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Systematic Review

Prevalence of Odontogenic Tumors and Cysts in Iran: A Systematic Review and Meta-analysis

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Abstract

Context: Odontogenic tumors and cysts (AOD) have a significant prevalence in Iran and have many negative effects on patients' health.

Objectives: The aim of the study is to investigate the prevalence of odontogenic cysts and tumors in Iran with a systematic review and meta-analysis method.

Methods: In this meta-analysis study, which was conducted using the PRISMA checklist, all published articles (2000 - 2024) on the prevalence of AOT and oral cancers (OCs) were included in the study. The information search was conducted by two researchers specializing in oral and dental diseases (in domestic Iranian and international databases). Articles published in Iran, in which the prevalence or the number of AOT and OCs were reported, were included in the study. Systematic review studies and case reports were excluded from the study. The researchers used a checklist containing items such as the number of anatomical locations of odontogenic (Maxilla and Mandible), the number of odontogenic tumors, the number of odontogenic cysts, and the total number of patients. An analysis was done using the software CMA.

Results: Result showed in 1043 articles found in the initial search, 26 articles were entered into the meta-analysis stage, and data analysis was conducted for them. The prevalence of AOD was 0.124 (CI = 0.121 - 0.126) based on the Fixed analysis model and 0.067 (CI = 0.097 - 0.046) in the random analysis model. Also, based on the Random model, the prevalence of Odontogenic cysts was equal to 0.111 (CI = 0.085 - 0.144) and the prevalence of Odontogenic tumors was equal to 0.023 [CI = 0.012 - 0.040].

Conclusions: Since the prevalence of odontogenic cysts and tumors was significant in this meta-analysis study, it is suggested to take necessary measures and screening for the prevention of AOT and OCs.

Keywords: Odontogenic Cysts, Odontogenic Tumors, Prevalence

1. Context

Cancer is a chronic, progressive, and incurable disease that has led to many complications for patients, including psychological, physical, and even death (1-4). Despite the progress made in the diagnosis and treatment of cancer, the complications of this disease are high, and the survival rate of patients is reported to be low. Different cancers have different growth trends, complications, and survival rates, and according to the importance of this disease, the prevalence of each type of cancer should be investigated separately (5).

Oral cancer (OC) is one of the types of cancer, whose prevalence varies according to age, gender, race, geographical region, lifestyle, and diet, like other types of cancer (6). The prevalence of oral cavity and lip cancers is 377 713, and the global mortality rate is 177 757 (7, 8). Oral cancer has a very bad prognosis, which is about 40%. If OC is diagnosed in stages I and II, its survival rate can increase to more than 80% (9, 10).

If OC is not diagnosed at the right time and in the early stages, irreparable malignancies will develop in the body and cause organ dysfunction along with pain and discomfort. For this reason, to prevent deaths in OC,

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complete and appropriate information on the prevalence of OC should be provided to the treatment staff (7, 11).

Odontogenic tumors and cysts (AOD) are an important part of oral and maxillofacial pathology, each of which is of special clinical importance due to its different biological behavior. These tumors are a complex group of lesions with different histopathological and clinical types that originate from odontogenic epithelium. Odontogenic tumors are asymptomatic but can cause jaw expansion, tooth movement, and bone destruction (12).

The differences in oral health status are the result of many factors, including social, environmental, biological, behavioral, cultural, economic, and political factors, limited access to oral health care, lack of oral and dental health information tools. Oral and dental diseases play an important role in the patient's health, and one of these diseases is AOD. Having sufficient information on the prevalence of these tumors is important and necessary in determining the planning and carrying out the necessary interventions for the prevention and treatment of these tumors (13-15).

2. Objectives

In studies conducted in Iran, various statistics have been mentioned regarding the amount of AOD, which makes it impossible to reach a systematic and coherent conclusion regarding the aforementioned statistics. For this reason, the aim of the study is to investigate the prevalence of odontogenic cysts and tumors in Iran.

3. Methods

In this meta-analysis study, which was conducted using the PRISMA checklist (16), all published articles on the prevalence of tumors and odontogenic cysts were included in the study.

3.1. Inclusion and Exclusion Criteria

3.1.1. Inclusion Criteria

Articles published in the Iranian setting, in which the prevalence or the number of odontogenic cysts and tumors were reported, were included in the study. The search timeframe was limited to articles from 2000 to 2024, and the quality of the extracted articles was the inclusion criterion for the study.

3.1.2. Exclusion Criteria

Systematic review studies and case reports were excluded from the study.

3.2. Information Sources and Study Selection

The search was conducted across various international databases, including ISI, Scopus, PubMed, EBSCO, ScienceDirect, Magiran, and SID.

3.3. Search Strategy

Before initiating the search, attempts were made to gather all the factors affecting AOD, based on which the search keywords could be selected. Accordingly, the keywords included “Odontogenic tumors” [MeSH], “Odontogenic cysts” [MeSH], “tumors” [MeSH], “cysts” [MeSH], “Maxilla” [MeSH], “Mandible” [MeSH], “Epidemiology” [MeSH], “Cancer” [MeSH], “Dental” [MeSH], and “Tooth” [MeSH].

3.4. Quality of the Articles

This checklist had 7 questions in the fields of years, sample size, city, female (n), male (n), type of study, and prevalence. Articles with a checklist score of less than 3 were excluded from the review process (Table 1).

3.5. Data Collection and Statistical Analysis

The researchers used a checklist that included items such as the number of anatomical locations (Maxilla and Mandible), the number of odontogenic tumors, the number of odontogenic cysts, and the total number of patients. These data were entered into Table 1 and analyzed using CMA software.

4. Results

Results showed that of the 1043 articles found in the initial search, 26 articles were entered into the meta-analysis stage, and data analysis was done for them (Figure 1).

Table 1. The Quality of the Articles

No.	Authors	Years	Sample Size	City	Female (n)	Male (n)	Type of Study	Prevalence	Total Score
1	Siadati et al. (17)	√	√	√	√	√	√	√	7
2	Adhami et al. (18)	√	√	√	√	√	√	√	7
3	Baghaei et al. (19)	√	√	√	√	√	√	√	7
4	Seyedmajidi and Nafarzadeh (20)	√	√	√	√	√	√	√	7
5	Moridani et al. (21)	√	√	√	-	-	√	√	5
6	Taghavi et al. (22)	√	√	√	√	√	√	√	7
7	Ranjbar et al. (23)	√	√	√	-	-	√	√	5
8	Jaafari Ashkavandi et al. (24)	√	√	√	-	-	√	√	5
9	Kowkabi et al. (25)	√	√	√	√	√	√	√	7
10	Kadeh et al. (26)	√	√	√	√	√	√	√	7
11	Habibi et al. (27)	√	√	√	-	-	√	√	5
12	Eshghyar and Ashori (28)	√	√	√	√	√	√	√	7
13	Mohajerani et al. (29)	√	√	√	-	-	√	√	5
14	Sharifian and Khalili (30)	√	√	√	√	√	√	√	7
15	Vaez et al. (31)	√	√	√	√	√	√	√	7
16	Razavi et al. (32)	√	√	√	√	√	√	√	7
17	Saghravanian et al. (33)	√	√	√	√	√	√	√	7
18	Khosravi et al. (34)	√	√	√	√	√	√	√	7
19	Ghazi et al. (35)	√	√	√	√	√	√	√	7
20	Lotfi et al. (36)	√	√	√	-	-	√	√	5
21	Mahmoudi et al. (37)	√	√	√	-	-	√	√	5
22	Jaafari-Ashkavandi and Ashraf (38)	√	√	√	-	-	√	√	5
23	Sargolzaei et al. (39)	√	√	√	√	√	√	√	7
24	Torabi-Parizi et al. (40)	√	√	√	√	√	√	√	7
25	Siadati et al. (41)	√	√	√	√	√	√	√	7
26	Kalantari and Alavi Samani (42)	√	√	√	-	-	√	√	5

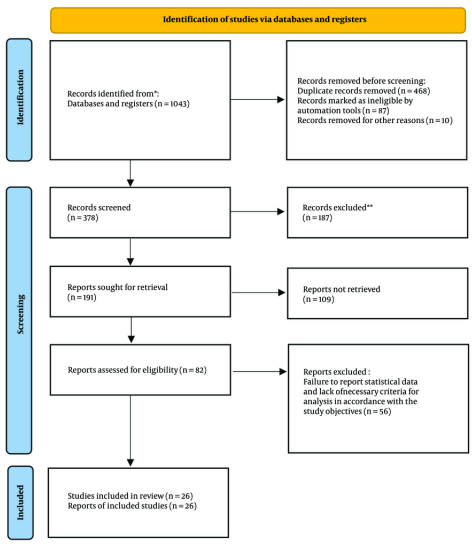

Figure 1. PRISMA flow diagram of studies' screening and selection

The prevalence of AOD was 0.124 (CI = 0.121 - 0.126) based on the Fixed analysis model and 0.067 (CI = 0.097 - 0.046) in the Random analysis model. Also, based on the Random model, the prevalence of Odontogenic cysts was equal to 0.111 (CI = 0.085 - 0.144) and the prevalence of Odontogenic tumors was equal to 0.023 (CI = 0.012 - 0.040) (Tables 2 and 3, Figures 2 - 8).

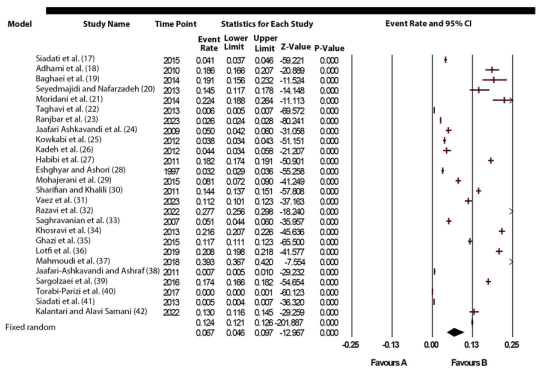

Figure 2. Total odontogenic (odontogenic cysts and odontogenic tumors) prevalence in Iran (17-42)

Table 2. Specifications of the Articles

No.	Author	Years	City	Total Number of Patients	Total Odontogenic	Odontogenic Cysts	Odontogenic Tumors	Male	Female	Anatomical Location of Odontogenic	
										Maxilla	Mandible
1	Siadati et al. (17)	2015	Babol	8956	370	317	53	205	165	-	-
2	Adhami et al. (18)	2010	Kerman	1320	245	221	24	134	111	123	194
3	Baghaei et al. (19)	2014	Hamadan	413	79	68	11	42	37	37	21
4	Seyedmajidi and Nafarzadeh (20)	2013	Babol	512	74	-	-	33	41	-	-
5	Moridani et al. (21)	2014	Tehran	460	103	80	23	-	-	310	150
6	Taghavi et al. (22)	2013	Tehran	30706	188	-	188	104	84	50	138
7	Ranjbar et al. (23)	2023	Tehran	19380	503	-	503	-	-	-	-
8	Jaafari Ashkavandi et al. (24)	2009	Shiraz	2343	117	-	117	-	-	-	-
9	Kowkabi et al. (25)	2012	Isfahan	6860	260	-	260	127	133	-	-
10	Kadeh et al. (26)	2012	Zahedan	1125	50	-	50	24	26	13	36
11	Habibi et al. (27)	2011	Mashhad	7707	1403	1208	195	-	-	-	-
12	Eshghyar and Ashori (28)	1997	Tehran	8451	273	-	273	78	195	-	-
13	Mohajerani et al. (29)	2015	Tehran	3875	312	312	-	-	-	-	-
14	Sharifian and Khalili (30)	2011	Tehran	8529	1227	1227	-	700	523	605	615
15	Vaez et al. (31)	2023	Tehran	3238	362	-	104	190	172	67	295
16	Razavi et al. (32)	2022	Esfahan, shiraz, Yazd	1800	498	-	498	231	265	118	352
17	Saghravanian et al. (33)	2007	Mashhad	3122	160	140	20	95	65	54	106
18	Khosravi et al. (34)	2013	Isfahan	7412	1603	1603	-	418	328	746	857
19	Ghazi et al. (35)	2015	Mashhad	10165	1189	1189	-	657	532	495	694
20	Lotfi et al. (36)	2019	Tehran	5865	1219	1219	-	-	-	-	-
21	Mahmoudi et al. (37)	2018	Tehran	1267	498	416	82	-	-	-	-
22	Jaafari-Ashkavandi and Ashraf (38)	2011	Shiraz	5018	35	-	35	-	-	-	-
23	Sargolzaei et al. (39)	2016	Tehran	8563	1489	1489	-	884	605	560	929
24	Torabi-Parizi et al. (40)	2017	Kerman	134722	61	-	-	31	30	-	-
25	Siadati et al. (41)	2013	Babol	8956	49	36	13	19	30	-	-
26	Kalantari and Alavi Samani (42)	2022	Kerman	2092	271	271	-	-	-	-	-

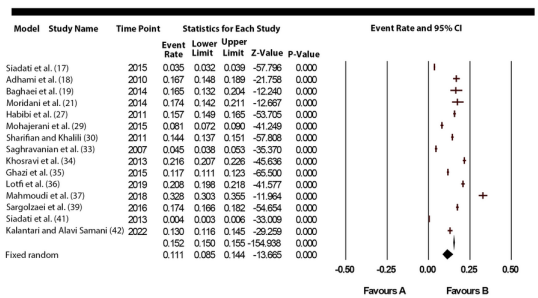

Figure 3. Total odontogenic cysts prevalence in Iran (17-19, 21, 27, 29, 30, 33-35, 36, 37, 41, 42)

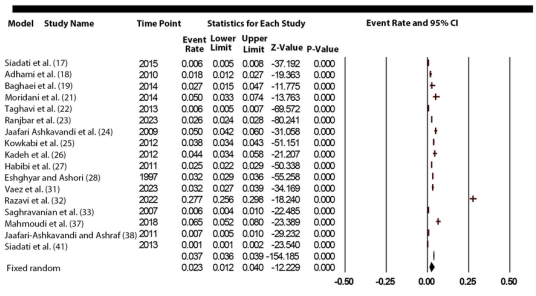

Figure 4. Total odontogenic tumors prevalence in Iran (17-19, 21, 22, 23-27, 28, 31-33, 37, 38, 41)

Table 3. Prevalence of Odontogenic Cysts and Tumors in Iran

Tumor type	Fixed	Random
Odontogenic cysts and odontogenic tumors	0.124 (CI = 0.121 - 0.126)	0.067 (CI = 0.046 - 0.097)
Odontogenic cysts	0.152 (CI = 0.150 - 0.155)	0.111 (CI = 0.085 - 0.144)
Odontogenic tumors	0.037 (CI = 0.036 - 0.039)	0.023 (CI = 0.012 - 0.040)
Odontogenic tumors and cysts in males	0.057 (CI = 0.056 - 0.059)	0.026 (CI = 0.016 - 0.042)
Odontogenic tumors and cysts in females	0.045 (CI = 0.044 - 0.047)	0.025 (CI = 0.016 - 0.040)
Odontogenic tumors and cysts in the maxilla	0.071 (CI = 0.069 - 0.074)	0.049 (CI = 0.028 - 0.084)
Odontogenic tumors and cysts in the mandible	0.090 (CI = 0.087 - 0.092)	0.073 (CI = 0.047 - 0.111)

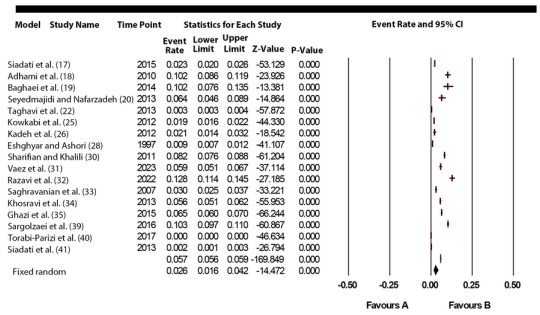

Figure 5. Total odontogenic (odontogenic cysts and odontogenic tumors) prevalence in Iranian males (17-20, 22, 25, 26, 28, 30, 31-35, 39-41)

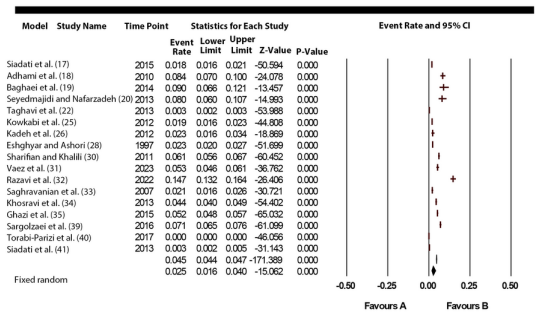

Figure 6. Total odontogenic (odontogenic cysts and odontogenic tumors) prevalence in Iranian females (17-20, 22, 25, 26, 28, 30, 31-35, 39-41)

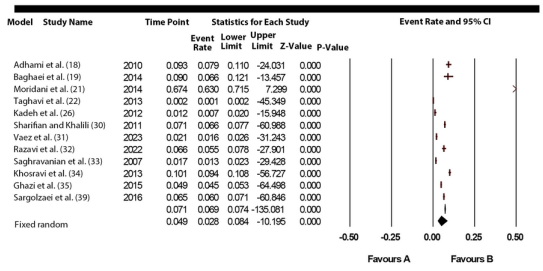

Figure 7. Total odontogenic (odontogenic cysts and odontogenic tumors) prevalence in the maxilla (18, 19, 21, 22, 26, 30-35, 39)

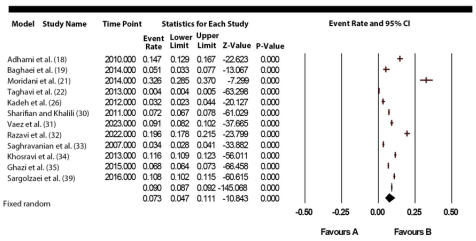

Figure 8. Total odontogenic (odontogenic cysts and odontogenic tumors) prevalence in the mandible (18, 19, 21, 22, 26, 30-35, 39)

5. Discussion

Cancer is a chronic disease with high prevalence that may affect different parts of the body (43). In this meta-analysis study, the prevalence of Ots was 0.111 (CI = 0.085 - 0.144) and the prevalence of AOT was 0.067 (CI = 0.046 - 0.097). In the study by Mello et al., which analyzed the results of 16 articles, the prevalence of AOD was reported as 5.3%, the prevalence of Ots was reported as 4.4%, and

the prevalence of Odontogenic tumors was reported as 5% (44).

Regarding the original studies that investigated the prevalence of AOT, we can refer to the study by Izgi et al. in Turkey. In this retrospective study, the number of 739 oral and dental lesions from 2008 to 2018 were examined, of which 467 were related to odontogenic cysts and 50 were related to odontogenic tumors (45). In the study of Shekar et al. in India, in 204 cases and 1 331 biopsies examined from 2007 to 2012, the prevalence of OCs was 9.6% and the prevalence of Ots was 5.7% (46). In Akram et al.'s study in Pakistan between 2001 and 2010, investigating 6 000 patients, the prevalence of OCs was 1.6% and the prevalence of Ots was 2.35% (47).

The prevalence of AOT has been reported in several studies. In Canada, a study involving 445 patients identified 14 cases (48). Similarly, research in Mexico (n = 349) found 25 cases (49), while a study in China (n = 759) reported 63 cases (50). Additionally, studies in Chile (n = 362) and Brazil (n = 340) documented 24 (51) and 13 cases (52), respectively.

In this meta-analysis study, the prevalence of AOT in men was 0.026 (CI = 0.016 - 0.042) and in women was 0.025 (CI = 0.016 - 0.040). In some studies, the prevalence of inflammatory cysts in men has been higher than in women. In the study of Acikgoz et al. in Turkey, the prevalence in men was 54.4% (53), in the study of Al Sheddi, the prevalence in men was 54.8% (54), in the study of Bataineh et al. in Jordan, the prevalence was 65.4% (55), in the study of Del Corso et al. in Italy, the prevalence was 61% (56), in the study of Kilinc et al. in Turkiye, the prevalence was 59.9% (57) and in the study of Lo Muzio et al. in Italy, it was 64.1% (58).

In this meta-analysis study, the prevalence of the anatomical location of odontogenic in the Maxilla was 0.049 (CI = 0.028 - 0.084) and in the Mandible was 0.073 (CI = 0.047 - 0.111). In the study of Johnson et al. in Australia, the prevalence of AOT in the mandible was higher than in the maxilla. Also, concerning the prevalence of OCs in the mandible and maxilla, no difference was observed in terms of the prevalence of OCs (59). Likewise, in the study by Johnson et al. in Mexico, where 753 cases of OC were examined, 41% of the reported OCs were in the mandibular posterior area (59).

5.1. Conclusions

Since the prevalence of odontogenic cysts and tumors was significant in this meta-analysis study, it is suggested to take necessary measures and screening for the prevention of AOT and OCs.

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Footnotes

Authors' Contribution: M. R. and F. F. conceived the study, collected data, performed data analysis, interpreted the results, wrote the manuscript, designed the study, and edited the manuscript.

Conflict of Interests Statement: The authors declared no conflict of interests.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after its publication.

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