articles regarding Aluminium tissue-implants.

4. Conclusion

Aluminium tissue implants was an interesting research domain and the most active journals related to this research domain was the Journal of Biomedical Materials Research and Biomaterials. The most active country was the United States of America. The leading organization engaged in research regarding Aluminium tissue implants was the Gothenberg University. The most active authors who had made valuable contributions related to Aluminium tissue implants were Cook S.D, Meredith N., Boyan B.D with the highest publication, citations and links respectively. This research domain offers a new avenue for researchers and future research can be on innovations in Aluminium tissue implants.



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