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Prevalence Of Odontogenic Tumours In Association With Age And Gender - An Institutional Study

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ABSTRACT

Background: Odontogenic tumours are a complex, heterogenous group of lesions ranging from hamartomas to malignancies. There is a lack in the number of studies recording the prevalence rates and epidemiology of odontogenic tumours among the Indian population.

Aim: The current study aims to establish the association between age, gender and odontogenic tumour occurence.

Methodology: Data was collected from patients' dental records from the department of oral pathology to meet the inclusion and exclusion criteria. A total of 640 records of patients who had undergone histopathological diagnosis were selected by random sampling and presence or absence of odontogenic tumours was analyzed in different gender and age. Descriptive analysis and chi-square tests were performed.

Results: Of the 640 examined subjects, only 11 patients were diagnosed with odontogenic tumour (0.1%). This study reveals that the prevalence of odontogenic among the study population was low. Unicystic ameloblastoma was the most commonly occurring OT. No significant correlation was found among gender or age.

J Popul Ther Clin Pharmacol Vol 29(4):e222–e231; 16 November 2022.

Conclusion: Odontogenic tumour is a rare occurrence for the given patient demographics. However, knowledge regarding the relative incidence of odontogenic tumours across the globe, will likely improve the understanding of these lesions and this will in turn contribute significantly in determining treatment, its clinical outcomes and prognosis.

Keywords: *odontogenic tumour; age; gender; prevalence; association; innovative technique*

INTRODUCTION

A tumor is usually defined as a swelling of tissues and it does not necessarily imply a neoplastic process. Neoplasia is a poorly understood biological process which cannot be distinctly differentiated from other processes or tissue reactions (1). Odontogenic tumours are lesions which originate from the odontogenic epithelium and remain entrapped in the adjacent soft tissues or within the jaws. In most cases, they are solely reported in the maxillary or mandibular jaw bones (2). Even though they are principally jaw lesions, some reports have found their occurrence as localized gingival swellings as peripheral odontogenic tumors (3). These hereditary progressions allow unreasonable and unregulated expansion that later becomes independent of physiologic stimuli for development,despite the fact that the tumor almost always stays subject to having the necessary nourishment and blood supply. Over the last decade, ten million fresh incidents of malignancies and 6 million malignancy related deaths have been reported worldwide (4). Odontogenic tumors comprise a heterogeneous collection of lesions. These lesions range from hamartomas, benign lesions to malignant neoplasms with metastasizing capacity (5). In humans however, tumors of the odontogenic tissues are relatively rare as they comprise about 1% of the total oral and maxillofacial biopsy specimens diagnosed (6).

Odontogenic tumors were assessed at a frequency of almost 0.5 cases/100,000 population for every year (7).

Odontogenic tumours comprise a broad range of lesions and have been classified in a number of ways throughout the years. Initially they were classified based on location and they could be either peripheral or central and later they were classified based on their biologic behaviour into benign and malignant types. None of these classifications were widely accepted (8). The newer classification of odontogenic tumours by WHO was published as recently as January 2017. The newly updated WHO classification system employs a simpler format of classification based on the germ cell layer of origin such as epithelial, mesenchymal (ectomesenchymal) and mixed odontogenic tumors. Similar to the earlier editions, the classification system also incorporates dividing odontogenic tumors into two categories, based on their biological behavior as malignant and benign (9). The odontogenic cysts that were previously eliminated from the 2005 edition of WHO classification have been updated and restored. Keratocystic odontogenic tumour (KCOT) and calcifying cystic odontogenic tumour (CCOT) were renamed/reclassified as odontogenic keratocysts and calcifying odontogenic cysts respectively. The majority of odontogenic tumors are benign although there are some exceptions where the ameloblastomas (typically but not exclusively) exhibit locally infiltrative behavior (10).

J Popul Ther Clin Pharmacol Vol 29(4):e222–e231; 16 November 2022.

The relative incidence of odontogenic tumours vary greatly in different countries (11,12). This discrepancy in occurrence is owing to the geographic and ethnical diversity of those countries. In India, the population is ethnically diverse which requires more epidemiological studies to be conducted (13). Apart from this frequency of odontogenic cysts and tumors is important, as it will help patients develop a realistic opinion of likely diagnoses when radiographic lucencies occur as an incidental finding on panoramic radiographs so that an unnecessary emphasis can be avoided for an uncommon, and sometimes aggressive lesions. This is also important from a healthcare professional viewpoint in providing a global frequency for their patients.

Our team has extensive knowledge and research experience that has translate into high quality publications (14–23)

Now the growing trend in this area motivated us to pursue this project. A large number of studies on odontogenic cysts are available, although studies regarding odontogenic tumours are relatively rare. There is also a lack of epidemiological studies reporting the incidence among the Indian population (24). Hence the aim of this study is to assess the prevalence of odontogenic tumours and evaluate its association with age and gender.

METHODOLOGY

This retrospective study was conducted in a university setting. The ethical clearance for the study was obtained from the Institutional Scientific Review Board. The treatment records of patients who had undergone treatment in Saveetha Dental college between June 2019 to December 2020 were assessed for this study. The data collection and analysis was done by a single examiner. The inclusion criteria were patients who were diagnosed with odontogenic tumour. Patient details were procured from DIAS. To avoid sampling bias, simple random sampling was done. Gender and age of the patients was recorded.

The extracted data was tabulated in a spreadsheet (Excel 2017: Microsoft Office) and analysed using SPSS 19.0 version software (SPSS, Inc., Chicago). Descriptive statistics and chi-square tests were performed with the level of significance at 5% ($P<0.05$).

RESULTS

The total study population was 640 patient records of the age group 0-70 years. In this study population, 72.7% belonged to the male gender and 27.3% to the female gender. The demographic data is represented in graph 1,2.

Of the 640 examined subjects, only 11 patients were diagnosed with odontogenic tumour (0.1%). The histopathological method for diagnosis was through biopsy in 72.7% and through resection in 27.3%. (graph 3) The most common type of odontogenic tumor among the subjects was Unicystic Ameloblastoma (54.5%). The prevalence rates of adenomatoid odontogenic tumour, squamous odontogenic tumour, follicular ameloblastoma, ameloblastic carcinoma and odontogenic myxoma was 9.1% each (graph 4).

Males showed higher prevalence rates and age group 20-40 showed higher prevalence. However, the patient's gender and age had no significant correlation in the occurrence of odontogenic tumours (graph 5,6).

DISCUSSION

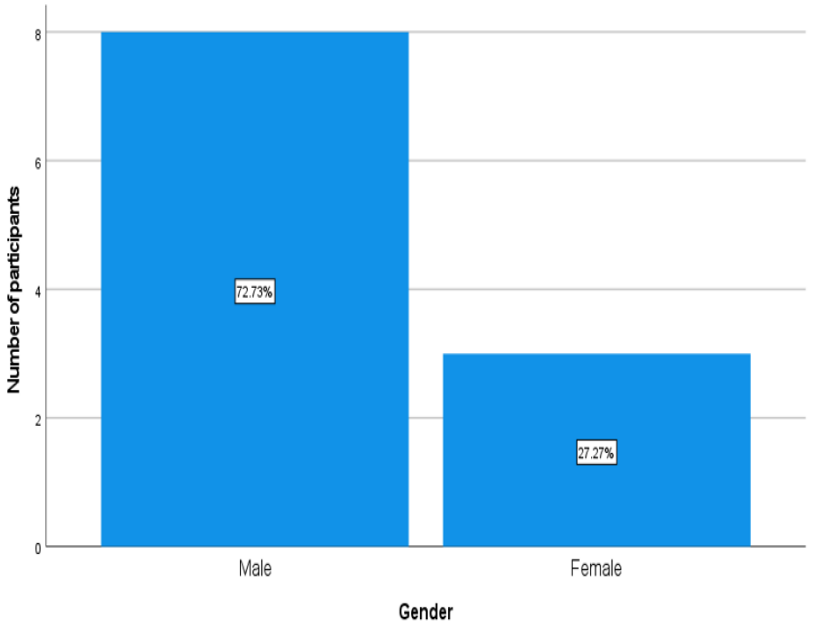
Odontogenic tumours are a relatively rare condition and comprise an unusual heterogenous group of lesions that are predominantly derived from odontogenic tissues. These complex lesions are a representation of some abnormality in the normal odontogenesis process. Odontogenic tumours also share almost similar clinicopathological features which require a careful diagnosis to ensure proper treatment and prognosis (11).

Epidemiological studies of OT, especially among the population of the Southern state of India are relatively rare (24). However studies across the globe have been conducted to determine their prevalence among various populations (5,25,26).

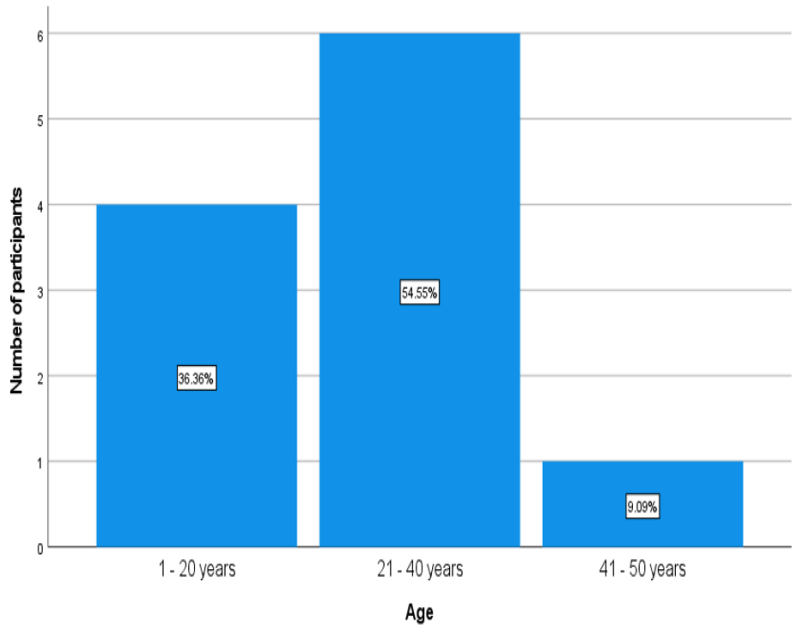
Only 0.1% of the study population were reported to be diagnosed with odontogenic tumour. This is comparatively lower than prevalence rates in previous studies (27,28). The age group with the higher number of incidence recorded was 20-40 years in this study. These findings were similar to the studies conducted among other populations (29–32). Only one case was recorded in the 0-10 age group and this result was consistent with a study conducted in Indian teaching institution (5). This reported low incidence of OT among children has suggested that the development of OT from the tooth forming tissues probably occurs after the crown formation. However, significant involvement of children and adolescents have been observed in studies conducted in Argentina (33) and Libya (34). Present study showed male predominance (72.7%) which is similar to the studies conducted by Odukoya (8) and Nalabolu (24).

In the present study, male patients (72.7%) were more commonly affected than females (27.3%). Previous studies conducted in Nigeria (35), Egypt (36), and in India (5,24), reported similar predominance among the male gender. In the present study unicystic ameloblastoma was the most common type of odontogenic tumour among the given subjects (graph 4) with a prevalence rate of 54.5%. This is in accordance with a number of previous studies that reported ameloblastoma to be the most common among odontogenic tumours (24,37–39). Higher prevalence of ameloblastoma in comparison to other OTs in this population suggests that these lesions could be more common in Africans and Asians when compared to Caucasians.

One deviation from previous studies is that only one case of adenomatoid odontogenic tumour was observed in the current study, whereas previous literature states that it is the second most prevalent OT (24). In this study other odontogenic tumours were observed to a lesser degree, with only one reported case for each, such as squamous odontogenic tumour, follicular ameloblastoma, ameloblastic carcinoma and odontogenic myxoma (graph 4). This is also in accordance with previous studies (10,24,40). Because of lack of these tumours the epidemiological data cannot be concluded. However, lower incidence of these OT in the present study exhibits the rarity of the tumours. We can also infer that the number of malignant cases are lesser in comparison to benign cases. Similar observations made in study among chinese population (25,26) whereas lower malignancy rates are most frequently reported (6,8,41,42). Age, gender and incidence of odontogenic tumours though in accordance with previous Indian studies were not significant (24,43,44).

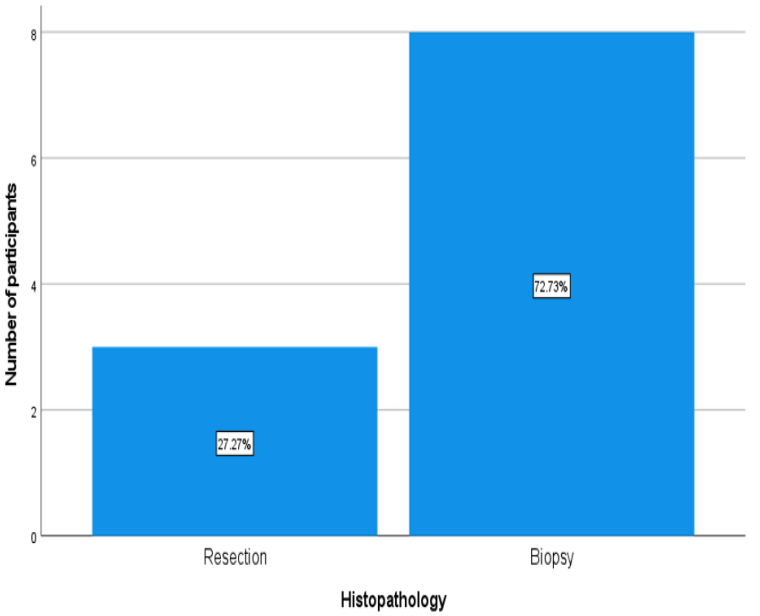


GRAPH 1: Bar graph represents the gender distribution in the sample population. X-axis denotes gender and Y-axis denotes the number of patients. 72.7% of the sample population belonged to the male gender and 27.3% of the population belonged to the female gender.

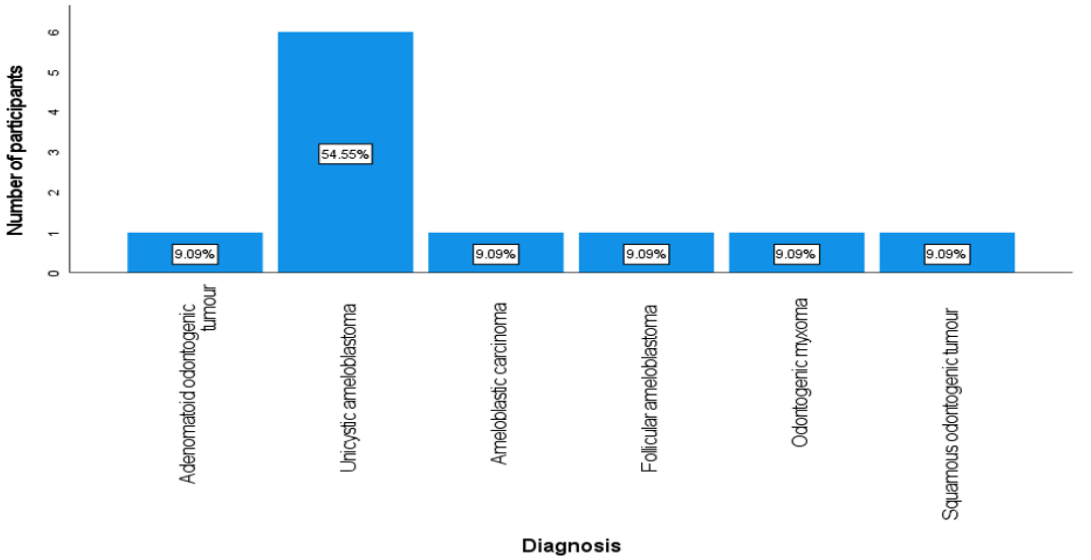


GRAPH 2: Bar graph represents the age distribution in the sample population. X-axis denotes age groups and Y-axis denotes the number of patients. 36.4% of the sample population belonged to the 1-20 age group, 54.5% to 20-40 year age group and 9.1% to the 40-50 age group.

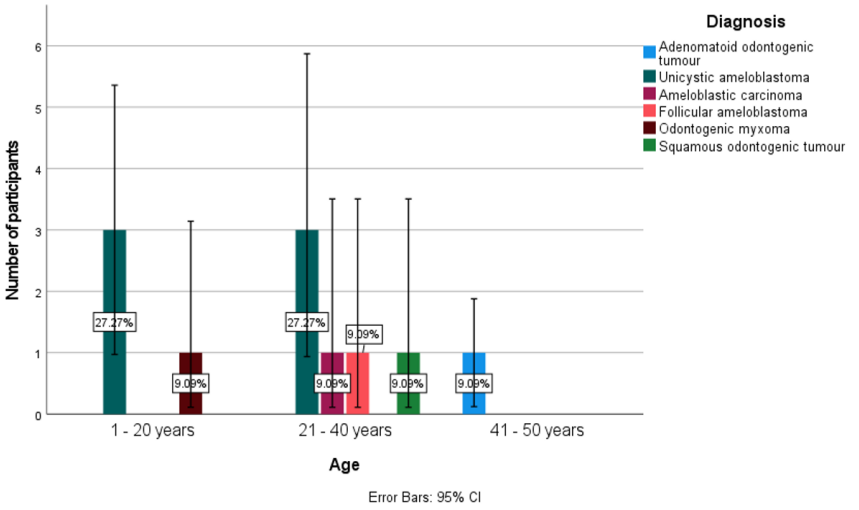
J Popul Ther Clin Pharmacol Vol 29(4):e222–e231; 16 November 2022.



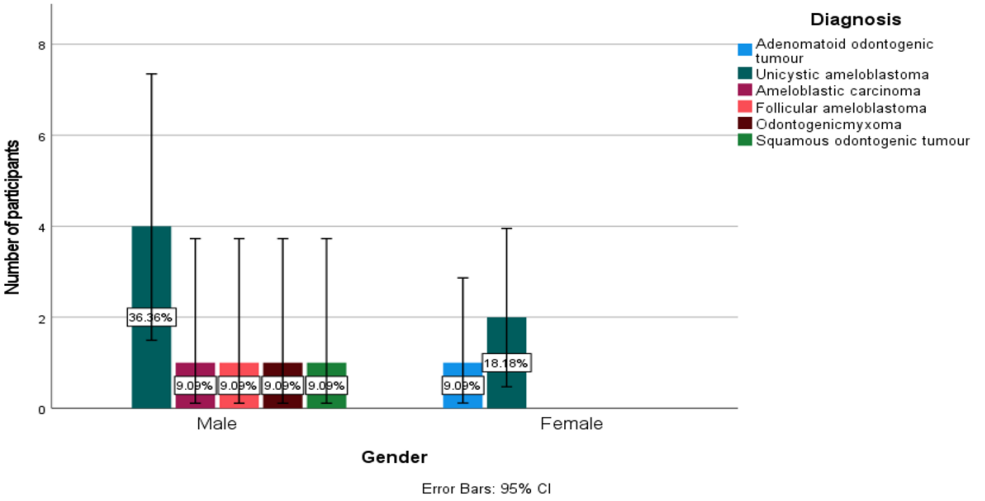
GRAPH 3: Bar graph represents the histopathological diagnosis of the sample population. X-axis denotes the histopathological method and Y-axis denotes the number of patients. 72.7% of the sample population underwent biopsy and 27.3% of the population underwent resection.



GRAPH 4: Bar Graph representing the odontogenic tumour distribution in the given population. X- axis denotes the diagnosis of odontogenic tumour, Y-axis denotes the number of patients. Unicystic Ameloblastoma had a prevalence rate of 54.5% and adenomatoid odontogenic tumour, squamous odontogenic tumour, follicular ameloblastoma, ameloblastic carcinoma and odontogenic myxoma was 9.1% each .



GRAPH 5: Bar Graph representing association of odontogenic tumour with age. X- axis denotes the age groups, Y-axis denotes the number of patients with odontogenic tumour. Color blue represents adenomatoid odontogenic tumor, color grey represents unicystic ameloblastoma, color pink represents ameloblastic carcinoma, color orange represents follicular ameloblastoma, color brown represents odontogenic myxoma and color green represents squamous odontogenic tumour. There was no difference between age groups and odontogenic tumour occurrence. Chi square test was done and the association was found to be not significant (p value = 0.128, p>0.05 statistically not significant).



GRAPH 6: Bar Graph representing association of odontogenic tumour with gender. X- axis denotes the gender, Y-axis denotes the number of patients with odontogenic tumour. Color blue represents adenomatoid odontogenic tumor, color grey represents unicystic ameloblastoma, color pink represents ameloblastic carcinoma, color orange represents follicular ameloblastoma, color brown represents odontogenic myxoma and color green represents squamous odontogenic tumour. There was no difference between gender and odontogenic tumour occurrence. Chi square test was done and the association was found to be not significant (p value = 0.510, p>0.05 statistically not significant).

LIMITATIONS

All data are obtained from a single institution and small sample size are a few limitations of this study. Future multicentre studies could also involve history to determine the etiological factors and site of the lesions for better understanding of OT.

CONCLUSION

Within the limits of the present study, we can conclude with the reported demographic data of various odontogenic tumours, that ameloblastoma is the predominant type of odontogenic tumour. However, no significant associations were made to age and gender. Further large scale studies are required to accurately estimate the prevalence rates among Indians. Knowledge regarding the relative incidence of odontogenic tumours across the globe, will likely improve the understanding of these lesions and this will in turn contribute significantly in determining treatment, its clinical outcomes and prognosis.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Rajendran R. Shafer'S Textbook Of Oral Pathology (6Th Edition). Elsevier India; 2009. 963 p.
2. Regezi DDS MS J, James Sciubba D, Jordan RCK. Oral Pathology: Clinical Pathologic Correlations. Elsevier Health Sciences; 2016. 496 p.
3. Morgan PR. Odontogenic tumors: a review. Periodontol 2000. 2011 Oct;57(1):160–76.
4. Kumar V, Abbas AK, Fausto N, Aster JC. Robbins and Cotran Pathologic Basis of Disease, Professional Edition E-Book. Elsevier Health Sciences; 2014. 1408 p.
5. Varkhede A, Tupkari JV, Sardar M. Odontogenic tumors: a study of 120 cases in an Indian teaching hospital. Med Oral Patol Oral Cir Bucal. 2011 Nov 1;16(7):e895–9.
6. Sriram G, Shetty RP. Odontogenic tumors: a study of 250 cases in an Indian teaching hospital. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008 Jun;105(6):e14–21.
7. Garg K, Chandra S, Raj V, Fareed W, Zafar M. Molecular and genetic aspects of odontogenic tumors: a review. Iran J Basic Med Sci. 2015 Jun;18(6):529–36.
8. Saghravanian N, Jafarzadeh H, Bashardoost N, Pahlavan N, Shirinbak I. Odontogenic tumors in an Iranian population: a 30-year evaluation. J Oral Sci. 2010 Sep;52(3):391–6.
9. Soluk-Tekkeşin M, Wright JM. The World Health Organization Classification of Odontogenic Lesions: A Summary of the Changes of the 2017 (4th) Edition. Turk Patoloji Derg [Internet]. 2018;34(1). Available from: http://dx.doi.org/10.5146/tjpath.2017.01410
10. Johnson NR, Gannon OM, Savage NW, Batstone MD. Frequency of odontogenic cysts and tumors: a systematic review. J Investig Clin Dent. 2014 Feb;5(1):9–14.
11. Ramos G de O, Porto JC, Vieira DSC, Siqueira FM, Rivero ERC. Odontogenic tumors: a 14-year retrospective study in Santa Catarina, Brazil. Braz Oral Res. 2014;28:33–8.

12. Kramer IR, Pindborg JJ, Shear M. The WHO Histological Typing of Odontogenic Tumours. A commentary on the Second Edition. Cancer. 1992 Dec 15;70(12):2988–94.
13. Gupta B, Ponniah I. The pattern of odontogenic tumors in a government teaching hospital in the southern Indian state of Tamil Nadu. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010 Jul;110(1):e32–9.
14. Neelakantan P, Grotra D, Sharma S. Retreatability of 2 mineral trioxide aggregate-based root canal sealers: a cone-beam computed tomography analysis. J Endod. 2013 Jul;39(7):893–6.
15. Aldhuwayhi S, Mallineni SK, Sakhamuri S, Thakare AA, Mallineni S, Sajja R, et al. Covid-19 Knowledge and Perceptions Among Dental Specialists: A Cross-Sectional Online Questionnaire Survey. Risk Manag Healthc Policy. 2021 Jul 7;14:2851–61.
16. Sheriff KAH, Ahmed Hilal Sheriff K, Santhanam A. Knowledge and Awareness towards Oral Biopsy among Students of Saveetha Dental College [Internet]. Vol. 11, Research Journal of Pharmacy and Technology. 2018. p. 543. Available from: http://dx.doi.org/10.5958/0974-360x.2018.00101.4
17. Markov A, Thangavelu L, Aravindhan S, Zekiy AO, Jarahian M, Chartrand MS, et al. Mesenchymal stem/stromal cells as a valuable source for the treatment of immune-mediated disorders. Stem Cell Res Ther. 2021 Mar 18;12(1):192.
18. Jayaraj G, Ramani P, Herald J. Sherlin, Premkumar P, Anuja N. Inter-observer agreement in grading oral epithelial dysplasia – A systematic review [Internet]. Vol. 27, Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology. 2015. p. 112–6. Available from: http://dx.doi.org/10.1016/j.ajoms.2014.01.006
19. Paramasivam A, Priyadharsini JV, Raghunandhakumar S, Elumalai P. A novel COVID-19 and its effects on cardiovascular disease. Hypertens Res. 2020 Jul;43(7):729–30.
20. Li Z, Veeraraghavan VP, Mohan SK, Bolla SR, Lakshmanan H, Kumaran S, et al. Apoptotic induction and anti-metastatic activity of eugenol encapsulated chitosan nanopolymer on rat glioma C6 cells via alleviating the MMP signaling pathway [Internet]. Vol. 203, Journal of Photochemistry and Photobiology B: Biology. 2020. p. 111773. Available from: http://dx.doi.org/10.1016/j.jphotobiol.2019.111773
21. Gan H, Zhang Y, Zhou Q, Zheng L, Xie X, Veeraraghavan VP, et al. Zingerone induced caspase-dependent apoptosis in MCF-7 cells and prevents 7,12-dimethylbenz(a)anthracene-induced mammary carcinogenesis in experimental rats. J Biochem Mol Toxicol. 2019 Oct;33(10):e22387.
22. Dua K, Wadhwa R, Singhvi G, Rapalli V, Shukla SD, Shastri MD, et al. The potential of siRNA based drug delivery in respiratory disorders: Recent advances and progress. Drug Dev Res. 2019 Sep;80(6):714–30.
23. Mohan M, Jagannathan N. Oral field cancerization: an update on current concepts. Oncol Rev. 2014 Mar 17;8(1):244.
24. Nalabolu GRK, Mohiddin A, Hiremath SKS, Manyam R, Bharath TS, Raju PR. Epidemiological study of odontogenic tumours: An institutional experience. J Infect Public Health. 2017 May;10(3):324–30.
25. Lu Y, Xuan M, Takata T, Wang C, He Z, Zhou Z, et al. Odontogenic tumors. A demographic study of 759 cases in a Chinese population. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1998 Dec;86(6):707–14.
26. Jing W, Xuan M, Lin Y, Wu L, Liu L, Zheng X, et al. Odontogenic tumours: a retrospective study of 1642 cases in a Chinese population. Int J Oral Maxillofac Surg. 2007 Jan;36(1):20–5.
27. Jaeger F, de Noronha MS, Silva MLV, Amaral MBF, Grossmann S de MC, Horta MCR, et al. Prevalence profile of odontogenic cysts and tumors on Brazilian sample after the reclassification of odontogenic keratocyst. J Craniomaxillofac Surg. 2017 Feb;45(2):267–70.

28. Raj A, Ramesh G, Nagarajappa R, Pandey A, Raj A. Prevalence of odontogenic lesions among the Kanpur population: an institutional study. J Exp Ther Oncol. 2017 May;12(1):35–42.
29. Santos JN, Pinto LP, de Figueredo CR, de Souza LB. Odontogenic tumors: analysis of 127 cases. Pesqui Odontol Bras. 2001 Oct;15(4):308–13.
30. Sousa FB, Etges A, Corrêa L. Pediatric oral lesions: a 15-year review from Sao Paulo, Brazil. Journal of Clinical [Internet]. 2002; Available from: https://meridian.allenpress.com/jcpd/article/26/4/413/76841
31. Osterne RLV, Brito RG de M, Alves APNN, Cavalcante RB, Sousa FB. Odontogenic tumors: a 5-year retrospective study in a Brazilian population and analysis of 3406 cases reported in the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011 Apr;111(4):474–81.
32. Olgac V, Koseoglu BG, Aksakalli N. Odontogenic tumours in Istanbul: 527 cases. Br J Oral Maxillofac Surg. 2006 Oct;44(5):386–8.
33. Guerrisi M, Piloni MJ, Keszler A. Odontogenic tumors in children and adolescents. A 15-year retrospective study in Argentina. Med Oral Patol Oral Cir Bucal. 2007 May 1;12(3):E180–5.
34. Elarbi M, El-Gehani R, Subhashraj K, Orafi M. Orofacial tumors in Libyan children and adolescents. A descriptive study of 213 cases. Int J Pediatr Otorhinolaryngol. 2009 Feb;73(2):237–42.
35. Adebiyi KE, Ugboko VI, Omoniyi-Esan GO, Ndukwe KC, Oginni FO. Clinicopathological analysis of histological variants of ameloblastoma in a suburban Nigerian population. Head Face Med. 2006 Nov 24;2:42.
36. Tawfik MA, Zyada MM. Odontogenic tumors in Dakahlia, Egypt: analysis of 82 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010 Feb;109(2):e67–73.
37. Fernandes AM, Duarte ECB, Pimenta FJGS, Souza LN, Santos VR, Mesquita RA, et al. Odontogenic tumors: a study of 340 cases in a Brazilian population. J Oral Pathol Med. 2005 Nov;34(10):583–7.
38. Wu PC, Chan KW. A survey of tumours of the jawbones in Hong Kong Chinese: 1963–1982. Br J Oral Maxillofac Surg. 1985 Apr 1;23(2):92–102.
39. Odukoya O. Odontogenic tumors: analysis of 289 Nigerian cases. J Oral Pathol Med. 1995 Nov;24(10):454–7.
40. Aregbesola B, Soyele O, Effiom O, Gbotolorun O, Taiwo O, Amole I. Odontogenic tumours in Nigeria: A multicentre study of 582 cases and review of the literature. Med Oral Patol Oral Cir Bucal. 2018 Nov 1;23(6):e761–6.
41. Adebayo ET, Ajike SO, Adekeye EO. A review of 318 odontogenic tumors in Kaduna, Nigeria. J Oral Maxillofac Surg. 2005 Jun;63(6):811–9.
42. Tamme T, Soots M, Kulla A, Karu K, Hanstein SM, Sokk A, et al. Odontogenic tumours, a collaborative retrospective study of 75 cases covering more than 25 years from Estonia. J Craniomaxillofac Surg. 2004 Jun;32(3):161–5.
43. Patil S, Halgatti V, Khandelwal S, Santosh BS, Maheshwari S. Prevalence of cysts and tumors around the retained and unerupted third molars in the Indian population. J Oral Biol Craniofac Res. 2014 May;4(2):82–7.
44. Anand S, Kashyap B, Kumar GR, Shruthi BS, Supriya AN. Pericoronal radiolucencies with significant pathology: clinico-histopathologic evaluation. Biomed J. 2015 Mar;38(2):148–52.

J Popul Ther Clin Pharmacol Vol 29(4):e222–e231; 16 November 2022.