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ODONTOGENIC CYST AND TUMOURS- A MAPPING THROUGH BIBLIOMETRIC ANALYSIS OF SCIENTIFIC LITERATURE

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doi: [10.33472/AFJBS.6.14.2024.2429-2454](https://doi.org/10.33472/AFJBS.6.14.2024.2429-2454)**ABSTRACT:**

Introduction: Bibliometric analysis is a well-known technique for statistically assessing academic literature. The mostwell-cited papers bring attention to significant works and trends in the literature on a certain topic. The objective was to conduct bibliometric analysis on 100 most cited articles on odontogenic cyst & tumour. This is the first comprehensive citation analysis with respect to this topic.

Materials and Methods: A retrospective data search was explored on June 2023 using Scopus database. Bibliometric details like period of growth of articles, total citations, common key words, thematic analysis & type of study designs were explored. Two softwares were used ,Vosviewer for assessing bibliometric network analysis for co-occurrence among countries & Biblioshiny for web-interface for bibliometrix. Statistical analysis were performed using Chi-square & Kruskal- Wallis H Test.

Results: A total of 3709 articles published from 1955 to 2018 were included in the study. A total of 14591 citations were observed. The journal of Oral Surgery, Oral Medicine, Oral Pathology And Oral Radiology received topmost total citation ,while Gorlin RJ was top author with the most citation. Four connected clusters were recognized during the co-occurrence network analysis with VOSviewer software. Research papers with multiple authors significantly got higher citations ($p < 0.05$), while articles published in dental journals received highest citations & was statistically significant ($p = 0.00$).

Conclusion: The top 100 articles on odontogenic cyst & tumours which received the most citations were listed in detail in the present study. This will be a valuable resource for students, academicians, and oral pathologist, and oral medicine, clinicians for future research.

Keywords: Bibliometric analysis, Citations, Odontogenic cyst, Odontogenic tumours, Oral Pathology

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1. INTRODUCTION

The odontogenic apparatus and its remnants give rise to a diverse range of lesions known as odontogenic cysts and tumours. The WHO classification (2022) of head and neck tumours

provides necessary diagnostic criteria for each entity, although it can be difficult to differentiate between some odontogenic tumours.^[1] Most of the jaw cysts are odontogenic which are about 90%. In a systematic analysis of the literature, Johnson et al discovered that odontogenic cysts were 2.25 times more prevalent than odontogenic tumours. Findings revealed that radicular cyst, which made up 54.6% of the odontogenic cysts, was the most common cyst. The prevalence of odontogenic tumours in the literature showed that; Ameloblastomas were found to be the most common type, accounting for 37.9% of cases. KCOT came in second with 36.6%, followed by odontogenic myxomas 3.8%, adenomatoid odontogenic tumour 3.2% and ameloblastic fibromas 1.1%.^[2]

The framework of this paper makes the use of bibliometric analysis & Prichard coined the term in 1969. A bibliometric technique has been used to quantify the rise of intellectual, scientific, and scholarly publication on a worldwide scale, inside one area or country, in one institution or group of institutions, and even within a specific subject field.^[3] Bibliometric studies have been carried out in various field of medical and dental sciences. It can be quite helpful to the researcher to focus on the bibliography for references from the vast ocean of publications by reducing the number to the most-cited research articles in a given field or topic.^[4]

According to the data available, a bibliometric study with respect to most cited articles on the topic “**odontogenic cyst and tumours**” have not been explored till date. To fill this gap, bibliometric analysis indexed in Scopus database from 1955 to 2018 were used to evaluate & analyse the publications, which would further help in studying & recognizing the updated information. The aim of the study was to explore the bibliometric analysis of 100 most cited articles on odontogenic cyst and tumours indexed in Scopus data base, while the objectives were

1. To examine the research growth & authorship pattern distribution in odontogenic cyst & tumours
2. To identify the most productive country,author & research institution with respect to average citation per publication
3. To recognize co-authorship network among different countries using VosVeier software.
4. To investigate the characteristics of 100 most cited published papers.

2. MATERIALS & METHODS

Search Criteria :

The Institutional Review Board of King Abdullah International Medical Research Centre had approved the study under the no: NRC23R/473/07 ,since the study was retrospective, need for ethical clearance was exempted. The extraction of citation information from published works on odontogenic cyst & odontogenic tumours was accessed on 14th June 2023 using Scopus database.

The keywords ‘Odontogenic Cyst’* AND ‘Odontogenic Tumour’* OR ‘Odontogenic Tumor’* OR ‘Dental Tissue Neoplasm’ were used for the search strategy. Articles published in the English language from the year 1955 to 2018 were included. Original articles ,reviews ,case reports were included ,while conference papers, shorts survey ,notes books ,classification, thesis, comments, letters were excluded. Total of 3709 articles were retrieved from the Scopus data base. The data were extracted and transferred to a microsoft excel file & article selection was done by one researcher, and it was double verified by two others to check its eligibility. The flow chart of the methodology shown in the Figure 1.

Data Analysis:

The 100 most cited articles were selected for data processing & the following variables were evaluated that included article types, year wise number of citations, total citations, list of journals, authorship pattern, top authors, top institutions, top Countries, Country collaboration top Journals ,Key words & 100 most cited articles .The bibliometric soft wares like VOSviewer (Leiden University, Leiden, Netherlands, Europe) software version 1.6.10 developed by Van Eck and Waltman ^[5] & Biblioshiny (R package) were used. In a two-dimensional environment, the VOSviewer visualises bibliometric networks by grouping a set of closely connected colour nodes into many conglomerates; a high correlation is indicated by a shared colour. Biblioshiny is a software that provides a cloud collaboration for bibliometrix- an R tool for a panoramic science mapping analysis.^[6]

Statistical Analysis

The following parameters of top 100 cited articles were assessed to compare articles published in dental & nondental journals ,clinical vs non-clinical studies and authorship patterns were evaluated with Chi Square test. While the characteristics of study design were evaluated with Kruskal- Wallis H Test. The data was analysed with SPSS Statistics for Windows, Version 20 (Released 2011; IBM Corp, Armonk, New York, United States). The p-value (< 0.05) was considered statistically significant.

3. RESULTS

A total of 3709 articles were published from the period of 1955 to 2018. The list of 100 most cited articles were later retrieved and it received total 14,591 citations.

Periodic Growth of 100 Most Cited Articles

The distribution of articles were divided into 4 equal time intervals of 15 years of time gap each. During the first-time interval between 1955 to 1970, 7 articles were published with 1212 citations and 173.14 citation impact. The second time interval was between 1971-1986 ,11 articles with 1888 citation's and 209.77 citation impact were observed. The third- & fourth-time interval was between 1987-2002 & 2003-2018 published 40 & 42 articles respectively. The above-mentioned time period had 6144 & 5437 total citations & citation impact of 153.6 & 127.21 respectively. Figure 2 shows the periodic growth of 100 most cited article.

Authorship Pattern of 100 Most Articles

Figure 3 shows authorship patterns, where 23 articles are contributed by single author, which gained 3899 citations with an average of 169.52 citations/ article. 77 articles had multiple authors which gained 10,692 citations with an average of 138.85 citations/article. The comparison of single author & multiple author citations are shown in Table no: 1. There was a significant ($p=0.00$) difference in type of authorship (single/multiple) and its impact on citation. The research papers with multiple authors significantly gained higher citations than single authors.

List Of Top Authors, Institutions & Countries of 100 Most Cited Articles

Total authors listed were 293 , out of which 267 authors (91.12%) had published single papers. Top 8 authors contributed to more than 3 articles each ,while remaining 19 authors published 2 articles each. (Table no:2). Among the most influential authors , Gorlin RJ had the highest citation impact/ publication (267.5) ,followed by Lo Muzio (216.5), Vickers RA (215) & Pindborg JJ (199.7). There were 9 organizations which contributed to more than 3 articles & remaining 6 organizations added 2 articles each (Figure 4). Seven universities were from

United states , two from South Africa and remaining one each from Japan, Brazil & China. The University of Minnesota gained highest citation impact (267.5), followed by University of California (225) & Tel Aviv (212). Finally out of 34 countries , top 12 countries contributed to more than 4 articles , while 15 countries added up one article each (figure 5). United States had more than one third publications, followed by U.K, China & South Africa.

Country Co -Author Collaboration of 100 Most Cited Articles

Out of 34 countries, 14 countries contributed to co-authorship network and consisted of 4 coloured clusters. Figure 6 depicts the cluster distribution using VOSviewer Software. Size of sphere indicate number of publications. First cluster of blue sphere had 4 countries, with U.S (biggest sphere) most productive having 33 articles of the co-authorship network. Second cluster of red spheres consisted of 5 countries, among these Japan was the most productive with 8 articles. Third cluster of green spheres had 3 countries with South Africa having 8 articles, while fourth cluster of yellow spheres had 2 countries with UK contributing to 8 articles.

List Of Top Journals in 100 Most Cited Articles

The 100 most cited articles were published in 39 journals, out of which 25 journals published one article each and top 14 journals published more than 1 article (Table no: 3). 33% articles were published in Top 2 journals, while 75% of articles were published in the top 14 journals. The Orphanet Journal of Rare Disease and Oral Surgery, Oral medicine, Oral Pathology & Oral Radiology received highest citation/publication which was 357.5 & 177.7 respectively.

Top 10 Key Words

Total 154 key words were used in the 100 most cited articles as displayed in the word cloud (figure 7) .The words CYST ,ODONTOGENIC CYST,AMELOBLASTOMA, CARCINOMA are clearly visible and were repeatedly used. Table no :4 shows most commonly used key words, the word Cyst received the highest total citation of 8929 & Odontoma had the highest citation impact/publication of 173.9.

Thematic Evolution & Trending Topics

The thematic evolution image (Sankey diagram) depicts how the themes have changed from 1955 to 2018 (Figure8). The themes were initially based on ameloblastoma, basal cell carcinoma and later changed to odontogenic cyst. The initial analysis of trending topics reveals terms used in the year 1995 to 2002 were research topics based on Calcifying odontogenic cyst epithelium ,ameloblastoma & odontogenic cyst. Later the research trends in the year 2004 to 2010 onwards shifted towards squamous cell carcinoma , odontoma ,therapies & prevalences (Figure 9).

Study Characteristics of 100 Most Cited Articles

The top 3 articles were Nevroid basal cell carcinoma syndrome,Odontogenic tumour : analysis of 706 cases and Familal adenomatous polyposis received the most total citation of 647,394 & 385 respectively. The top 100 most cited articles of odontogenic cyst and tumours were evaluated for different types of study designs (Table no: 5) .The review articles received the highest citation impact (165.25) and the least cited were systematic reviews (103.00). The statistical analysis of Kruskal- Wallis H Test was applied for the total citation and citation impact among different type of study designs, thus showed no statistical significance ($p=0.56$) (Table 5). Out of 100 most cited articles , number of clinical studies were 47 ,while nonclinical studies were 53 & total citation received was 14591. When Chi Square test was applied between citation impact of clinical & nonclinical studies ,showed no statistical significance ($p=0.31$)(Table no: 6).The number of articles in dental journals and non-dental journals were

67 & 33 respectively, which received a total citation of 11,116 citations. The Chi Square test revealed a statistically significant difference ($p=0.00$) in citation impact when published in dental journals in comparison to non dental journals (Table no: 7). The bibliographic description of top 100 most cited articles are given in the appendix.(Table no:8)

4. DISCUSSION

Quantitative analysis of academic and scientific publications is known as bibliometric analysis. It entails evaluating publication and citation trends to gauge the prominence, impact, and influence of research within a certain topic or discipline. It can assist academics and organisations in determining topics for future research or collaboration.^[6] This bibliometric analysis included extensive research on the topmost 100 cited articles on odontogenic cysts and tumours. To our knowledge no bibliometric analysis has been carried out on this topic.

Odontogenic lesions consist of cyst & tumours with exclusive epidemiological data cited in the literature, with more importance given to ameloblastoma & keratocystic odontogenic tumour due their destructive nature.^[7] Preoperative clinical assessment and imaging techniques like panorex, CT ,MRI are essential for the provisional diagnosis for any jaw lesion. Enucleation with histopathologic diagnosis is the initial treatment of unicystic lesions, while multiloculated and multicystic tumors are recommended for more aggressive treatment.^[2]

In the present study 3709 articles were retrieved from the Scopus data base , which are published in the span of 64 years during the period of 1955 to 2018. The first period of growth interval from 1955 -1970 published 7 articles with the highest citation impact of 173, while the fourth period from 2003-2018 showed 42 articles published but had only 127.31 citation impact. The scientific article's citation often follows a time-lapse pattern, peaking 3–10 years after publication, then declining for the next several years. Older articles have a better likelihood of being cited ,than recently released articles since they had more time to gain recognition; thus making it more difficult for recently published articles to be identified. Additionally, the number of citations varies by specialisation and may be influenced by the number of scholars who publish in a certain area.^[8,9]

The present study showed eminent authors , leading countries & top institutions mostly belonging to US ,UK and China. The disparities in publishing output between nations are caused by several causes like scientific population, active research community, availability of online databases, financing for capital projects related to research, proficiency in english, and keywords used for data searches are among the factors that may contribute to the high volume and calibre of biomedical publications.^[10,11]

In the present study the articles were evaluated for distribution among authorship pattern, speciality journals ,clinical relevance & different study designs. The authorship distribution among multiple authors received significantly higher citations than single authors. The articles in dental journals (n=67) received a higher citation compared to non-dental journals (n=33) & was statistically significant. Majority of cited articles in dental journals (i.e. 50% were published in top 4 journals; Oral Surgery, Oral medicine, Oral Pathology Oral Radiology , Journal of Oral Pathology & Medicine, Journal of Oral And Maxillofacial Surgery, Oral Oncology respectively. The relationship between articles cited in clinical studies (n=47) & non-clinical studies (n=53) didn't show any statistical significance. Among the different study designs, most citations were from Review articles (40%) & Retrospective studies (33%) and

least was from systematic review (3%), relationship among study design didn't show any statistical significance.

The bibliometric analysis on this topic according to our knowledge so far has not been published. Although, very limited bibliometric studies related to field have been recognised. A bibliometric analysis published on 50 Most Cited Articles on Odontomas from 1971 to 2011 highlighted that US had highest number of publications, most common study design cited was the review article, most journal contribution was from Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology and finally followed by most institutional representation were from Tel Aviv University (Israel) & Peking University (China).^[12] Another bibliometric analysis published on mapping research on 50-years of odontogenic keratocyst showed similar findings.^[13] These overall findings were comparable to the present study.

In the present study, two software's namely Vosviewer & Biblioshiny were used. The Vosviewer is used to create and examine maps based on network data. It examines co-authorship, co-occurrence, bibliographical coupling & co-citation linkages in three possible forms of density, network, or overlay visualisation. The network consist of nodes & edges that support the analysis. Nodes depict items of key words, journals, publications, researches or institutions. Edges reveal the relationship between two nodes.^[14] The biblioshiny is related to bibliometrics and scientometric research tools having an inbuilt interface which possess various functionalities, analytics, data & graphs.^[15]

One typical type of scientific cooperation network that arises from the collaborative interaction between authors of a study is called a co-author network. A continuous link is formed between two authors if they have co-authored one or more articles. An effective approach for examining the composition of academic connection networks is co-authorship networks.^[16,17] In the present study when the network of collaboration between the countries (figure 1) were analyzed among 34 countries, 14 countries showed collaboration. The thickness of the connections indicate the number of collaborations i.e thicker the linkage, bigger is the number. Next is the size of the node which reflects the amount of cooperation i.e larger the nodes, more the collaboration.^[17] In the present study United states had the most collaboration with 4 countries with 33 articles of co-authorship network.

The present study had a Sankey diagram (figure 7) which was used to explain the thematic evolution of odontogenic lesions. Sankey diagrams are typically used to show how materials or energy moves via various networks and processes i.e. they provide quantitative details to depict flows, relationships, and their transition. The rectangular shape represent elements with various colour, while the height of the rectangle indicates authors key words, i.e. larger the size of the rectangle, more the interconnection between the components. The Biblioshiny 2.0 visually assess the relationship between the keywords, authors, countries, affiliations etc.^[18,19]

Key words are crucial as they provide more relevant results during literature search than sentences or phrases. There are numerous reasons for using key words, firstly three to five most crucial terms in an author's publication are represented by keywords. Secondly to identify popular study subjects from the past and present using keyword analysis. Thirdly, a paper's chances of getting referenced rise with particular keywords linked with it.^[20] In the present study the most common key word was 'Cyst' which got cited in 62 publication out of the top 100 most cited article, while the key word 'Odontoma' was cited in 20 publication, which received the highest citation impact of (173.9).

Last but not least, dentists are the pioneers of oral examination, it is their responsibility to take biopsy from suspected lesions and refer them for histopathological analysis. Long-term follow-up and repeated imaging are pivotal due to recurrence rates and future possible malignant conversion. All these measures will improve the prognosis of odontogenic lesions, which will further minimize the associated physical, psychological & social challenges of the patients.

Limitations

The present study was based on Scopus database only, which might have led to the exclusion of pertinent articles that Scopus does not index. Bibliometric data on published papers are also found in other databases like Web of Science (WoS) and Google Scholar. Google scholar content coverage is unknown, and yields results with varying degrees of accuracy. PubMed disregards citation analysis. Scopus offers 20% greater coverage, better extended spectrum of journals & faster citation analysis than WOS.^[13,21,22] Nevertheless, Scopus is still widely used in literature and is thought to be the most trustworthy database for citation analysis.

Finally, articles published post 2018 couldn't be included in the present study due to time constraint on gathering the citation data and the data have not been cited in most 100 cited articles. Future studies could be implemented to combine all the search data bases for a comprehensive coverage of such an extensive topic.

5. CONCLUSION

This is the first comprehensive bibliometric analysis study carried out on odontogenic cyst and tumours from 1955 to 2018 which revealed the following.

- 1) 100 most cited articles were published in 67 dental journals & 33 non dental journals thus reflecting the multidisciplinary interest.
- 2) Multiple authors gained higher citations than single authors.
- 3) University of Minnesota received the highest total citation, while United States had the highest total publication.
- 4) The journal of Oral Surgery, Oral Medicine, Oral Pathology And Oral Radiology had the highest total citation.
- 5) The theme of the research work shifted from carcinoma in the early period towards cyst in the present scenario.
- 6) The most common key words used were cyst, odontogenic cyst & ameloblastoma.
- 7) There was an increase trend of publications of articles on odontogenic cyst & tumours post 2010, highlighting the relevance of the topic.

We consider the list of top 100 most cited articles in the present study, which will be a beneficial resource for students, researchers, clinicians working in the various disciplines of oral medicine, oral pathology, and maxillofacial surgery to plan strategies for upcoming research on odontogenic cyst and tumours. Lastly future research work is required, since science is ever evolving, and the list of new published articles must be updated periodically.

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Conflicts of Interest

The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

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Figures

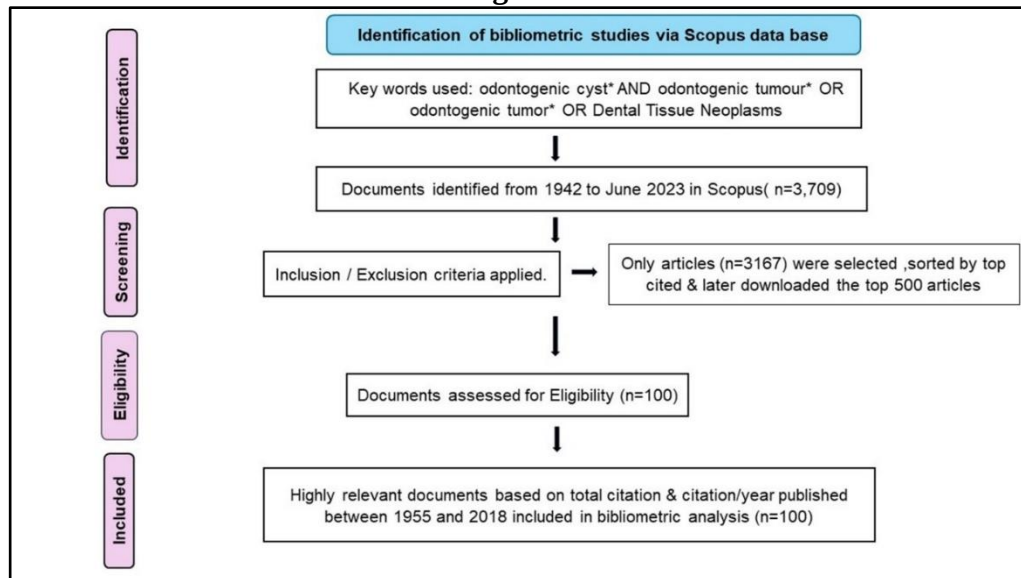


Figure 1: Flow chart of methodology

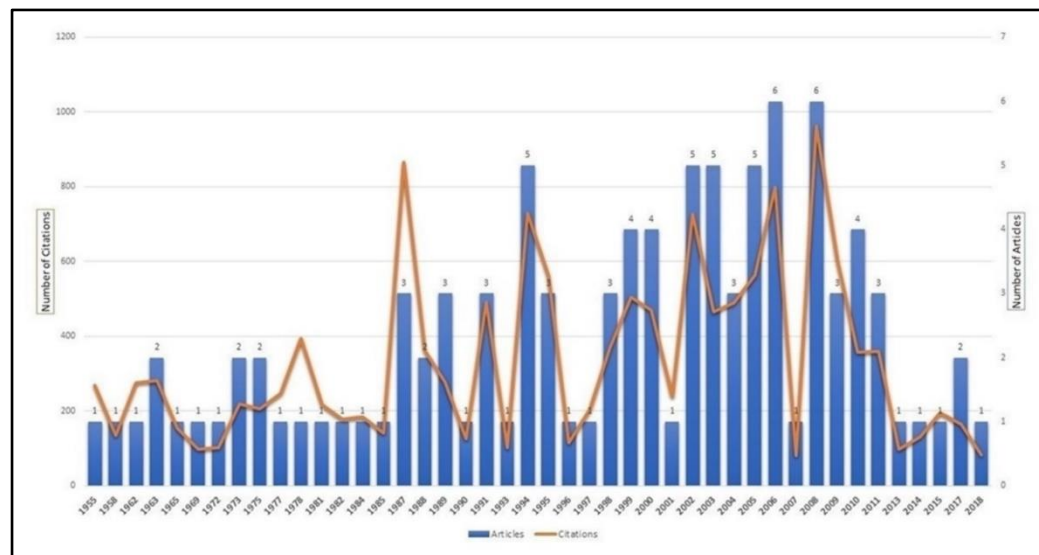


Figure 2: Periodic growth distribution of 100 most cited articles

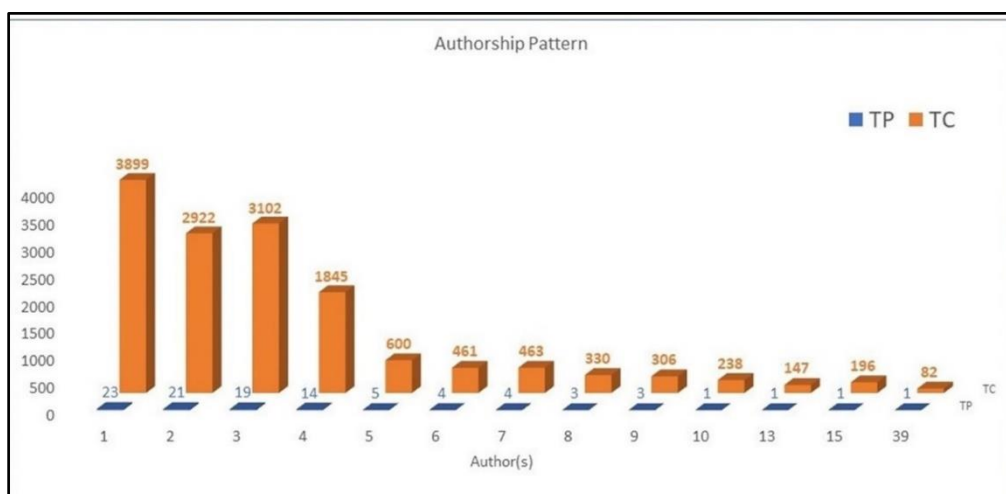


Figure 3: Distribution of Authorship pattern

	Institution	TP	TC	C/P
	University of Minnesota	8	2140	267.5
	Royal Dental College	5	810	162
	Peking University	4	418	104.5
	Tel Aviv University	4	851	212.8
	University of The Western Cape	4	604	151
	University of The Witwatersrand	4	591	147.8
	Hiroshima University	3	359	119.7
	University of California	3	675	225
	Washington University	3	474	158
	Medical College of Virginia	2	260	130
	Universidade Federal De Minas Gerais	2	290	145
	University of Birmingham	2	201	100.5
	University of Florida	2	231	115.5
	University of Pittsburgh	2	205	102.5
	University of The Pacific	2	332	166

Figure 4: List of most cited top institutions

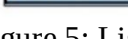
Country	TP	TC
 USA	37	6236
 UK	9	1064
 China	8	983
 South Africa	8	1168
 Japan	8	853
 Denmark	7	1232
 Netherlands	5	544
 Canada	5	755
 Germany	5	631
 Israel	5	951
 Brazil	4	518
 Australia	4	511
 Italy	3	516
 Mexico	3	432
 Nigeria	3	367
 South Korea	2	340
 Iran	1	81
 Yemen	1	82
 Turkey	1	84
 Thailand	1	93
 Sweden	1	184
 France	1	93
 Spain	1	92
 New Zealand	1	92
 Guatemala	1	147
 UAE	1	82
 Ireland	1	385
 Singapore	1	127
Portugal	1	94
Peru	1	147
Greece	1	92

Figure 5: List of most cited top countries

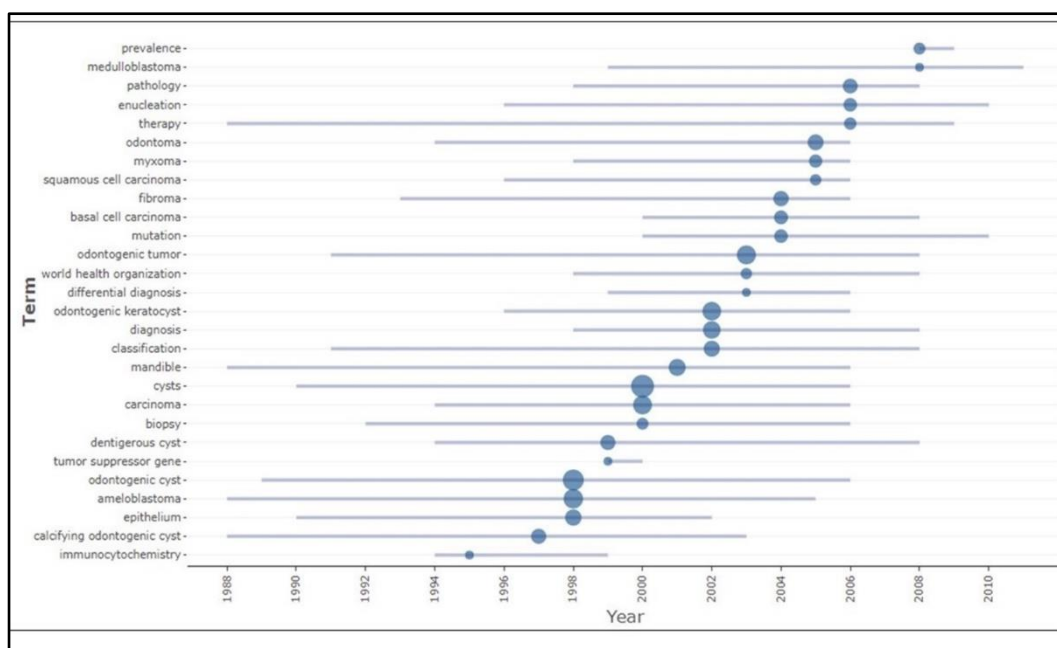


Figure 9: Trending topics analysis by biblioshiny

Tables

Table 1: Single authorship vs Multiple authorship (Statistically significant * $P < 0.05$)

No of authors	No of Articles	Citations	Average citation per article	Chi-Square test
Single authors	23	3,899	169.52	0.00*
Multiple authors	77	10,692	138.85	

Table 2: List of most cited Top authors

Author	TP	TC	C/P
GORLIN, R.J.	8	2140	267.5
SHEAR, M.	7	1048	149.7
LI, T.-J.	7	736	105.1
WALDRON, C.A.	4	599	149.8
VICKERS, R.A.	3	645	215
REICHART, P.A.	3	456	152
PINDBORG, J.J.	3	599	199.7
PHILIPSEN, H.P.	3	456	152
ALTINI, M.	2	372	186
MENESES-GARCÍA, A.	2	350	175
VAN DER WAAL, I.	2	194	97
SLOOTWEG, P.J.	2	214	107
SAVAGE, N.W.	2	227	113.5
MOSQUEDA-TAYLOR, A.	2	350	175
LO MUZIO, L.	2	433	216.5
MATTHEWS, J.B.	2	201	100.5
BATSTONE, M.D.	2	227	113.5

LEDESMA-MONTES, C.	2	350		175
JONES, A.V.	2	281		140.5
JOHNSON, N.R.	2	227		113.5
FRANKLIN, C.D.	2	281		140.5
EVERSOLE, L.R.	2	253		126.5
ELLIS, G.L.	2	263		131.5
COLLINS, B.M.	2	205		102.5
BUCHNER, A.	2	302		151
BROWNE, R.M.	2	201		100.5
YU, S.-F.	2	214		107

Tp-total publication , Tc-total citation ,C/P-citation per publication

Table no 3: List of top most cited journals

Journal	TP	TC	C/P
Oral Surgery, Oral Medicine, Oral Pathology And Oral Radiology	17	3020	177.7
Journal of Oral Pathology & Medicine	16	1902	118.9
Journal of Oral And Maxillofacial Surgery	9	1183	131.4
Oral Oncology	8	1049	131.1
Cancer	4	633	158.3
International Journal of Oral And Maxillofacial Surgery	3	272	90.67
Journal of Dental Research	3	379	126.3
Journal of Cranio-Maxillofacial Surgery	3	311	103.7
Radiographics	2	306	153
Journal of The Canadian Dental Association	2	236	118
Archives of Pathology And Laboratory Medicine	2	208	104
Orphanet Journal of Rare Diseases	2	715	357.5
Journal of Oral Science	2	204	102
American Journal of Surgical Pathology	2	214	107
Acta Odontologica Scandinavica	1	216	216
Dermatologic Clinics	1	326	326
British Journal of Oral And Maxillofacial Surgery	1	98	98
Annals of The New York Academy of Sciences	1	93	93
European Journal of Radiology	1	130	130
American Journal of Pathology	1	101	101
American Journal of Medical Genetics, Part A	1	160	160
American Journal of Clinical Pathology	1	90	90
Acta Pathologica Microbiologica Scandinavica	1	189	189
American Journal of Roentgenology	1	116	116
Genetics In Medicine	1	282	282

Table no 4: Top 10 most cited key words

Keywords	TP	TC	C/P
Cysts	62	8929	144.02
Odontogenic Cyst	49	6454	131.71
Ameloblastoma	39	5976	153.23
Odontogenic Tumor	36	4967	137.97

No	Study designs	Total Articles	Total Citations	Citation impact	Kruskal-Wallis H Test	
1	Review articles	40	6490	162.25	0.56	
2	Retrospective studies	33	4922	149.15		
3	Case reports	7	791	113.00		
4	Comparative study	7	906	129.43		
5	Laboratory based	7	786	112.29		
6	Prospective	3	387	129.00		
7	Systematic review	3	309	103.00		
Carcinoma				35	5704	162.97
Odontogenic Keratocyst				34	4595	135.15
Mandible				25	3540	141.6
Epithelium				22	3329	151.32
Odontoma				20	3478	173.9
Dentigerous Cyst				17	2551	150.06

Table 5: Distribution of articles by different study designs (Statistically significant * $P<0.05$)Table 6: Distribution of articles by clinical relevance (Statistically significant * $P<0.05$)

Type	Articles	Citations	Citation impact	Chi-Square test
Clinical studies	47	6503	138.36	0.31
Non clinical studies	53	8088	152.60	

Table 7: Distribution of articles by dental vs nondental journals (Statistically significant * $P<0.05$)

Type	Articles	Citations	Citation impact	Chi-Square test
Dental Journals	67	9112	136.00	0.00*
Non-Dental Journals	33	2004	60.72	

Table 8: Appendix: Bibliographic description of 100 most cited articles

	Citation	Title	TC	C/Y
1	GORLIN RJ, 1987, MEDICINE	NEVOID BASAL-CELL CARCINOMA SYNDROME	647	17.97
2	REGEZI JA, 1978, J ORAL SURG	ODONTOGENIC TUMORS: ANALYSIS OF 706 CASES.	394	8.76
3	HALF E, 2009, ORPHANET J RARE DIS	FAMILIAL ADENOMATOUS POLYPOSIS	385	27.5
4	DALEY TD, 1994, ORAL SURG ORAL MED ORAL PATHOL	RELATIVE INCIDENCE OF ODONTOGENIC TUMORS AND ORAL AND JAW CYSTS IN A CANADIAN POPULATION	331	11.41

5	LO MUZIO L, 2008, ORPHANET J RARE DIS	NEVOID BASAL CELL CARCINOMA SYNDROME (GORLIN SYNDROME)	330	22
6	GORLIN RJ, 1995, DERMATOL CLIN	NEVOID BASAL CELL CARCINOMA SYNDROME	326	11.64
7	GORLIN RJ, 2004, GEN MED	NEVOID BASAL CELL CARCINOMA (GORLIN) SYNDROME	282	14.84
8	GORLIN RJ, 1962, ORAL SURG ORAL MED ORAL PATHOL	THE CALCIFYING ODONTOGENIC CYST-A POSSIBLE ANALOGUE OF THE CUTANEOUS CALCIFYING EPITHELIOMA OF MALHERBE. AN ANALYSIS OF FIFTEEN CASES	275	4.51
9	SMALL IA, 1955, ORAL SURG ORAL MED ORAL PATHOL	AMELOBLASTOMAS OF THE JAWS	269	3.96
10	ROBINSON L, 1977, CANCER	UNICYSTIC AMELOBLASTOMA. A PROGNOSTICALLY DISTINCT ENTITY	248	5.39
11	MYOUNG H, 2001, ORAL SURG ORAL MED ORAL PATHOL ORAL RADIOL ENDOD	ODONTOGENIC KERATOCYST: REVIEW OF 256 CASES FOR RECURRENCE AND CLINICOPATHOLOGIC PARAMETERS	238	10.82
12	ACKERMANN GL, 1988, J ORAL PATHOL MED	THE UNICYSTIC AMELOBLASTOMA: A CLINICOPATHOLOGICAL STUDY OF 57 CASES	225	6.43
13	BUCHNER A, 2006, J ORAL MAXILLOFAC SURG	RELATIVE FREQUENCY OF CENTRAL ODONTOGENIC TUMORS: A STUDY OF 1,088 CASES FROM NORTHERN CALIFORNIA AND COMPARISON TO STUDIES FROM OTHER PARTS OF THE WORLD	220	12.94
14	PRÆTORIUS F, 1981, ACTA ODONTOL SCAND	CALCIFYING ODONTOGENIC CYST: RANGE, VARIATIONS AND NEOPLASTIC POTENTIAL	216	5.14
15	MOSQUEDA- TAYLOR A, 1997, ORAL SURG ORAL MED ORAL PATHOL	ODONTOGENIC TUMORS IN MEXICO: A COLLABORATIVE RETROSPECTIVE STUDY OF 349 CASES	203	7.81

	ORAL RADIOL ENDOD			
16	PHILIPSEN HP, 1998, ORAL ONCOL	UNICYSTIC AMELOBLASTOMA. A REVIEW OF 193 CASES FROM THE LITERATURE	197	7.88
17	SMITH MJ, 2015, J CLIN ONCOL	GERMLINE MUTATIONS IN SUFU CAUSE GORLIN SYNDROME-ASSOCIATED CHILDHOOD MEDULLOBLASTOMA AND REDEFINE THE RISK ASSOCIATED WITH PTCH1 MUTATIONS	196	24.5
18	PINDBORG JJ, 1963, APMIS	STUDIES ON ODONTOGENIC CYST EPITHELIUM: 2. CLINICAL AND ROENTGENOLOGIC ASPECTS OF ODONTOGENIC KERATOCYSTS	189	3.15
19	REGEZI JA, 2002, MOD PATHOL	ODONTOGENIC CYSTS, ODONTOGENIC TUMORS, FIBROUSSEOUS, AND GIANT CELL LESIONS OF THE JAWS	188	8.95
20	SCHOLL RJ, 1999, RADIOGRAPHIC S	CYSTS AND CYSTIC LESIONS OF THE MANDIBLE: CLINICAL AND RADIOLOGIC- HISTOPATHOLOGIC REVIEW	185	7.71
21	AHLFORS E, 1984, J ORAL MAXILLOFAC SURG	THE ODONTOGENIC KERATOCYST: A BENIGN CYSTIC TUMOR?	184	4.72
22	SHEAR M, 2002, ORAL ONCOL-a- b	THE AGGRESSIVE NATURE OF THE ODONTOGENIC KERATOCYST: IS IT A BENIGN CYSTIC NEOPLASM? PART 2. PROLIFERATION AND GENETIC STUDIES	181	8.62
23	SHEAR M, 2002, ORAL ONCOL-a	THE AGGRESSIVE NATURE OF THE ODONTOGENIC KERATOCYST: IS IT A BENIGN CYSTIC NEOPLASM? PART 1. CLINICAL AND EARLY EXPERIMENTAL EVIDENCE OF AGGRESSIVE BEHAVIOUR	179	8.52
24	BARRETO DC, 2000, J DENT RES	PTCH GENE MUTATIONS IN ODONTOGENIC KERATOCYSTS	177	7.7
25	ELZAY RP, 1982, ORAL SURG ORAL MED ORAL PATHOL	PRIMARY INTRAOSSEOUS CARCINOMA OF THE JAWS. REVIEW AND UPDATE OF ODONTOGENIC CARCINOMAS	177	4.32

26	PHILIPSEN HP, 1991, J ORAL PATHOL MED	ADENOMATOID ODONTOGENIC TUMOR: BIOLOGIC PROFILE BASED ON 499 CASES	167	5.22
27	LADEINDE AL, 2005, ORAL SURG ORAL MED ORAL PATHOL ORAL RADIOL ENDOD	ODONTOGENIC TUMORS: A REVIEW OF 319 CASES IN A NIGERIAN TEACHING HOSPITAL	165	9.17
28	BUCHNER A, 1991, J ORAL MAXILLOFAC SURG	THE CENTRAL (INTRAOSSUEOUS) CALCIFYING ODONTOGENIC CYST: AN ANALYSIS OF 215 CASES	164	5.12
29	HONG SP, 1991, ORAL SURG ORAL MED ORAL PATHOL	CALCIFYING ODONTOGENIC CYST. A REVIEW OF NINETY- TWO CASES WITH REEVALUATION OF THEIR NATURE AS CYSTS OR NEOPLASMS, THE NATURE OF GHOST CELLS, AND SUBCLASSIFICATION	161	5.03
30	BREE AF, 2011, AM J MED GENET PART A	CONSENSUS STATEMENT FROM THE FIRST INTERNATIONAL COLLOQUIUM ON BASAL CELL NEVUS SYNDROME (BCNS)	160	13.33
31	GORLIN RJ, 1965, CANCER	THE MULTIPLE BASAL-CELL NEVI SYNDROME. AN ANALYSIS OF A SYNDROME CONSISTING OF MULTIPLE NEVOID BASAL-CELL CARCINOMA, JAW CYSTS, SKELETAL ANOMALIES, MEDULLOBLASTOMA, AND HYPORESPONSIVENESS TO PARATHORMONE	154	2.66
32	JONES AV, 2006, INT J PAEDIATR DENT	AN ANALYSIS OF ORAL AND MAXILLOFACIAL PATHOLOGY FOUND IN CHILDREN OVER A 30-YEAR PERIOD	153	9
33	MADRAS J, 2008, J CAN DENT ASSOC	KERATOCYSTIC ODONTOGENIC TUMOUR: RECLASSIFICATION OF THE ODONTOGENIC KERATOCYST FROM CYST TO TUMOUR	151	10.07
34	LEDESMA- MONTES C, 2008, J ORAL PATHOL MED	INTERNATIONAL COLLABORATIVE STUDY ON GHOST CELL ODONTOGENIC TUMOURS: CALCIFYING CYSTIC ODONTOGENIC	147	9.8

		TUMOUR, DENTINOGENIC GHOST CELL TUMOUR AND GHOST CELL ODONTOGENIC CARCINOMA		
35	LEIDER AS, 1985, ORAL SURG ORAL MED ORAL PATHOL	CYSTIC AMELOBLASTOMA. A CLINICOPATHOLOGIC ANALYSIS	141	3.71
36	STOELINGA PJW, 1988, J CRANIO- MAXILLOFAC SURG	THE INCIDENCE, MULTIPLE PRESENTATION AND RECURRENCE OF AGGRESSIVE CYSTS OF THE JAWS	136	3.89
37	LUO HY, 2009, ORAL ONCOL	ODONTOGENIC TUMORS: A STUDY OF 1309 CASES IN A CHINESE POPULATION	136	9.71
38	PINDBORG JJ, 1958, CANCER	A CALCIFYING EPITHELIAL ODONTOGENIC TUMOR	135	2.08
39	SLOOTWEG PJ, 1995, J ORAL PATHOL MED	P53 PROTEIN AND KI-67 REACTIVITY IN EPITHELIAL ODONTOGENIC LESIONS. AN IMMUNOHISTOCHEMICAL STUDY	132	4.71
40	JOHNSON NR, 2014, J INVESTIG CLIN DENT	FREQUENCY OF ODONTOGENIC CYSTS AND TUMORS: A SYSTEMATIC REVIEW	130	14.44
41	BOEDDINGHAU S R, 2008, EUR J RADIOL	CURRENT CONCEPTS IN MAXILLOFACIAL IMAGING	130	8.67
42	JONES AV, 2006, J ORAL PATHOL MED	AN ANALYSIS OF ORAL AND MAXILLOFACIAL PATHOLOGY FOUND IN ADULTS OVER A 30-YEAR PERIOD	128	7.53
43	WALDRON CA, 1990, J ORAL MAXILLOFAC SURG	CENTRAL MUCOEPIDERMOID CARCINOMA OF THE JAWS: REPORT OF FOUR CASES WITH ANALYSIS OF THE LITERATURE AND DISCUSSION OF THE RELATIONSHIP TO MUCOEPIDERMOID, SIALODONTOGENIC, AND GLANDULAR ODONTOGENIC CYSTS	127	3.85
44	HARRIS M, 1973, NATURE	PROSTAGLANDIN PRODUCTION AND BONE RESORPTION BY DENTAL CYSTS	123	2.46

45	GONZÁLEZ-ALVA P, 2008, J ORAL SCI	KERATOCYSTIC ODONTOGENIC TUMOR: A RETROSPECTIVE STUDY OF 183 CASES.	123	8.2
46	AGARAM NP, 2004, ARCH PATHOL LAB MED	MOLECULAR ANALYSIS TO DEMONSTRATE THAT ODONTOGENIC KERATOCYSTS ARE NEOPLASTIC	122	6.42
47	DUNFEE BL, 2006, RADIOGRAPHIC S	RADIOLOGIC AND PATHOLOGIC CHARACTERISTICS OF BENIGN AND MALIGNANT LESIONS OF THE MANDIBLE	121	7.12
48	ADEBAYO ET, 2005, J ORAL MAXILLOFAC SURG	A REVIEW OF 318 ODONTOGENIC TUMORS IN KADUNA, NIGERIA	120	6.67
49	PADAYACHEE A, 1987, J ORAL PATHOL MED	TWO CYSTIC LESIONS WITH FEATURES OF BOTH THE BOTRYOID ODONTOGENIC CYST AND THE CENTRAL MUCOEPIDERMOID TUMOUR: SIALO-ODONTOGENIC CYST?	120	3.33
50	SHEAR M, 1994, J ORAL PATHOL MED	DEVELOPMENTAL ODONTOGENIC CYSTS. AN UPDATE	119	4.1
51	LI TJ, 2000, AM J SURG PATHOL	UNICYSTIC AMELOBLASTOMA: A CLINICOPATHOLOGIC STUDY OF 33 CHINESE PATIENTS	117	5.09
52	MINAMI M, 1996, AM J ROENTGENOL	CYSTIC LESIONS OF THE MAXILLOMANDIBULAR REGION: MR IMAGING DISTINCTION OF ODONTOGENIC KERATOCYSTS AND AMELOBLASTOMAS FROM OTHER CYSTS	116	4.3
53	FERNANDES AM, 2005, J ORAL PATHOL MED	ODONTOGENIC TUMORS: A STUDY OF 340 CASES IN A BRAZILIAN POPULATION	113	6.28
54	EVERSOLE LR, 1999, SEMIN DIAGN PATHOL	MALIGNANT EPITHELIAL ODONTOGENIC TUMORS	112	4.67
55	FREEDMAN PD, 1975, ORAL SURG ORAL MED ORAL PATHOL	CALCIFYING ODONTOGENIC CYST. A REVIEW AND ANALYSIS OF SEVENTY CASES	112	2.33
56	WALDRON CA, 1989, ORAL	PRIMARY INTRAOSSEOUS CARCINOMA OF THE	109	3.21

	SURG ORAL MED ORAL PATHOL	MANDIBLE WITH PROBABLE ORIGIN IN AN ODONTOGENIC CYST		
57	COHEN JR. MM, 1999, INT J ORAL MAXILLOFAC SURG	NEVOID BASAL CELL CARCINOMA SYNDROME: MOLECULAR BIOLOGY AND NEW HYPOTHESES	104	4.33
58	LO MUZIO L, 1999, J DENT RES	EXPRESSION OF CELL CYCLE AND APOPTOSIS-RELATED PROTEINS IN SPORADIC ODONTOGENIC KERATOCYSTS AND ODONTOGENIC KERATOCYSTS ASSOCIATED WITH THE NEVOID BASAL CELL CARCINOMA SYNDROME	103	4.29
59	FEJERSKOV O, 1972, J ORAL PATHOL MED	THE CALCIFYING GHOST CELL ODONTOGENIC TUMOR – OR THE CALCIFYING ODONTOGENIC CYST	103	2.02
60	LI TJ, 1995, J ORAL PATHOL MED	EPITHELIAL CELL PROLIFERATION IN ODONTOGENIC KERATOCYSTS: A COMPARATIVE IMMUNOCYTOCHEMICAL STUDY OF KI67 IN SIMPLE, RECURRENT AND BASAL CELL NAEVUS SYNDROME (BCNS)- ASSOCIATED LESIONS	102	3.64
61	KIM J, 1993, J ORAL MAXILLOFAC SURG	DENTAL FOLLICULAR TISSUE: MISINTERPRETATION AS ODONTOGENIC TUMORS	102	3.4
62	SEKINE S, 2003, AM J PATHOL	B-CATENIN MUTATIONS ARE FREQUENT IN CALCIFYING ODONTOGENIC CYSTS, BUT RARE IN AMELOBLASTOMAS	101	5.05
63	BODNER L, 2011, J ORAL PATHOL MED	PRIMARY INTRAOSSEOUS SQUAMOUS CELL CARCINOMA ARISING IN AN ODONTOGENIC CYST - A CLINICOPATHOLOGIC ANALYSIS OF 116 REPORTED CASES	100	8.33
64	LI TJ, 2011, J DENT RES	CRITICAL REVIEWS IN ORAL BIOLOGY & MEDICINE: THE ODONTOGENIC KERATOCYST: A CYST, OR A CYSTIC NEOPLASM?	99	8.25
65	LI TJ, 1994, J ORAL PATHOL MED	QUANTIFICATION OF PCNA+ CELLS WITHIN ODONTOGENIC JAW CYST EPITHELIUM	99	3.41

66	PARTRIDGE M, 1987, BR J ORAL MAXILLOFAC SURG	THE PRIMORDIAL CYST (ODONTOGENIC KERATOCYST): ITS TUMOUR- LIKE CHARACTERISTICS AND BEHAVIOUR	98	2.72
67	LI TJ, 2003, AM J SURG PATHOL	CLINICOPATHOLOGIC SPECTRUM OF THE SO-CALLED CALCIFYING ODONTOGENIC CYSTS: A STUDY OF 21 INTRAOSSEOUS CASES WITH RECONSIDERATION OF THE TERMINOLOGY AND CLASSIFICATION	97	4.85
68	JOHNSON NR, 2013, ORAL SURG ORAL MED ORAL PATHOL ORAL RADIOL	MANAGEMENT AND RECURRENCE OF KERATOCYSTIC ODONTOGENIC TUMOR: A SYSTEMATIC REVIEW	97	9.7
69	SHEAR M, 2002, ORAL ONCOL	THE AGGRESSIVE NATURE OF THE ODONTOGENIC KERATOCYST: IS IT A BENIGN CYSTIC NEOPLASM? PART 3. IMMUNOCYTOCHEMISTRY OF CYTOKERATIN AND OTHER EPITHELIAL CELL MARKERS	97	4.62
70	GARDNER AF, 1969, J AM DENT ASSOC	THE ODONTOGENIC CYST AS A POTENTIAL CARCINOMA: A CLINICOPATHOLOGIC APPRAISAL.	97	1.8
71	DEHNER LP, 1973, CANCER	TUMORS OF THE MANDIBLE AND MAXILLA IN CHILDREN. I. CLINICOPATHOLOGIC STUDY OF 46 HISTOLOGICALLY BENIGN LESIONS	96	1.92
72	MENDES RA, 2010, ORAL ONCOL	CHARACTERIZATION AND MANAGEMENT OF THE KERATOCYSTIC ODONTOGENIC TUMOR IN RELATION TO ITS HISTOPATHOLOGICAL AND BIOLOGICAL FEATURES	94	7.23
73	BROWAND BC, 1975, ORAL SURG ORAL MED ORAL PATHOL	CENTRAL MUCOEPIDERMOID TUMORS OF THE JAWS. REPORT OF NINE CASES AND REVIEW OF THE LITERATURE	94	1.96
74	GORLIN RJ, 1963, ANN NEW YORK ACAD SCI	ODONTOGENIC TUMORS IN MAN AND ANIMALS: PATHOLOGIC CLASSIFICATION	93	1.55

		AND CLINICAL BEHAVIOR—A REVIEW		
75	PITAK-ARNNOP P, 2010, J CRANIO-MAXILLOFAC SURG	MANAGEMENT OF ODONTOGENIC KERATOCYSTS OF THE JAWS: A TEN-YEAR EXPERIENCE WITH 120 CONSECUTIVE LESIONS	93	7.15
76	SLEEMAN MA, 2000, INT IMMUNOL	B CELL- AND MONOCYTE-ACTIVATING CHEMOKINE (BMAC), A NOVEL NON-ELR A-CHEMOKINE	92	4
77	LIAPATAS S, 2003, INT ENDOD J	INFLAMMATORY INFILTRATE OF CHRONIC PERIRADICULAR LESIONS: AN IMMUNOHISTOCHEMICAL STUDY	92	4.6
78	PHILIPSEN HP, 2006, J ORAL PATHOL MED	CLASSIFICATION OF ODONTOGENIC TUMOURS. A HISTORICAL REVIEW	92	5.41
79	TOIDA M, 1998, J ORAL PATHOL MED	SO-CALLED CALCIFYING ODONTOGENIC CYST: REVIEW AND DISCUSSION ON THE TERMINOLOGY AND CLASSIFICATION	91	3.64
80	SUEI Y, 1994, J ORAL MAXILLOFAC SURG	PRIMARY INTRAOSSEOUS CARCINOMA: REVIEW OF THE LITERATURE AND DIAGNOSTIC CRITERIA	91	3.14
81	HASSANEIN AM, 2003, AM J CLIN PATHOL	B-CATENIN IS EXPRESSED ABERRANTLY IN TUMORS EXPRESSING SHADOW CELLS: PILOMATRICOMA, CRANIOPHARYNGIOMA, AND CALCIFYING ODONTOGENIC CYST	90	4.5
82	WILLIAMS TP, 1994, J ORAL MAXILLOFAC SURG	SURGICAL MANAGEMENT OF THE ODONTOGENIC KERATOCYST: AGGRESSIVE APPROACH	90	3.1
83	DONG Q, 2010, ARCH PATHOL LAB MED	ORTHOKERATINIZED ODONTOGENIC CYST A CLINICOPATHOLOGIC STUDY OF 61 CASES	86	6.62
84	KAHN MA, 1989, ORAL SURG ORAL MED ORAL PATHOL	AMELOBLASTOMA IN YOUNG PERSONS: A CLINICOPATHOLOGIC ANALYSIS AND ETIOLOGIC INVESTIGATION	86	2.53

85	AVON SL, 2003, J CAN DENT ASSOC	AMELOBLASTIC CARCINOMA: CASE REPORT AND LITERATURE REVIEW.	85	4.25
86	CHAI SUPARAT R, 2006, ORAL SURG ORAL MED ORAL PATHOL ORAL RADIOL ENDOD	PRIMARY INTRAOSSEOUS ODONTOGENIC CARCINOMA ARISING IN AN ODONTOGENIC CYST OR DE NOVO: A CLINICOPATHOLOGIC STUDY OF SIX NEW CASES	85	5
87	AUGUST M, 2004, J ORAL MAXILLOFAC SURG	MARSUPIALIZATION AS A DEFINITIVE TREATMENT FOR THE ODONTOGENIC KERATOCYST	85	4.47
88	GÜVEN O, 2000, INT J ORAL MAXILLOFAC SURG	THE INCIDENCE OF CYSTS AND TUMORS AROUND IMPACTED THIRD MOLARS	84	3.65
89	ZHANG LL, 2010, INT J ORAL MAXILLOFAC SURG	DENTIGEROUS CYST: A RETROSPECTIVE CLINICOPATHOLOGICAL ANALYSIS OF 2082 DENTIGEROUS CYSTS IN BRITISH COLUMBIA, CANADA	84	6.46
90	KAUGARS GE, 1989, ORAL SURG ORAL MED ORAL PATHOL	ODONTOMAS	83	2.44
91	PIATTELLI A, 1998, ORAL ONCOL	EXPRESSION OF PROLIFERATING CELL NUCLEAR ANTIGEN IN AMELOBLASTOMAS AND ODONTOGENIC CYSTS	83	3.32
92	BILODEAU EA, 2017, SURG PATHOL CLIN	ODONTOGENIC CYSTS AND NEOPLASMS	83	13.83
93	VERED M, 2005, ORAL ONCOL	MYOFIBROBLASTS IN STROMA OF ODONTOGENIC CYSTS AND TUMORS CAN CONTRIBUTE TO VARIATIONS IN THE BIOLOGICAL BEHAVIOR OF LESIONS	82	4.56
94	SLOOTWEG PJ, 2009, HISTOPATHOLO GY	LESIONS OF THE JAWS	82	5.86
95	NINOMIYA T, 2002, J ORAL PATHOL MED	MARSUPIALIZATION INHIBITS INTERLEUKIN-1A EXPRESSION AND EPITHELIAL CELL	82	3.9

		PROLIFERATION IN ODONTOGENIC KERATOCYSTS		
96	KICHI E, 2005, J ORAL PATHOL MED	CELL PROLIFERATION, APOPTOSIS AND APOPTOSIS-RELATED FACTORS IN ODONTOGENIC KERATOCYSTS AND IN DENTIGEROUS CYSTS	82	4.56
97	APPS JR, 2018, ACTA NEUROPATHOL	TUMOUR COMPARTMENT TRANSCRIPTOMICS DEMONSTRATES THE ACTIVATION OF INFLAMMATORY AND ODONTOGENIC PROGRAMMES IN HUMAN ADAMANTINOMATOUS CRANIOPHARYNGIOMA AND IDENTIFIES THE MAPK/ERK PATHWAY AS A NOVEL THERAPEUTIC TARGET	82	16.4
98	AL-MORAISSEI EA, 2017, J CRANIO-MAXILLOFAC SURG	WHAT SURGICAL TREATMENT HAS THE LOWEST RECURRENCE RATE FOLLOWING THE MANAGEMENT OF KERATOCYSTIC ODONTOGENIC TUMOR?: A LARGE SYSTEMATIC REVIEW AND META-ANALYSIS	82	13.67
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