1-2019

Scientometric Study of Literature on Osteoporosis in Children for the Period 1950 -2018

PI Janaarthanan Mr
Research Scholar, Bharath University, Chennai, janarthananpichai@gmail.com

K Nithyanandham Dr
Research Supervisor, Hindustan University, Chennai, mail2nithi@gmail.com

Munusmay Natarajan Dr
Retd CSIR-NISCAIR, Senior Principal Scientist, New Delhi, drnatarajanm@gmail.com

Scientometric Study of Literature on Osteoporosis in Children for the Period 1950 -2018

PI. Janaarthanan, Research Scholar, Bharath University, Chennai.*

Dr. K. Nithyananadham, Research Supervisor, Hindustan University, Chennai and

Dr M Natarajan, Retired Senior Principal Scientist, NISCAIR, New Delhi.

* ***Corresponding Author*** : PI. Janaarthanan, E-mail: janarthananpichai@gmail.com

Introduction

Osteoporosis happens when bone density decreases and the body stops producing as much bone as it did before. It can affect both males and females, but it is most likely to occur in women after menopause, because of the sudden decrease in estrogen, the hormone that normally protects against osteoporosis. It occurs when there is an imbalance between new bone formation and old bone read sorption. The body may fail to form enough new bone, or too much old bone may be reabsorbed, or both. Two essential minerals for normal bone formation are calcium and phosphate. Throughout youth, the body uses these minerals to produce bones. Calcium is essential for proper functioning of the heart, brain, and other organs. To keep those critical organs functioning, the body reabsorbs calcium that is stored in the bones to maintain blood calcium levels. If calcium intake is not sufficient or if the body does not absorb enough calcium from the diet, bone production and bone tissue may suffer. Thus, the bones may become weaker, resulting in fragile and brittle bones that can break easily.

"Osteoporosis" literally means "porous bones." The bones become weaker, increasing the risk of fractures, especially in the hip, spinal vertebrae and wrist. Bone tissue is constantly being renewed, and new bone replaces old, damaged bone. In this way, the body maintains bone density and the integrity of its crystals and structure. Osteoporosis is a disease in which bones deteriorate or become brittle and fragile due to low bone mass and bone tissue loss. The disease also called as Silent disease because we may not know or feel our bones getting weaker many people don’t know they have this condition until they break a bone. When this condition occurs in children it’s called juvenile osteoporosis. This rare condition is usually caused by an underlying medical condition, certain medications used to treat a medical condition, or lifestyle factors such as poor diet and lack of exercise. This is known as secondary osteoporosis.

Review of Literature

D. Ohlendorf and others **(**2015) reviewed the data for Arthrosis from ISI Web of Science by conducting a scientometric analysis during 1900–2013 and found 46,212 (approx 95%) publications date back to the last 25 years. The illustrations demonstrate the global structure of the research and citation activity by Density Equalizing Map Projection. The analysis of the country collaborations as well as the number of institutions indicates a predominance of the United States. Most of the articles are in the subject areas of rheumatology, orthopedics, and surgery. It shows a great scientific interest, especially by North American and European scientists. Gupta and Ritu (2018) analyzed the data on"Knee Osteoarthritis Research in India: A Scientometric Assessment of Publications Output During 2008 – 2017" collected from Scopus database. From the data (432), it was found that the average growth rate was 6.86%; the global publication share was 24.05%. International collaborative publication share was 24.07%. Medicine 78.47%, pharmacology, toxicology& pharmaceutics (14.58%) Biochemistry, Genetics and molecular biology (14.12%) Immunology and microbiology (2.55%) the author conclude that journal of Arthroplasty is the most productive journal with 35 papers.

Gupta and others (2018) examined 1744 Indian publications on rheumatoid arthritis research using Scopus database during 2007-2016. The data experiences an annual average growth rate of 8.19% and qualitative citation impact averaged to 9.23 citations per paper. India's share in global output was 3.05% during 2007-16, which increased from 2.46% to 3.61% from 2007-11 to 2012-16. The international collaborative share of India's publications in rheumatoid arthritis research was 11.75% during 2007-16, which increased from 11.35% to 12.02% from 2007-11 to 2012-16. Medicine, among subjects contributed the highest publications share (58.89%) in India's output in rheumatoid arthritis,, followed by pharmacology, toxicology & pharmaceutics (30.91%), biochemistry, genetics & molecular

biology (18.41%), immunology & microbiology (12.10%) and chemistry (3.44%) during 2007-16. Among the total journal output of 1722 papers (98.74% of total output), the top 15 journals contributed 31.24% share to the global journal output during 2007-16, this increased from 30.41% to 31.79% from 2007-11 and 2012-16. Indian Journal of Radiology contributed the maximum number of papers (169), followed by International Journal of Rheumatic Diseases (50 papers), Rheumatology International (36 papers), Clinical Rheumatology (30 papers), etc. during 2007-16. Indian rheumatoid arthritis research output, the top 12 highly cited publications registered citations from 101 to 1138 during 2007-16, which together received 3405 citations, which averaged to 283.78 citations per paper.

Gupta et al. (2018) examined 1839 global spondylosis research publications as indexed in Scopus database during 2008-2017. The research registered an annual average growth rate of 4.43% and its citation impact averaged to 15.44 citations per paper. The global share of top 10 most productive countries in spondylosis research ranged from 3.97% to 32.84% with largest global publication share coming from USA (32.84%), followed by U.K. (11.69%), Japan (7.94%), Germany and France (5.55% and 5.33%), etc. during 2008-17. Together, the top 10 most productive countries accounted for 86.03% of the world output during 2007-16, which increased from 84.62% during 2008-12 to 87.12% during 2013-17. Medicine contributed the largest publications share of 90.81%, followed by among sub-fields; medicine registered the highest publications share (90.81%), followed by biochemistry, genetics and molecular biology (13.43%), immunology and microbiology (6.63%), neurosciences (6.31%) and pharmacology, toxicology and pharmaceutics (5.33%) during 2008-17. Among 41818 journal papers in global spondylosis research, the top 15 most productive journals contributed 19.64% share of total journal publication output during 2007-16, which decreased from 21.26% to 18.38% from 2008-12 to 2013-17. Sixty four publications were found to be high cited, as they registered citations from 100 to 806 during 2007-16 and they together received 11683 citations, which averaged to 182.55 citations per papers.

Objectives

a. To find out the total number of articles published
b. To find out the total number of authors and analyze their authorship pattern

c. To find out the Geographical Distribution of Contribution

d. To find out the Ranking of author

e. To find out the Ranking of Contribution

f. To find out the Relative Growth Rate

Methodology

The data has been collected from PubMed database, articles published during the year 1950 to 2018. The study concentrated on the scientometric analysis, which is one of the widely used methods in library and information science research. The collected data is arranged in Excel format and analyzed for total number of articles published, authorship pattern, Ranking of author, Geographical Distribution, Ranking of countries contribution and Relative growth rate.

Analysis

The collected data for the total numbers of articles are given below in Table 1.

Table 1. Total number of articles published on osteoporosis in children

Year	No. of articles	Cumulative Total	Percentage	Cumulative percentage
1950-55	7	7	0.145	0.145
1956-60	13	20	0.269	0.413
1961-65	59	79	1.221	1.6353
1966-70	158	237	3.271	4.9059
1971-75	149	386	3.084	7.9902
1976-80	165	551	3.416	11.4057
1981-85	171	722	3.540	14.9454
1986-90	196	908	3.850	18.7956
1991-95	295	1203	6.107	24.9021
1996-00	484	1687	10.019	34.9209
2001-05	804	2491	16.643	51.4989
2006-10	816	3307	16.870	68.3688
2011-15	855	4162	17.699	86.0451
2016-18	675	4837	13.973	100

Table 1 show that the total number (4837) of articles published on osteoporosis in children during the year 1950-2018. During 2011-15, the maximum number 855 (17.69%) of articles was published and the minimum 7 (0.145%) during 1950-55. The total numbers of articles

are written by 22544 authors. They were analyzed for authorship pattern, which is given below in Table 2.

Table 2. Authorship pattern

S. No.	Authorship Pattern	Total Number of articles	Cumulative Total	Percentage	Total number of authors
1	Single authored	866	866	17.904	866
2	Double authored	741	1607	15.319	1482
3	Triple	614	2221	12.693	1842
4	Four	592	2813	12.238	2368
5	Five	482	3295	9.96	2410
6	Six	460	3755	9.51	2760
7	Seven	321	4076	6.64	2247
8	Eight	212	4288	4.38	1696
9	Nine	140	4428	2.89	1260
10	Ten	105	4533	2.17	1050
11	Eleven	58	4591	1.19	638
12	Twelve	53	4644	1.2	636
13	Thirteen	37	4681	0.764	481
14	Fourteen	33	4714	0.682	462
15	Fifteen	19	4733	0.392	285
16	sixteen	13	4746	0.268	208
17	Seventeen	14	4760	0.289	238
18	Eighteen	9	4769	0.186	162
19	Nineteen	6	4775	0.124	114
20	Twenty	2	4777	0.041	40
21	Twenty-one	21	4798	0.434	441
22	Twenty two	39	4837	0.806	858
	Total	4837		100.08	22544

From Table 2, authorship pattern shows that the single author contribution was 866 (17.904%) followed by double authors 741(15.319%) and triple authors 614(12.693%).

Ranked below in Table 3, as per the publications count for the number of Authors:

Table 3. Ranking of author based on the contribution of articles

S.No.	Author Type	Total	Percentage	Rank
1	Single authored	866	17.904	2
2	Double authored	741	15.319	3
3	Triple	614	12.693	4
4	Multi-authored	2616	54.1	1
	Total	4837	100.0	

From the Table 3, it is found that multi authors contributed most number of articles 2616(54.1%) as ranked as 1, single author contributed 866(17.904%) Ranked as 2, Double authors contributed 741(15.319%) ranked as 3 and triple authors contributed 614(12.693%) and ranked as 4.

It was also collected data for the number of articles from each journal. It is ranked as per the total number of articles for the Journals in the Table 4.

Table 4. Ranking of Journals

S.No	Name of the Journal	Total Number	Percentage	Rank
1	Osteoporosis Int	141	2.90	1
2	J Bone Miner Res	118	2.43	2
3	Bone	95	1.95	3
4	J Clin Endocrinol Metab	76	1.56	4
5	Calcif Tissue Int	72	1.48	5
6	J Clin Densitom	52	1.07	6
7	J Pediatr Endocrinol Metab	46	0.946	7
8	J Pediatr	41	0.843	8
9	Pediatrics	39	0.802	9
10	Am J Clin Nutr Clin Calcium, Clin Orthop Relat Res.	36	0.740	10
11	Radiology	32	0.658	11
12	J Bone Miner Metab, J. Pediatr Orthop	30	0.617	12

13	PLoS One	29	0.596	13
14	Arch Pediatr,Pediatr Radiol	28	0.576	14
15	Eur J Pediatr	27	0.555	15
16	Cochrane Database Syst Rev	25	0.514	16
17	Am J Med Genet A, J Am Diet Assoc	24	0.494	17
18	Arch Dis Child	23	0472	18
19	Clin Endocrinal (Oxf), J Rheumatol, Pediatr Neprol	21	0.432	19
20	J Bone Joint Surg Am	19	0.391	20

From the Table 4, it is found that the Journal, “Osteoporosis Int” contributed 141(2.90%) articles, so ranked as1, Bone Miner Research contributed 118(2.43%) and so ranked as 2 and Rank 3 contributed by Bone Journal the 95(1.95%) articles and so on.

Osteoarthritis in children published in the different languages is as follows in Table 5:

Table 5: The contribution of articles by language wise

Language	Total	Rank	Language	Total	Rank	Language	Total	Rank
English	3945	1	Italian	59	8	Swedish	6	15
German	238	2	Chinese	29	9	Ukrainian	3	16
French	182	3	Portuguese	16	10	Serbian	2	17
Russian	94	4	Czech	14	11	Undetermined	2	18
Japanese	86	5	Dutch	13	12	Bosnian	1	19
Polish	83	6	Finnish,Danish (Each)	11	13	Bulgarian	1	20
Spanish	60	7	Norwegian	7	14			

The Language wise Contribution shows predominant number (3945) of article literature on osteoporosis in child was published on English language, seconded by German language contributed 238 articles, third by French (182) and the least one in each Bosnian and Bulgarian.

The table 6 shows the top 20 countries contributions of articles on literature on osteoporosis in children from the year 1950-2018.

Table 6. Countrywise contribution of articles

Country Name	Total contributions	Rank	Country Name	Total Contributions	Rank
USA	1817	1	Spain	53	11
England	847	2	India	51	12
Germany	443	3	Canada	47	13
France	153	4	China, Denmark	42	14
Switzerland	152	5	New Zealand	29	15
Japan	130	6	Greece, Norway	26	16
Italy	123	7	Netherland	25	17
Poland	102	8	Czech Republic	24	18
Russia	79	9	Brazil, Ireland	22	19
Australia	59	10	South Korea	21	20

From the above Table 6, it is learnt that maximum articles were contributed (Rank 1) by United Nation, Rank 2 being England contributed 847 articles and Germany contributed 443 articles, those occupy the third rank etc.

The relative growth rate has been calculated for the number of articles that is given in Table 7.

Table 7. Relative Growth Rate

Year	Quantum of output	Cumulative output	W1	W2	$1\text{-}2^{R(aa}\text{-}1$ $year^{-1)\ RGR}$	DT(a)
1950-55	7	7		1.95		
1956-60	13	20	2.56	2.99	0.43	1.61
1961-65	59	79	4.08	4.37	0.29	2.39
1966-70	158	237	5.06	5.47	0.41	1.69
1971-75	149	386	5.00	5.96	0.96	0.72
1976-80	165	551	5.11	6.31	1.2	0.58
1981-85	171	722	5.14	6.58	1.44	0.48
1986-90	186	908	5.22	6.81	1.59	0.44
1991-95	295	1203	5.69	7.09	1.4	0.49
1996-00	484	1687	6.18	7.43	1.25	0.55
2001-05	804	2491	6.69	7.82	1.13	0.61
2006-10	816	3307	6.70	8.10	1.4	0.49
2011-15	855	4162	6.75	8.33	1.58	0.44
2016-18	675	4837	6.51	8.48	1.97	0.35

From the above Table 7, RGR has been increasing from 1956-60 (.43) to 2016-18 (1.97) in the span of 68 years. The doubling time (DT) is decreasing year by year. Also it reveals that the value in doubling time in 68 years. Doubling time decreases from 1.61 in the time period 1956-60 to 0.35 in the time period 2016-18.

Conclusion

The scientometric study on literature published on osteoporosis in children during 1950-2018 found the total 4837 articles, of which during 2011-15 the maximum 855(17.699%) number of articles was published and minimum 7(0.145%) during 1950-55 only. The authorship pattern shows the single author contribution was 866(17.904%) followed by double Author 741(15.319%) and triple author 614(12.693%). Total 22544 authors contributed 4837 articles during 1950 – 2018. The multi author contributed maximum number of articles 2616(54.1%, rank 1), single author contributed 866(17.904%, rank 2), double author contributed

741(15.319%, rank 3) and triple author contributed 614(12.693%, rank 4). By ranking of Journals based on number of articles, Osteoporosis Int contributed 141(2.90%, Rank 1), Bone Miner Research contributed 118(2.43%, Rank 2) and Rank 3 being Bone Journal that contributed 95(1.95%) articles. The Language wise Contribution shows predominant number of article was published in English (3945), seconded by German (238) and third by French (182). As per countries contribution United Nation contributed 1817 article (Rank 1), England 847 (Rank 2) and Germany 443(Rank 3), etc. Relative Growth Rate has been increasing from 1956-60 (.43) to 2016-18 (1.97) in the span of 68 years. The doubling time (DT) has decreasing year by year. Doubling time decreases from 1.61 in the time period 1956-60 to 0.35 in the time period 2016-18.

References

1. D. Ohlendorf, S. Mayer, D. Klingelhöfer, M. Schwarzer and D.A. Groneberg (2015). Arthrosis: a scientometric analysis. *Orthopäde*, 44 (1), 71–79. DOI 10.1007/s00132-014-3015-6.
2. Gupta BM, and Ritu Gupta (2018). Knee Osteoarthritis Research in India: A Scientometric Assessment of Publications Output During 2008-17. *Ortho & Rheum Open Access J*. 11(5), 1-8.
3. Gupta BM and Ritu Gupta. (2018). Global Thalassemia Research: A Scientometric Assessment of Publications Output during 2008-17. *Open Acc Blood Res & Trans J*. 2(4), 1-8.
4. Gupta BM, Ritu G, Ashok K, Madhu B (2018). Rheumatoid Arthritis Research in India: A Scientometric Assessment of Publications during 2007-2016.*Ortho Res Online J*. 3(1), 1-7.
5. Gupta BM and others (2018). Spondylosis: A Scientometric Assessment of Global Publications Output during 2008-17. *EC Orthopaedics.* 9(6), 331-339.
6. www.emedicinehealth.com/osteoporosis/article_em.htm#what_causes_osteoporosis
7. www.everydayhealth.com/osteoporosis/guide
8. www.medicalnewstoday.com/articles/155646.php