



Bibliometric Analysis of Iron Overload (IO) of Thalassemia Disease

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Abstract. Background: Iron overload (IO) is a condition of iron dyshomeostasis which is characterized by iron levels in the body exceeding the limit of iron needs that needed by the body and is characterized by an increase in the value of serum ferritin in the body, which is more than 1000 $\mu\text{g/L}$. There are many studies of iron overload disease, but there are no studies of bibliometric analysis of these studies. This study provides an overview of iron overload research in vivo. Method: Iron overload disease publications from 17 November, 2011 to December 2021, extracted from Pubmed database. Bibliometrics indicator analysis is performed by using Biblioshiny with keywords: Thalassemia, iron overload, in vivo. Result: From 17 November, 2011 to 17 December, 2021, there were 20 authors with the most authors in 2018 6 people (30%). Kontoghiorghe CN conducted research in 2015 1x and 2020 1x (10%). Frequently used keywords are human 6x (15%), test animal 5x (12.5%), female 4x (10%), male 4x (10%) of 40 keywords. Local author citations of 2 for 4 authors each, namely Chattipakorn N, Chattipakorn SC, Kontoghiorghe CN, Kontoghiorghes GJ. Chiang Mai University's most affiliated universities are 9 articles (16%). The most relevant countries according to correspondents are Cyprus 2 (22%) and Thailand 2 (22%). Journal sources are used 20 with the most journals Journal of magnetic resonance imaging (JMRI) as many as 2 (10%). Conclusion: Bibliometrics analysis of in vivo research of iron overload diseases such as thalassemia is helpful for mapping research-related studies. This article provides an overview of further research related to iron overload disease research.

Keywords: Thalassemia, Iron overload, In vivo

1 Introduction

Iron overload (IO) is a condition of iron dyshomeostasis which is characterized by iron levels in the body exceeding the limit of iron needs that needed by the body and is characterized by an increase in the value of serum ferritin in the body, which is more than 1000 $\mu\text{g/L}$. The cause of iron overload (IO) disorder is a consequence of the body's inability to excrete excess iron after the process of iron absorption by the intestines (Wang et al., 2021), in the research of Mobarra et al., (2016) the cause of iron overload comes from within the body (endogenous) such as genetic disorders and from outside

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the body (exogenous). In addition to genetic factors iron overload can be triggered from outside the body such as the frequency of transfusions that are too frequent, abuse of iron consumption as well as chronic hepatitis disease (Mobarra et al., 2016). The impact of excess iron overload due to hemochromatosis disorders can cause hyperpigmentation disorders, cirrhosis of the liver, diabetes, cardiomyopathy, artropy, as well as pituitary hypogonadism (Pipemo et al., 2020 in the study of Zachary et al., 2021).

Scientific literature in this domain field has increased to have a comprehensive picture of the current state of literature on iron overload for several reasons, such as 1) to organize and coordinate literature; 2) explore the research topics discussed; 3) understanding literary evolution; 4) to recognize leading researchers, institutions, and countries in this field. Overview of the full document on iron overload literature and *in vivo* tests available to cover the gaps described above. *In vivo* test activity on iron overload, research using test animals on iron flatfoot activity.

2 Methods

For the analysis, we use the following keywords: thalassemia, iron overload, *in vivo*. We're using updates that correspond to the timestamps of 17 November, 2011 to December 2021. All languages and documents are included for data search. Then, from the search results, in addition to be saved as a PubMed document for bibliometric analysis, it is also saved in an excel document to ensure that the document title contains relevant keywords and can be used for manual searches when needed.

Bibliometric analysis and all other processes are performed with Biblioshiny, a web interface application for Bibliometrix analysis accessed with R-Studio.

The newest keywords and trend of change used from 2011 to 2021 vary. keywords in the top 22 for ten years. Top 22 keywords: "iron overload/*in vivo*" (Table 3). The most productive authors were 20 authors in 2018 6 people (30%). Kontoghiorghe CN conducted research in 2015 1x 2020 1x (10%). Frequently used keywords are human 6x (15%), test animal 5x (12.5%), female 4x (10%), male 4x (10%) of 40 keywords.

3 Results and Discussion

The most productive authors from 2011 to 2021 were 20 authors with the most authors in 2018 6 people (30%). Kontoghiorghe CN conducted research in 2015 1x and 2020 1x (10%). Frequently used keywords are human 6x (15%), test animal 5x (12.5%), female 4x (10%), male 4x (10%) of 40 keywords. Local author citations of 2 for 4 authors each, namely Chattipakorn N, Chattipakorn SC, Kontoghiorghe CN, Kontoghiorghes GJ. Chiang Mai University's most affiliated universities are 9 articles (16%). The most relevant countries according to correspondents are Cyprus 2 (22%) and Thailand 2 (22%). Journal sources are used 20 with the most journals Journal of magnetic resonance imaging (JMRI) as many as 2 (10%).

Research on thalassemia with iron overload conditions on *in vivo* activity for 10 years from 2011 to 2021 from 7 countries Cyprus, Thailand, Canada, China, India, Iran

and USA there are 9 research articles. Cyprus and Thailand have 2 articles with a frequency of 0.222 scopus journal submissions 2. Canada, Thailand, China, India, Iran and USA have 1 article each with a frequency of 0.111 submit scopus journals 1 (Table 1).

Table 1. 7 Most Relevant Countries according to Correspondence

Country	Articles	Freq	SCP	MCP	MCP ratio
Cyprus	2	0,222	2	0	0
Thailand	2	0,222	2	0	0
Canada	1	0,111	1	0	0
China	1	0,111	1	0	0
India	1	0,111	1	0	0
Iran	1	0,111	1	0	0
USA	1	0,111	1	0	0

3.1 The Most Productive Journals

Most of the top 10 journals are infection journals (Table 2). Relevant to this research topic. The institution conducted research on the condition of iron overload on in vivo tests of 9 universities. Most productive institutions overall is 9, documents are the participating institutions. Journal volume 10 indicates that several universities coordinate to conduct research. The most prolific research institutes come from Journal Of Magnetic Resonance Imaging (20%), Biomaterials (10%), Indian (10%), blood (10%), Indian Journal of Hematology & Blood Transfusion: an official journal of Indian (10%), international journal of medicinal mushrooms (10%), journal of cellular physiology Mediterranean journal of hematology and infectious diseases (10%), molecules (Basel Switzerland) (10%), the Canadian journal of cardiology (10%) (Table 2).

Table 2. Top 9 Iron overload Publishing Institutions and research in vivo (2011- 2021).

Institution	Total Articles
Journal of magnetic resonance imaging: jmri	2
Biomaterials	1
Blood	1
Indian journal of hematology & blood transfusion: an official journal of indian society of hematology and blood transfusion	1
International journal of medicinal mushrooms	1
Journal of cellular physiology	1
Mediterranean journal of hematology and infectious diseases	1
Molecules (basel switzerland)	1
The canadian journal of cardiology	1

3.2 Keywords

In addition, keyword analysis highlighted the dominance of thalassemia topics with iron overload conditions on in vivo test activity with keywords such as "human", "test animal", "female", and "male". Keyword 40 provides important information about the dynamics of the issue and the larger scope of the study (Table 3 and figure 1). In addition to the information given above, the most used common keyword is human in 6 titles, animal used in 5 titles, female used in 4 titles, male used 4 titles, iron/blood/metabolism used 2 titles, iron/metabolism used 2 titles, rats used 2 titles, middle-aged used 2 titles, chain distribution used 2 titles, adiponectin/genetic used 2 titles. The keywords teen, adults, agaricales, antioxidants/metabolism, biological/pharmacological products, bone resorption transfusions/ genetic/ metabolism/ pathology blood transfusions, cardiomyopathy/ blood/ genetics/ pathology. Each of them used 1 title.

Table 3. 20 keywords from 2011 to 2021

Keywords	Event
humans	6
animals	5
female	4
male	4
iron/blood/metabolism	2
iron/metabolism	2
mice	2
middle aged	2
tissue distribution	2
adiponectin/genetics	1
adolescent	1
adult	1
agaricales	1
antioxidants/metabolism	1
biological products/pharmacology	1
blood transfusion	1
bone resorption/genetics/metabolism/pathology	1
cardiomyopathies/ blood/genetics/pathology	1
cation transport proteins/genetics/metabolism	1
chelating agents/pharmacology	1



Fig. 1. Size letter describes the level often keyword usage (Source: Biblioshiny Software)

4 Conclusion

Bibliometric analysis of thalassemia research, Iron Overload on in vivo activity tests is useful for mapping studies related to Iron Overload. This study provides an overview for further research related to research progress, for example by searching for the keywords in vitro, ex vivo.

Ethical Permits. Ethical permission is not required in this study.

Conflict of Interest. The authors have no conflict of interest regarding this investigation.

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