



**International Journal of Biology, Pharmacy  
and Allied Sciences (IJBPAS)**

*'A Bridge Between Laboratory and Reader'*

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## INDIAN RESEARCH TRENDS IN THALASSEMIA: A BIBLIOMETRIC STUDY

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Received 19<sup>th</sup> Aug. 2021; Revised 20<sup>th</sup> Sept. 2021; Accepted 29<sup>th</sup> Oct. 2021; Available online 1<sup>st</sup> Dec. 2021

<https://doi.org/10.31032/IJBPAS/2021/10.12.2009>

### ABSTRACT

This study represents the Thalassaemia research output in India during 1987 to 2020. Pub Med database has been used and retrieved 979 data on thalassaemia research. It been observed that 297 sources like journals, books etc has used in this study. Study showed that 9.42 average years from publication and average citation per documents is 8.428. Multi authors have done maximum research in comparison to single authors. The author collaboration index is 2.59. Maximum no. of publication (96) published in the year 2020 and 1989 had lowest no. of publications (2). Hemoglobin” and “Indian Journal of Hematology & Blood Transfusion” has contributed highest no. of publications (61) each respectively. Indian journal of paediatrics has highest h-index =13, g-index =20 and 556 total citations. All India Institute of Medical Science (AIIMS) has contributed the maximum no. of research on thalassaemia followed by Christian Medical College. Authors keywords, title keywords and abstract keywords were analyzed.

**Keywords: Bibliometrics, Thalassaemia, PubMed, Haematology, Indian Scholars,  
Mediterranean Thalassaemia**

### INTRODUCTION

Bibliometric is the scientific and quantitative study of publications it has existed as a discipline for many decades. Bibliometrics has developed rapidly since 1960's largely

because of the theoretical work by Derek de Solla Price and practical work of Eugene Garfield. Bibliometrics is the study of books, papers, and other publications using statistical

methods. In the subject of library and information science, bibliometric methods are extensively utilised. Scientometrics is a sub-discipline of bibliometrics that deals with the examination of scientific publications.

Thalassemia is a genetic blood disorder in which body produce less amount of haemoglobin. Haemoglobin is the protein particle in red platelets that conveys oxygen. When there is insufficient haemoglobin, the red blood cells not work properly. This problem causes unreasonable obliteration of red platelets, prompting iron deficiency. There are around 3.6 to 3.9 crore carriers of  $\beta$  - thalassemia in India, and approximately 10000 to 15,000 new born with  $\beta$  -thalassemia major is born each year, with approximately 150000 Thalassemia major patients.

## REVIEW OF LITERATURE

There are very few bibliometrics study conducted on thalassemia, reviews are done for the further understanding of topics.

Pouris and Pouris (2011) carried out scientrometric study on HIV/AIDS research in South Africa and the world. 2316 papers had been analyzed for the period 1996 to 2006. Globally, South Africa had largest number of HIV patient. This study highlighted the status of HIV/AIDS research in South Africa and worldwide. The USA had produces highest no. of publications. Hereditary blood disorders research output in India conducted by Gupta, B.M. (2012) for the period 2002 – 2011. 29773 articles gathered from the Scopus

database and further analysed. The United States leads with 25.79% productivity among the top 20 countries. Maximum no. of publication published during 2007 to 2011. Prajapati, & et.al. investigated the international journal of ophthalmology through bibliometric analysis. Hopkins University and the University of California System contributed 561 papers respectively and hold 1<sup>st</sup> position. Wong TY is most prolific author contributed 136 papers. A bibliometric study on Dengue research output in Arab and Global for the period 1872 – 2015 analyzed by Zyoud, Saed H. (2016). 19581 articles has been extracted from Scopus database for the period 1872 to 2015. In the top 10 countries, the USA has highest productivity share (4709) followed by India (1942). In the Arab region, kingdom of Saudi Arab produced highest no. of papers.

## METHODOLOGY

PubMed is one of the largest biomedical science databases which has more than 33 million citations is used to collect data for bibliometric analysis. These data fetch with the use of keywords related to thalassemia. The keyword used were (Thalassemia or Thalassaemia or Mediterranean thalassemia) with the Affiliation of India for the period of 1987 to 2020. The 979 data were downloaded in CSV format and further analysed by using Ms-excel and Vos viewer used for collaboration.

## RESULT AND DISCUSSION

This study analysed 979 publications retrieved from PubMed database for the period of 1987 to 2020. This study showed 297 sources like journals, books etc., average years from publication is 9.42, average citation per documents (8.428), the average of citations per year per documents is 0.8274, keyword + and authors keywords are 2513 respectively, multi authored documents are dominated 2412 and single authors documents are 29, collaboration of single authored documents (49), documents per author (0.401), authors per documents (2.49), Co-authors per documents (5.04) and collaboration index (2.59). The publications per year is 27.94 and relative citation ratio is 440.05 also measured.

#### YEAR WISE PUBLICATION GROWTH

**Table 1**, depicts the year wise publications growth in the field of thalassemia. Before 2010 the research growth was low but after 2011 publication growth was increased and minimum 50 papers were published. During 2003 to 2009, the research growth was minimal but publications rise after 2011 and it's continuously increasing. The year 2020 recorded highest no. of publications (96) and 1988 and 1989 had lowest no. of publications (2). The highest mean of total citation per article is 21.65 for the 20 publications in the year 2004 with 17 citable years and the lowest mean of total citation per article 0.50 for the year 1987 and 1989 respectively. The 4 publications published in 1987 with highest 34 citable years and lowest mean of citation per

year 0.01. The maximum no. of publications (353) is published in the 5 years block period of 2016 to 2020 and the second highest no. of publications (268) published in block year of 2011 to 2015.

#### PUBLICATION BY AUTHOR'S IMPACT

2441 authors contributed on Thalassemia research. Ghosh K. has most popular author. He has ranked 1<sup>st</sup> in terms of no. of publications (73), h-index=17, g-index=25, m-index=25 and 893 tc. Colah R ranked 2<sup>nd</sup> contributed 49 papers while on 3<sup>rd</sup> position in h-index=14, g-index=23 and total citation (631). Saxena R contributed (45) publications followed by Colah RB (41). Mohanty D ranked on 5<sup>th</sup> position for number of publication (36) but on 2<sup>nd</sup> position in terms of h-index=15, 1<sup>st</sup> position in g-index = 25 with ranked 2<sup>nd</sup> in total citations (679). Many other authors have contributed fewer papers but their h-index value is above 10 (**Table 2**).

#### JOURNAL PRODUCTIVITY IN TERMS OF INDIAN CONTRIBUTION

**Table 3**, shows the top 20 journals preferred by researchers for publication of thalassemia research. "Hemoglobin" and "Indian Journal of Hematology & Blood Transfusion" ranked 1<sup>st</sup> both contributed 61 publications respectively. Indian journal of paediatrics ranked on 2<sup>nd</sup> position with contribution of 58 publications and has highest h-index =13, g-index =20 and 556 total citations amongst all the top 15 journals. "Hemoglobin" has second highest h-index=10 and g-index =14 while the

total citations ranked 2<sup>nd</sup> (363). “Indian paediatrics” contributed 37 publications and ranked 4<sup>th</sup> with h-index = 9, g-index = 14, m-index = 0.29.” Journal of Family Medicine and Primary Care” has lowest h-index =2, g-index = 3 but got 16<sup>th</sup> rank in terms of publication (12). As far as IF is concerned, American Journal of Hematology has highest IF (6.973) with 11 publications, Bone Marrow Transplantation has second highest IF (4.725), Biology of Blood and Marrow Transplantation has IF (3.853) Annals of Hematology with 2.904 IF, European Journal of Haematology IF value is 2.220. These IF as per 2019.

#### **INSTITUTE PRODUCTIVITY IN TERMS OF INDIAN CONTRIBUTION**

Total 880 institute contributed on Thalassemia research. **Figure 1** represents the top contributions of institute. National Institute of Immunohaematology has contributed maximum no. of articles (134) followed by All India Institute of Medical Sciences (AIIMS) (100), Christian Medical College (82), Postgraduate Institute of Medical Education and Research (81), Sankalp India Foundation (47), Post Graduate Institute of Medical Education and Research (46).

#### **Author’s collaboration of research publications**

**Figure 2**, shows that the Indian authors have collaboration with 35 countries on Thalassemia. Collaboration frequency was Italy (59) followed by the USA (48), Saudi Arabia (23), Pakistan (20), Turkey (18), Egypt (17), Oman (12), Qatar (11), Iran (10), Greece (9), Cyprus (7), Bulgaria (6), China (5), Germany (5), South Korea (5), Denmark (4), Sri Lanka (4) and Azerbaijan (3).

#### **CONTENT ANALYSIS**

**Figure 3-5** depicts the author, title and abstract keywords analysed in this study. The author’s keywords ‘human’ ranked 1<sup>st</sup> with 665 times occurrence while female ranked on 2<sup>nd</sup> position (395) occurrence. In title keywords term ‘thalassemia’ dominated with occurrence of 319 but term ‘thalassemia’ used 1120 times in abstract keywords. The highly used term is ‘patients’ with occurrence of 1834 times in abstract keywords. The keyword ‘India’ is used 474 times in abstract keywords, 197 times in title keywords and 156 times in author keywords. The word ‘beta thalassemia’, ‘phenotype’ and ‘prospective studies’ has the least occurrences (37) among all the keywords. Abstract keywords words have maximum no. of occurrences in comparison to author keywords and title keywords. These trends of keywords are presented through graphs.

Table 1: Year wise growth along with their impacts

Year	NP	MTCPA	MTCPY	CY
1987	4	0.50	0.01	34
1988	2	1.00	0.03	33
1989	2	0.50	0.02	32
1990	7	6.86	0.22	31
1991	4	7.00	0.23	30
1992	8	32.50	1.12	29
1993	3	15.67	0.56	28
1994	4	9.00	0.33	27
1995	5	3.80	0.15	26
1996	3	7.00	0.28	25
1997	13	16.77	0.70	24
1998	4	18.00	0.78	23
1999	14	10.07	0.46	22
2000	12	11.17	0.53	21
2001	15	19.60	0.98	20
2002	15	16.33	0.86	19
2003	25	15.28	0.85	18
2004	20	21.65	1.27	17
2005	28	16.64	1.04	16
2006	23	12.35	0.82	15
2007	39	15.69	1.12	14
2008	28	12.32	0.95	13
2009	32	12.44	1.04	12
2010	48	15.21	1.38	11
2011	29	11.00	1.10	10
2012	52	5.83	0.65	9
2013	52	8.50	1.06	8
2014	69	6.16	0.88	7
2015	66	6.68	1.11	6
2016	63	4.62	0.92	5
2017	61	5.49	1.37	4
2018	75	3.35	1.12	3
2019	58	2.16	1.08	2
2020	96	1.17	1.17	1

\*NP=No. of Publications, MTCPA=Means of total citation per article, MTCPY=Mean of total Citation per year, CY= Citable years

Table 2: Top Rank Keywords by Authors, Title, Abstract

Author	h_index	g_index	m_index	TC	NP	PY_start
Ghosh K	17	25	0.708	839	73	1998
Colah R	14	23	0.438	631	49	1990
Saxena R	14	21	0.56	552	45	1997
Colah RB	14	23	0.56	611	41	1997
Mohanty D	15	25	0.556	679	36	1995
Nadkarni A	10	19	0.313	420	35	1990
Agarwal S	11	17	0.44	348	33	1997
Das R	10	13	0.476	224	33	2001
Srivastava A	13	24	0.5	593	30	1996
Marwaha RK	12	16	0.48	286	26	1997
Chandy M	13	22	0.565	528	24	1999
Kumar R	6	12	0.176	170	24	1988
Nadkarni AH	10	16	0.4	294	24	1997
Bansal D	9	13	0.5	189	23	2004
Choudhry VP	10	16	0.323	268	22	1991
Sharma P	7	9	0.467	99	21	2007
Sharma S	9	15	0.3	239	20	1992
Chakrabarti A	10	16	0.526	261	19	2003
Chandra J	8	15	0.471	242	19	2005
Patel S	6	10	0.5	115	19	2010
George B	11	18	0.524	394	18	2001
Mathews V	11	18	0.524	415	18	2001
Gorakshakar AC	9	16	0.281	288	17	1990
Sawant P	6	15	0.4	230	17	2007
Bhattacharyya M	5	11	0.238	141	16	2001

Table 3: Top rank journal along with their impacts

Name of Journal	h index	g index	m index	TC	NP	PYS	IF
Hemoglobin	10	14	0.303	363	61	1989	0.526
Indian Journal of Hematology & Blood Transfusion : an Official Journal of Indian Society of Hematology and Blood Transfusion	7	10	0.467	183	61	2007	
Indian Journal of Pediatrics	13	20	0.433	556	58	1992	1.508
Indian Pediatrics	9	14	0.29	250	37	1991	1.186
Journal of Clinical And Diagnostic Research: Jcdr	4	5	0.444	67	30	2013	
Hematology (Amsterdam, Netherlands)	9	16	0.429	302	29	2001	1.650
The Indian Journal of Medical Research	8	15	0.258	233	23	1991	
Journal of Pediatric Hematology /Oncology	5	8	0.333	96	22	2007	
Indian Journal of Pathology & Microbiology	7	10	0.368	125	20	2003	
Asian Journal of Transfusion Science	6	11	0.5	143	19	2010	
Annals of Hematology	7	13	0.259	178	16	1995	2.904
Blood Cells, Molecules & Diseases	6	13	0.316	179	13	2003	
Bone Marrow Transplantation	9	13	0.321	215	13	1994	4.725
Indian Journal of Clinical Biochemistry	4	8	0.16	71	13	1997	
International Journal of Laboratory Hematology	7	9	0.467	97	13	2007	2.141
Journal Of Family Medicine and Primary Care	2	3	0.25	16	12	2014	
American Journal of Hematology	8	11	0.32	192	11	1997	6.973
European Journal of Haematology	6	11	0.353	126	11	2005	2.220
Indian Journal of Human Genetics	6	11	0.4	134	11	2007	
Biology of Blood And Marrow Transplantation : Journal of The American Society For Blood And Marrow Transplantation	5	10	0.333	105	10	2007	3.853

\*TC=Total Citation, NP=Number of publications, PY\_Start= Publication year start, IF=Impact Factor

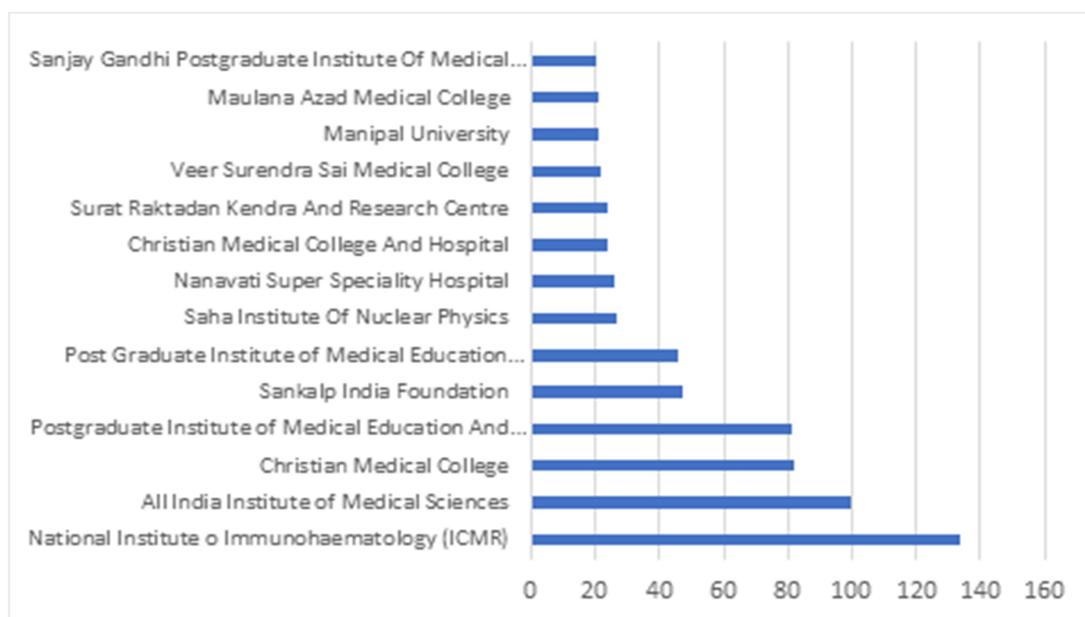


Figure 1: Top Rank highly productive institutions

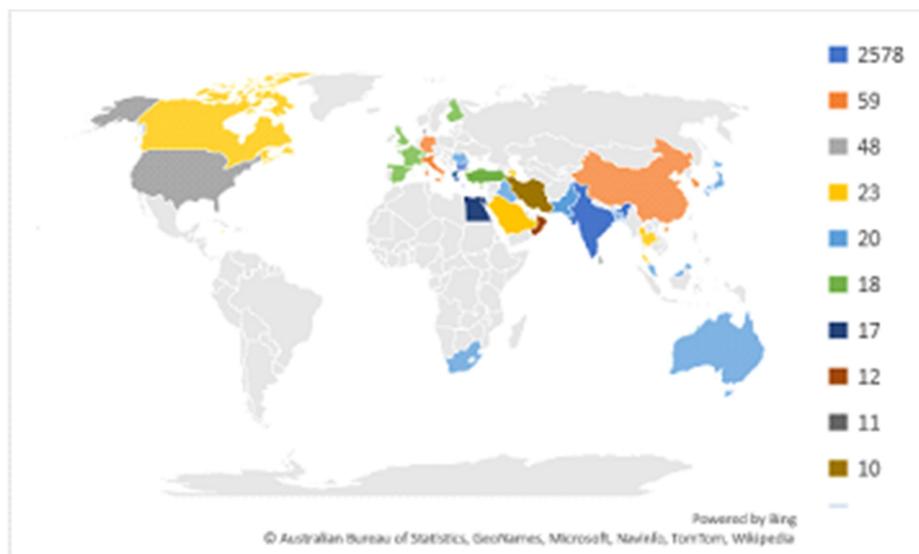


Figure 2: Indian Scholars Country Collaboration Map

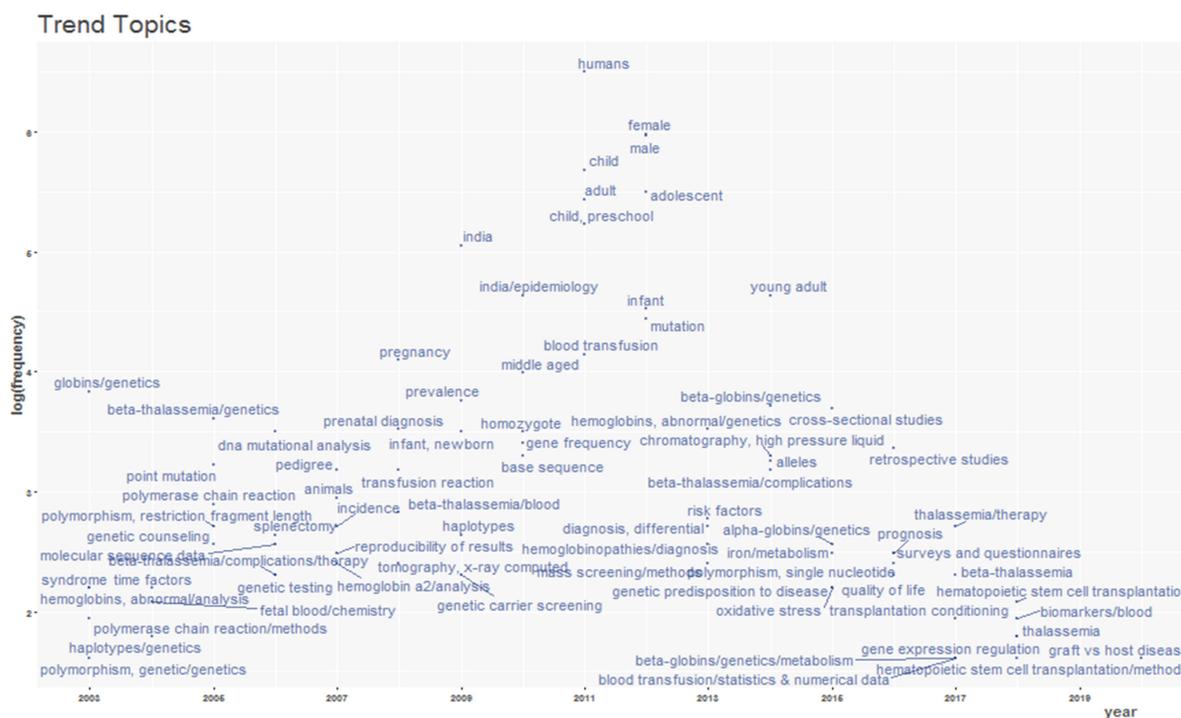


Figure 3: Authors Keywords trends

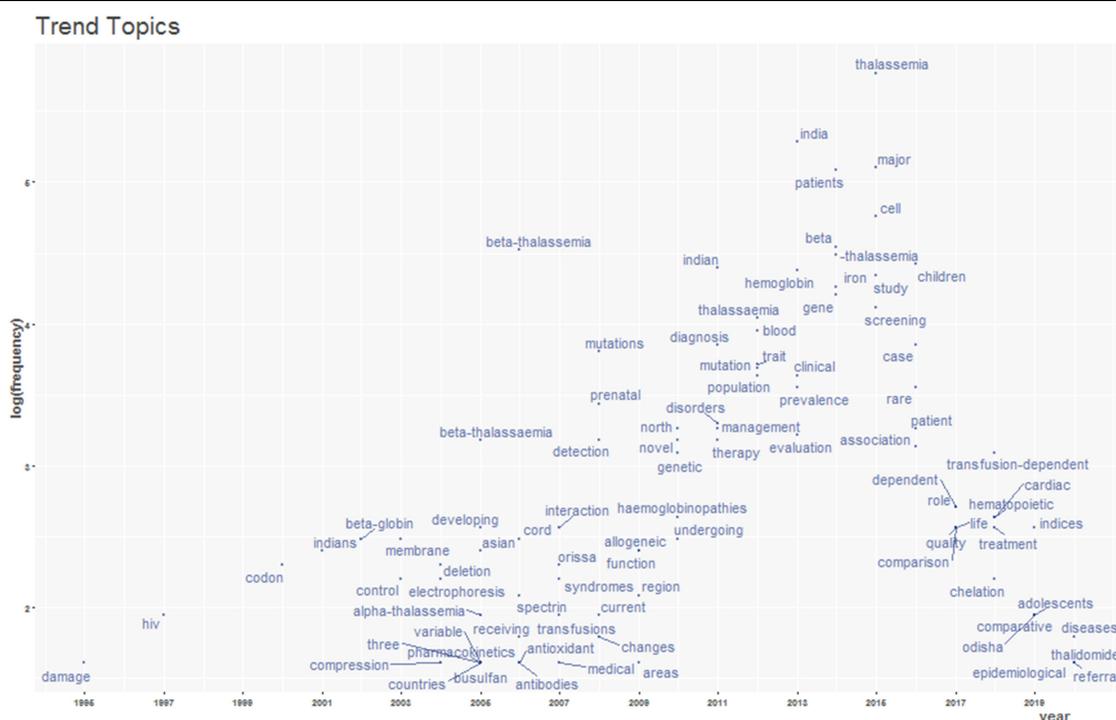


Figure 4: Trend of Keywords from Title

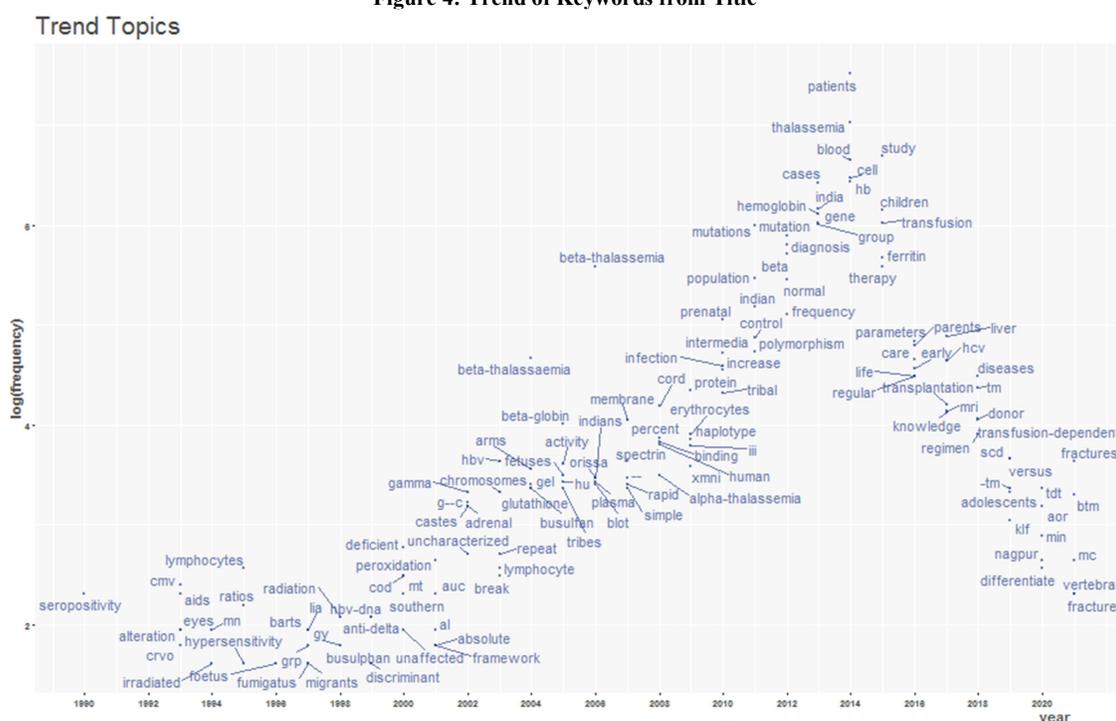


Figure 5: Trend of Keywords from Abstracts

**CONCLUSION**

Thalassemia is inherited disorder and one of the main reasons of morbidity and mortality in India. There are around 3.6 to 3.9 crore

carriers of  $\beta$  -thalassemia in India, and approximately 10000 to 15,000 new-borns with  $\beta$  -thalassemia major is born each year, with approximately 150000 Thalassemia major

patients. The highlights of study are as follows: -

1. Growth of publications is slow but doing continuously research on thalassemia.
2. The average years from publication is 9.42 while average citation per documents (8.428) and the average of citations per year per documents is 0.8274,
3. 979 data was analysed for the period of 1987 to 2020.
4. “Hemoglobin” and “Indian Journal of Hematology & Blood Transfusion” is the most preferred journals among the researchers.
5. AIIMS is the top most institute, has contributed 100 publications.
6. The most prolific author is Ghosh K in thalassemia research.
7. Indian Authors has highest collaboration frequency.
8. The publications per year is 27.94 and relative citation ratio is 440.05

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