International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

A critical review on in Allergy of Aluminium Implants Using AI

Altaf Hasan Tarique, Assistant Professor, Department of Mechanical & Chemical Engineering, Galogotias University

Abstract

The visualisation of research trends of allergy of Aluminium implants by using Review analysis had been conducted in this paper. This research will help to understand the active authors, organizations, journals, and countries involved in the research on "allergy of Aluminium implants". All published articles related to "allergy of implants" from "Scopus", were analyzed using the VOS viewer to prepare and present the research trends. This article had set the objective to consolidate the scientific literature regarding "allergy of implants" and also to find out the trends related to the same. The leading Journals were the Contact Dermatitis. The most active country was the United States of America. The leading organization engaged in the research regarding allergy of Aluminium-implants was the Sao Paulo State University, Brazil. The most active author who had made valuable contributions related to an allergy to Aluminium dental implants was Valentra R.

Keywords: Aluminium, Allergy, Material engineering, analysis,

1. Introduction

Aluminium metal and aluminium oxide had diversified usage in the medical field. The aluminium metal had been used for ortho implants, knee implants, hip implants and dentistry. Corrosion of implants is a major threat to Aluminium-based implants.(Bayer, Tiwari and Megaridis, 2008). The major challenges associated with Aluminium implants are the allergy or hypersensitivity; and toxicity of Aluminium implants; high level of serum Aluminium level (Grübl *et al.*, 2006) and lead to various complicated health issues.

Allergy of Aluminium may affect both Aluminium implants and medicines based on Aluminium. The allergy to Aluminium may lead to various complicated health issues. There are evidence for Aluminium allergy on aluminium-adsorbed vaccines (Andersen, Zachariae and Johansen, 2014) contact allergy due to aluminium-adsorbed vaccines (Bergfors, Björkelund and Trollfors, 2005)(Bergfors *et al.*, 2014)(Bergfors and Trollfors, 2013)(Bergfors, Trollfors and Inerot, 2003, 2004). Contact allergy of Aluminium had been reported in cases of aluminium tubes in medical uses. Aluminium Finn Chambers are medical implants and contact allergy had been reported related to Aluminium Finn Chambers (Dwyer and Kerr, 1993). Similarly, findings are supporting Aluminium Ingestion causing colorectal allergy. But contradictory studies are highlighting that there is no evidence for high-level Aluminium content (Adams *et al.*, 2003).

Research in the field of material and surface engineering by using Aluminium can come up with solutions 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 allergy of Aluminium implants.

This article is arranged into four sections. The first section is the introduction, followed

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

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 allergy of aluminium implants
b) To find out the trends related to research in allergy of aluminium implants

1.2 Research Questions

a) Who are the active researchers working on the allergy of aluminium implants?
b) Which are the main organizations and countries working on the allergy of aluminium based implants?
c) Which are the main journals on the allergy of aluminium implants?

2. Research Methodology

Scopus files had been used for this article. For the article selection, the Boolean used was TITLE-ABS (Aluminium allergy). 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 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 297 documents, in15 languages, out of which 264 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 222 English articles (both open access and others) and had been used to conduct Review analysis and visualization using VOS Viewer. The English research articles in this domain since 1970.

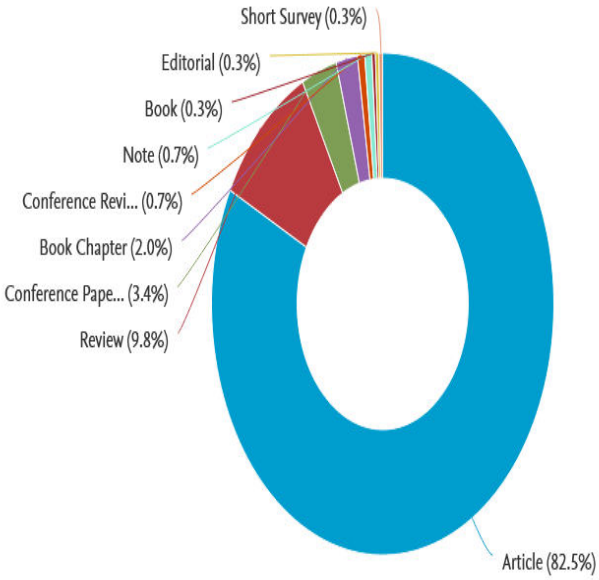

Figure 1: Classification of the documents on "allergy of Aluminium implant", Source:

Co-authorship analysis of top authors had been shown in figure 1. 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 24 authors, in 9clusters. 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. The citation analysis of top authors had been shown in table 1, along with co-authorship links. For the citation analysis, the parameters used

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

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 and co-authorship links	Valentra R	8	217	27	75
Authors with the highest citations	Levine B.B	1	363	363	1
	Vaz N.M	1	363	363	1

In Co-occurrence analysis, we had used all keyword analyses, by keeping the minimum number of occurrences of a keyword as 40. This combination plotted the map of 23thresholds, in two clusters. The overlay visualization of co-occurrence analysis of keywords has been shown in Figure 4.

The leading organizations engaged in research on "Allergy of Aluminium 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 "Allergy of Aluminium implants", with the highest number of publications and citations, was the Medical University of Vienna, Vienna (Refer to table 2).

Table 2: Highlights of the most active organization

Organizations	Country	Documents	Citations	Average Citations per document
Medical University of Vienna	Vienna	17	399	23.4

Co-authorship analysis of the countries engaged in the research on "Allergy of Aluminium implants" had been shown in Figure 5. 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 highest publication,	United States of America	40	1627	14

International Journal For Advanced Research In Science & Technology
A peer reviewed international journal
www.ijarst.in
ISSN: 2457-0362

citations, and co-authorship links				

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 "Allergy of Aluminium implants" are shown in table 4. Table 4shows 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	Links
Journal with the highest publications, citations and links	Contact Dermatitis	21	521	25	48

From the above discussion regarding the Review patterns in the research regarding allergy of Aluminium implants, this research had observed a gradual increase in research interest regarding allergy of Aluminium implantsfrom 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 author in this research domain was Valentra R with the highest publication and co-authorship links(Refer to table 1).The overlay analysis of top countries researching allergy of Aluminium implants indicates that the United States of America was the leading country relating to the highest number of publications, citations, and co-authorship links(Refer to figure 1). The top journal of this research domain was identified as Contact Dermatitis. From these wide sources of information, researchers can focus on top journals where they can identify the most relevant and highly cited articles regarding allergy of Aluminium implants.

Conclusion

The allergy of Aluminium implants was an interesting research domain and the most active journals related to this research domain was Contact Dermatitis. The most active country was the United States of America. The leading organization engaged in the research regarding allergy of Aluminium-implants was the Sao Paulo State University, Brazil. The most active author who had made valuable contributions related to an allergy to Aluminium implants was Valentra R.T his research domain offers a new avenue for researchers and future research can be on innovations in allergy to Aluminium implants.

References

1. Adams, J. E. *et al.* (2003) 'Prosthetic implant associated sarcomas: A case report emphasizing surface evaluation and spectroscopic trace metal analysis', *Annals of Diagnostic Pathology*, 7(1), pp. 35–46. doi: 10.1053/adpa.2003.50006.
2. Andersen, R. M., Zachariae, C. and Johansen, J. D. (2014) 'Aluminium allergy and granulomas induced by vaccinations for children', *Ugeskrift for laeger*, 176(12).
3. Bayer, I. S., Tiwari, M. K. and Megaridis, C. M. (2008) 'Biocompatible poly(vinylidene fluoride)/cyanoacrylate composite coatings with tunable hydrophobicity and bonding strength', *Applied Physics Letters*, 93(17). doi: 10.1063/1.3009292.
4. Bergfors, E. *et al.* (2014) 'How common are long-lasting, intensely itching vaccination granulomas and contact allergy to aluminium induced by currently used pediatric vaccines? A prospective cohort study', *European Journal of Pediatrics*, 173(10), pp. 1297–1307. doi: 10.1007/s00431-014-2318-2.
5. Bergfors, E., Björkelund, C. and Trollfors, B. (2005) 'Nineteen cases of persistent pruritic nodules and contact allergy to aluminium after injection of commonly used aluminium-adsorbed vaccines', *European Journal of Pediatrics*, 164(11), pp. 691–697. doi: 10.1007/s00431-005-1704-1.
6. Bergfors, E. and Trollfors, B. (2013) 'Sixty-four children with persistent itching nodules and contact allergy to aluminium after vaccination with aluminium-adsorbed vaccines - Prognosis and outcome after booster vaccination', *European Journal of Pediatrics*, 172(2), pp. 171–177. doi: 10.1007/s00431-012-1841-2.
7. Bergfors, E., Trollfors, B. and Inerot, A. (2003) 'Unexpectedly high incidence of persistent itching nodules and delayed hypersensitivity to aluminium in children after the use of adsorbed vaccines from a single manufacturer', *Vaccine*, 22(1), pp. 64–69. doi: 10.1016/S0264-410X(03)00531-0.
8. Bergfors, E., Trollfors, B. and Inerot, A. (2004) 'Erratum: Unexpectedly high incidence of persistent itching nodules and delayed hypersensitivity to aluminium in children after the use of adsorbed vaccines from a single manufacturer (Vaccine (2004) 22 (64-69) DOI: 10.1016/S0264-410X(03)00531-0)', *Vaccine*, 22(11–12), p. 1586. doi: 10.1016/j.vaccine.2004.02.006.
9. Dwyer, C. M. and Kerr, R. E. (1993) 'Contact allergy to aluminium in 2 brothers', *Contact Dermatitis*, 29(1), pp. 36–38. doi: 10.1111/j.1600-0536.1993.tb04534.x.
10. Farhat, T. *et al.* (2013) 'Research in congenital heart disease: A comparative Review analysis between developing and developed countries', *Pediatric Cardiology*, 34(2), pp. 375–382. doi: 10.1007/s00246-012-0466-6.
11. Grübl, A. *et al.* (2006) 'Serum aluminium and cobalt levels after ceramic-on-ceramic and metal-on-metal total hip replacement', *Journal of Bone and Joint Surgery - Series B*, 88(8), pp. 1003–1005. doi: 10.1302/0301-620X.88B8.17870.
12. Singh, H. and Kumar, R. (2013) 'Measuring the utilization index of advanced manufacturing technologies: A case study', in *IFAC Proceedings Volumes (IFAC-PapersOnline)*. Saint Petersburg: IFAC Secretariat, pp. 899–904. doi: 10.3182/20130619-3-RU-3018.00395.
13. Subramanian, B., Ananthakumar, R. and Jayachandran, M. (2010) 'Microstructural,

mechanical and electrochemical corrosion properties of sputtered titanium-aluminum-nitride films for bio-implants', *Vacuum*, 85(5), pp. 601–609. doi: 10.1016/j.vacuum.2010.08.019.