The Importance of Knowledge of Risk Factors and Clinical Evaluation for Oral Precancerous Lesions and Oral Cancer in Dentists Community of Tirana

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Abstract

Early detection is the most effective way for survival and reduced mortality in the case of oral cancer. The aim of this study was to evaluate the knowledge of dentists regarding early detection of oral cancer and precancerous lesions in many Dental Clinics in Tirana, Albania**.** This is a descriptive, cross-sectional study, where 200 general dentists practicing in private and University clinic in Tirana are involved in one questionnaire, between June - October 2022. This study was conducted using a simple random sampling technique with a self-reported questionnaire with open and closed questions. The dentists, aged from 25 to above 50, were well informed about the major risk factors associated with oral cancer. Around 25% of the respondent paid attention to the overall tongue as a potential site for malignancy. Looking at the dentist's knowledge about oral cancer; enlargement of cervical lymph nodes was the best-known clinical presentation of oral cancer (85.5%), followed by persistent ulcer (82.5 %). 68/200 dentists felt confident to examine and diagnose an oral precancerous/cancer lesion. Only 11.5% felt adequately trained in diagnostic techniques for early detection of oral precancerous/cancer lesion and were comfortable in performing a biopsy. Mostly the participants (89%) felt that they need further training on oral precancerous/cancer lesion early detection. Dentists must know more scientific data related to precancerous lesions to optimize early diagnosis and referral of patients. There is need for further training courses and continuing education regarding early detection and prevention of oral cancer.

Keywords: Oral Cancer, Oral Precancerous Lesions, Dentists.

Introduction

The premalignant oral disorder is a blanket term for a variety of pathologies that can arise in the oral cavity. Early recognition and prompt management are key to optimal outcomes. However, there remains a significant knowledge gap in this area among medical practitioners (S. Papadiochou et al. 2020). According to the World Cancer report, 530.000 new oral cancer cases were diagnosed, and 290.000 deaths were registered world-wide. Two-thirds of new cases are reported from the low-, and lower-middle income countries (Stewart et al. 2014).

Oral cancers in Europe are the most common in Easter European countries from where the highest mortality rates are reported (Warnakulasuriya at al. 2009). About 80% of those suffering from oral cancer could hardly survive one year after the clinical diagnosis (American cancer society 2004). Five-year survival is reported only from clinical centers where best treatment can be provided (Johnson et al. 2011). The most described premalignant oral lesions are leukoplakia, erythroplakia, lichen planus, and submucous fibrosis (Warnakulasuriya at al. 2007), (Maymone et al. 2019), (Mccormick et al. 2016), (Wetzel et al. 2020). The most described etiologies of premalignant oral lesions are cigarette smoking, tobacco, and alcohol exposure (Kusiak et al. 2020), (Grady et al. 1990). Betel nut chewing has also been associated with the development of oral leukoplakia (Thomas et al. 2008). Human papillomavirus (HPV) has emerged as a risk factor: a recent meta-analysis of 52 studies revealed a pooled HPV DNA prevalence of 22.5% in oral premalignant disorders (De la Cour et al. 2021). The authors also noted that HPV16 was the predominant genotype, which is also the most common serotype found in oropharyngeal cancer (Kreimer et al. 2005). Patients with oral lesions are often first seen by general practitioners, both medical and dental.

Therefore, general practitioners are in a unique position to detect oral cancer at early stages (Kujan et al. 2013). Dentists working in Albania receive formal education and training in prevention and detection of oral cancer during their undergraduate studies in their respective dental schools. However, there are no specific courses currently available in Albania for the dentists working in various sectors. Therefore, assessing dentists' knowledge and practices regarding oral cancer risk factors and diagnostic concepts on a "large scale" would provide baseline information that might help in future planning of undergraduate and continuing professional education programmer. This study was designed to evaluate the knowledge, opinions, and practices of dentists in Tirana, Albania regarding the early detection oral cancer and to explore potential educational needs in this regard.

Materials and Methods

The questionnaire used in this study consisted of 15 close-ended questions which contain information on the participants' characteristics such as gender, age, number of years since graduation, type of clinical practice working and highest qualification. Furthermore, information on the level of knowledge was based on risk factors

associated with oral cancer and precancerous lesions, oral cancer and precancerous lesions diagnostics, and perception on training and continuous education in oral cancer and precancerous lesions. The survey was developed from previously validated tools in other studies (Decuseara et al. 2011), (Joseph et al. 2011), with modifications particularly in risk factors associated with the disease in Albanian population.

The questionnaire was first validated among a convenient sample (10 dentists) to ensure clarity of interpretation and ease of completion. A total of 200 dentists working in Tirana, Albania, were selected for inclusion in this study. At least one year of work experience in the current position was a criterion for eligibility to be included in the study. The Clinics were selected randomly. This includes private dental clinics/polyclinics, medical centers, and university polyclinics. The purpose of the questionnaire and how they should be answered was explained. The questionnaires were distributed by the researchers between June 2022 and October 2022. All the data were entered in the Microsoft Excel, and then data analyses were performed.

Results

This cross-sectional study evaluated knowledge and practice of dentists in Tirana, Albania regarding early detection of oral precancer/cancer lesions. A total of 200 dentists participated in this study with a total response rate of 100%. Of the 200 dentists 112 (56%) were male and almost 79,5% of the dentists are younger than 45 years. Over 53.5% of the respondent had practiced for less than 10 years as a dentist. Only 18.5% had a post graduate qualification (Table 1). To examine participant's knowledge about pre-cancer and cancer conditions; dentists were asked about risk factors and the most common sites affected by oral cancer. Dentists were aware of the major risk factors most likely associated with (Table 2)., since 98.5% of them identified smoking cigarettes as a risk factor for developing oral cancer, followed by previous history of oral cancer 90.0%, alcohol use 91.0%, viral infection (HPV-Human Papilloma Virus) 67.0%, ultraviolet exposure 85.0%, older age 62.0% and low consumption of fruits/vegetables 63.5%. Around one-fourth of the respondent paid attention to the overall tongue as a potential site for malignancy (Table 3).

Looking at the dentist's knowledge about oral cancer; enlargement of cervical lymph nodes was the best-known clinical presentation of oral cancer (85.5%), followed by persistent ulcer (82.5 %); other possible presentation of oral cancer including white and red lesion and dysphagia was also known to more than 65% of the dentists. Assessing dentist's knowledge about the most common type of oral precancerous lesion; leukoplakia followed by erythroplakia, lichen planus and oral mucous fibrosis were the best-known conditions by the participants. But we must mention that 17% of respondents were uncertain about the most common type of oral precancerous lesion.

The most common form of oral cancer was recognized squamous cell carcinoma (60%) followed by malignant melanoma. We must mention that 19.5% of

respondents were uncertain about the most common form of oral cancer. As age group more vulnerable for lesions to become malignant was identified the group 20–30 years of age by 53.5% of respondents and only 13% identified the group above 40 years of age. Regarding the diagnostic techniques for oral precancer/cancer lesions (Table 4) 40% of the respondents reported biopsy (41.5%) as the most common diagnostic technique followed by exfoliative cytology (28.5%) and brush biopsy (27.0%); to a less extent they recognized toluidine blue (11.5 %) and fluorescent imaging (5.0%).

As a tool for the definitive diagnosis for oral precancer/cancer lesions was identified radiographic examination (45%); and only 25.5% identified histopathological examination. Knowledge about respondents' opinions and perceptions regarding oral cancer are given in Table 5. Sixty-eight dentists felt confident to examine and diagnose an oral precancerous/cancer lesion. Only twenty-three dentists (11.5%) felt adequately trained in diagnostic techniques for early detection of oral precancerous/cancer lesion and were comfortable in performing a biopsy. Further analysis also showed that only 10 respondents (5%) attended trainings/seminars related to oral precancer/cancer lesions recently. Almost 89% felt that they need further training on oral precancerous/cancer lesion early detection, and 183 of the respondents (91.5%) would like that continuing education programs focus more on this topic in the future.

Table 1 Background characteristics of the respondents.

		n	*%*
Gender	Male	112	(56.0)
	Female	88	(44.0)
Age	25–35	98	(49.0)
	35–45	61	(30.5)
	45–55	28	(14.0)
	55+	13	(6.5)
Time since graduation	Less than 10 years	107	(53.5)
	More than 10 years	93	(46.5)
Qualification	General dentist	163	(81.5)
	MSc/PhD	37	(18.5)
Type of practice	University clinic	21	(10.5)
	Private clinic	179	(89.5)

Table 2 Knowledge about oral cancer risk factors.

	Yes *n* (%)	No *n* (%)	Uncertain *n* (%)
Smoking cigarettes	197 (98.5%)	1 (0.5%)	2 (1.0%)
Low consumption fruit/vegetable	127 (63.5%)	25 (12.5%)	48 (24.0%)
Ultraviolet exposure	170 (85.0%)	9 (4.5%)	21 (10.5%)
Viral infection (HPV)	134 (67.0%)	16 (8.0%)	50 (25.0%)
Alcohol use	182 (91.0%)	9 (4.5%)	9 (4.5%)
Prior malignant/premalignant oral disorders	180 (90.0%)	9 (4.5%)	11 (5.5%)
Older age	124 (62.0.%)	46 (23.0%)	30 (15.0%)

Table 3 Clinical Evaluation about oral precancer/cancer lesions.

		n	%
The most common sites	All sites equally	58	29.0
	Floor of the mouth/under the tongue	43	21.5
	Mucous membrane cheek/lip/gums	20	10.0
	Hard and soft palate	31	15.5
	The tongue	48	24.0
The most common type of oral precancerous lesion	Eryhtroplakia	22	11.0
	Leukoplakia	129	64.5
	Lichen planus	8	4.0
	Oral mucous fibrosis	7	3.5
	Uncertain	34	17.0
The most common form of oral cancer	Squamous cell carcinoma	120	60.0
	Basal cell carcinoma	11	5.5
	Malignant melanoma	17	8.5
	Salivary gland tumors	13	6.5
	Uncertain	39	19.5
Age group vulnerable for lesions to become malignant	Under 20	40	20.0
	20–30	107	53.5
	30–40	27	13.5

	Above 40	26	13.0
Clinical presentation of oral cancer	Persistent ulcer	165	82.5
	Enlarged lymph nodes	171	85.5
	White lesion	153	76.5
	Red lesion	133	66.5
	Dysphagia	128	64.0

Table 4 Diagnostic and diagnostic techniques for oral precancer/cancer lesions

		n	*%*
Diagnostic techniques	Biopsy	83	41.5
	Brush biopsy	54	27.0
	Toluidine blue	23	11.5
	Fluorescent imaging	10	5.0
	Exfoliative cytology	57	28.5
The definitive diagnosis for oral precancer/cancer lesions	Physical examination	31	15.5
	Radiographic examination	90	45.0
	Histopathological examination	51	25.5
	All have the same value	21	10.5
	Uncertain	7	3.5

Table 5 Knowledge about respondents' opinions and perceptions.

	n	*%*
I feel confident to examine and diagnose an oral precancerous/cancer lesion.	68	34.0
I am adequately trained in diagnostic techniques for early detection of oral precancerous/cancer lesion.	23	11.5
I feel confident to perform biopsy in my clinic.	23	11.5
I have done trainings/seminars on oral precancerous/cancer lesion recently.	10	5.0
I need further training on oral precancerous/cancer lesion early detection.	178	89.0
I would like that continuing education programs focus more on this topic in the future.	183	91.5

Discussion

Many dentists appeared to have a good knowledge of the risk factors and the clinical presentation of oral cancer. However, the findings of the present study identified several deficiencies in the knowledge of dentist working in Tirana, Albania about the diagnostic techniques and conditions associated commonly with early oral cancer. Inadequate knowledge about oral cancer has been widely documented among general practitioners from both developed and developing countries (Babiker et al. 2017), (Kebabcıoğlu et al. 2017). Lack of awareness of oral cancer risk and clinical signs may prohibit dentists from delivering preventive advice. The lack of knowledge observed could be attributed to the fact that most of the participants practicing in private clinics did not receive any further information or update after finishing dental school. It is well-established that oral cancer is largely related to lifestyle and as health care providers; dental practitioners should be aware of these factors and further, play a central role in providing information about the benefits that could result from the changing of lifestyle habits (Galvão-Moreira et al. 2017). It is encouraging that large majority of dentist identified most risk factors for oral cancer. Tobacco use is the main risk factor for oral cancer and was identified by almost all respondents which indicate that dentist's knowledge is consistent with the current understanding of the etiology of oral premalignant and malignant lesions.

This was in accordance with the results of (Jaber 2011) and (Colella et al. 2008). Unfortunately, despite the availability of oral cavity for examination and not requiring advanced tools and not being uncomfortable for the patients, most cases of oral cancers are diagnosed when the symptoms appear because of the progress of the disease (Varela-Centelles et al. 2017). Many diagnostic techniques have been used to help in screening and early detection of oral cancer (Walsh et al. 2013), (Masthan et al. 2012). The observation that many precancerous lesions that are not biopsied progress to cancer underlines the need for routine biopsy of oral precancerous lesions regardless of clinical impression. Results from some studies also reinforce the need for adjunctive tools for improved triage and reduced sampling errors in the biopsy of oral precancerous lesions (Anil et al. 2020). The clinical recognition and evaluation of oral mucosal lesions can detect up to 99% of oral cancers/premalignancies.

As stated by the World Health Organization, any suspicious lesion that does not subside within two weeks from detection and removal of local causes of irritation must be biopsied. Surgical biopsy remains the gold standard for diagnosis of oral cancer. Adjunctive tools have been developed and studied to help clinicians in the diagnostic pathway, such as toluidine blue staining and autofluorescence imaging. Soon other methods, i.e., identification of salivary markers of progression may help in reducing mortality due to oral cancer (Abati et al. 2020). Even though, biopsy is considered the gold standard in oral cancer diagnosis, not all the respondents were

aware of this fact, and fewer had knowledge about other less invasive techniques such as brush biopsy, toluidine blue, fluorescent imaging and exfoliative cytology. Lack of experience in performing biopsies should be attributed to insufficient importance placed on the practical teaching of biopsy techniques during their undergraduate training (Murgod et al. 2011). Despite, staining of live tissue with toluidine blue has been identified as a useful aid in selection of biopsy site in cases of premalignant lesions, (Scully et al. 2008) unfortunately few respondents identify it as a useful diagnostic technique.

Leukoplakia and erythroplakia are the best known oral potentially malignancy disorders and it was not identified by most respondents. Dentists need to possess a thorough knowledge of clinical signs of oral cancer to be effective in identifying, referring, and counseling high-risk patients. Oral visual screening can reduce mortality in high-risk individuals and has the potential to prevent oral cancer deaths. Regardless the high knowledge on risk factors of oral cancer, the lack of confidence in conducting comprehensive oral cancer examination and performing biopsy in the clinic is evident. Similar finding has been reported by several authors (Murgod et al. 2011), (Anandani et al. 2015).

Dentists are familiar with the structures and health of the oral cavity and are the first group who might examine patients for main signs and symptoms of oral cancer; so, they can significantly enhance the life expectancy in patients suffering from oral cancers. Conventional oral examination still constitutes the gold standard screening tool for potentially malignant oral lesions and oral cancer. There are many reasons why dentists may avoid mucosal screening. Obstacles like lack of training and lack of confidence can hinder doctors' ability or even motivation to perform mucosal screening. Similar finding has been reported by (Brocklehurst et al. 2010), and (LeHew et al. 2010). The chance of curing oral cancers increases if patients are diagnosed and treated early (Khani et al. 2022). The results of surveys suggest that dentists do perform oral cancer screenings, but there is only weak evidence that screening in dental practices leads to downstaging of disease (Warnakulasuriya et al. 2021). Therefore, educational strategies should be aimed at providing current information on oral examinations, diagnostic techniques and conditions associated with oral cancer to facilitate early detection and follow up. It is well established that dentists' knowledge and practices are positively influenced by continues education courses (Silverman et al. 2010). In recent studies, it is shown ability to detect genetic alterations from noninvasive samples.

This opens the door to prospective studies to determine whether implementing this information in the clinic will lead to earlier detection and better patient outcome (Poell et al. 2023). Although the response rate of our study was good, one of the main limitations of this type of research is that what respondents report may differ from what they do. The tendency of dentists to provide socially acceptable answer might bias the outcome.

However, the anonymous nature of the questionnaire should have minimized this type of information error. Despite this limitation, we think that this study provides some important information about dentists' knowledge and opinion regarding oral cancer. This might be considered by continuing education programs, to influence on practitioners in the future, by improving their knowledge and early detection process.

Conclusions

Dentists should be aware of all aspects regarding precancerous lesions to optimize early diagnosis and referral of oral cancer and precancerous lesions patients. There is need for further training courses and continuing education regarding early detection and prevention of oral cancers and precancerous lesions. Most dentists expressed their willingness to attend training courses in oral cancer and precancerous lesions screening and prevention in the form of interactive seminars or continuing education lecturers. This must be noted by our dental and medical education planners, to include content on smoking and alcohol risks and related educational programs, along with the latest diagnostic and detection techniques for oral cancer and precancerous lesions.

References

[1] Abati S, Bramati C, Bondi S, Lissoni A, Trimarchi M. Oral Cancer and Precancer: A Narrative Review on the Relevance of Early Diagnosis (2020). Int J Environ Res Public Health, 17(24):9160. doi: 10.3390/ijerph17249160. PMID: 33302498; PMCID: PMC7764090.

[2] American Cancer Society (2004). Cancer Facts & Figures 2004. American Cancer Society, Atlanta.

[3] Anandani C, Metgud R, Ramesh G, Singh K (2015). Awareness of general dental practitioners about oral screening and biopsy procedures in Udaipur, India. Oral Health Prev Dent, 13, 523-30.

[4] Anil K Chaturvedi,Natalia Udaltsova,Eric A Engels,Jed A Katzel,Elizabeth L Yanik,Hormuzd A Katki, Mark W Lingen,Michael J Silverberg (2020). Oral Leukoplakia and Risk of Progression to Oral Cancer: A Population Based Cohort Study, *JNCI: Journal of the National Cancer Institute*, Volume 112, Issue 10, Pages 1047–1054, https://doi.org/10.1093/jnci/djz238

[5] Babiker TM,Osman KA,Mohamed SA,Mohamed MA,Almahdi HM (2017). Oral cancer awareness among dental patients in Omdurman, Sudan: a cross-sectional Study. BMC Oral Health,17, 69.

[6] Brocklehurst PR, Baker SR, Speight PM (2010). A qualitative study examining the experience of primary care dentists in the detection and management of potentially malignant lesions. 1. Factors influencing detection and the decision to refer. Br Dent J, 208, 72-3.

[7] Colella G,Gaeta GM,Moscariello A,Angelillo IF (2008). Oral cancer and dentists: knowledge, attitudes, and practices in Italy. Oral Oncol, 44, 393-9.

[8] De la Cour CD,Sperling CD,Belmonte F,Syrjänen S,Kjaer SK (2021). Human papillomavirus prevalence in oral potentially malignant disorders: Systematic review and meta-analysis. Oral diseases. [PubMed PMID: 32144837]

[9] Decuseara G, MacCarthy D, Menezes G (2011). Oral cancer: knowledge, practices and opinions of dentists in Ireland. J Ir Dent Assoc, 57, 209-14.

[10] Galvão-Moreira LV,da Cruz MCFN (2017). Screening and early detection of oral cancer: current controversies. Acta Odontol Scand, 75, 361-5.

[11] Grady D,Greene J,Daniels TE,Ernster VL,Robertson PB,Hauck W,Greenspan D,Greenspan J,Silverman S Jr (1990). Oral mucosal lesions found in smokeless tobacco users. Journal of the American Dental Association. [PubMed PMID: 2370378]

[12] Jaber M (2011). Dental practitioner's knowledge, opinions and methods of management of oral premalignancy and malignancy. Saudi Dent J, 23, 29-36.

[13] Johnson, N.W.,Warnakulasuriya, S.,Gupta, P.C.,Dimba, E.,Chindia,M., Otoh,E.C.,Sankaranarayanan, R., Califano,J.,Kowalski, L (2011). Global Oral Health Inequalities in Incidence and Outcomes for Oral Cancer: Causes and Solutions. Advances in Dental Research, 23, 237-46. https://doi.org/10.1177/0022034511402082

[14] Joseph BK, Sundaram DB, Sharma P (2011). Oral cancer awareness among dentists in Kuwait. Med Princ Pract, 21, 164-70.

[15] Kebabcıoğlu Ö,Pekiner FN (2017). Assessing oral cancer awareness among dentists. J Cancer Educ, doi: 10.1007/ s13187-017-1199-2. [Epub ahead of print].

[16] Khani Jeihooni A, Jafari F (2022). Oral Cancer: Epidemiology, Prevention, Early Detection, and Treatment. Oral Cancer - Current Concepts and Future Perspectives [Internet]. Available from: http://dx.doi.org/10.5772/intechopen.99236

[17] Kreimer AR,Clifford GM,Boyle P,Franceschi S (2005). Human Papillomavirus Types in Head and Neck Squamous Cell Carcinomas Worldwide: A Systematic Review. *Cancer Epidemiol Biomarkers*; 14 (2): 467–475. https://doi.org/10.1158/1055-9965.EPI-04-0551 [PubMed PMID: 15734974]

[18] Kujan O,Sloan P (2013). Dilemmas of oral cancer screening: An update. Asian Pacific Journal of Cancer Prevention (APJCP);14(5):3369-3373. https://doi.org/10.7314/APJCP.2013.14.5.3369

[19] Kusiak A,Maj A,Cichońska D,Kochańska B,Cydejko A,Świetlik D (2020). The Analysis of the Frequency of Leukoplakia in Reference of Tobacco Smoking among Northern Polish Population. International journal of environmental research and public health. [PubMed PMID: 32971842]

[20] LeHew CW, Epstein JB, Kaste LM, Choi YK (2010). Assessing oral cancer early detection: clarifying dentists' practices. J Public Health Dent, 70, 93-100.

[21] Masthan KM,Babu NA,Dash KC,Elumalai M (2012). Advanced diagnostic aids in oral cancer. Asian Pac J Cancer Prev, 13, 3573-6.

[22] Maymone MBC,Greer RO,Kesecker J,Sahitya PC,Burdine LK,Cheng AD,Maymone AC,Vashi NA (2019). Premalignant and malignant oral mucosal

lesions: Clinical and pathological findings. Journal of the American Academy of Dermatology. [PubMed PMID: 30447325]

[23] Mccormick NJ,Thomson PJ,Carrozzo M (2016). The Clinical Presentation of Oral Potentially Malignant Disorders. Primary dental journal. [PubMed PMID: 29029654]

[24] Murgod V, Angadi PV, Hallikerimath S, et al (2011). Attitudes of general dental practitioners towards biopsy procedures. J Clin Exp Dent, 3, 418-23.

[25] Poell, JB, Wils, LJ, Brink, A, et al (2023). Oral cancer prediction by noninvasive genetic screening. *Int J Cancer*; 152(2): 227- 238. doi:10.1002/ijc.34277

[26] S. Papadiochou, I. Papadiochos, C. Perisanidis, N. Papadogeorgakis (2020). Medical practitioners' educational competence about oral and oropharyngeal carcinoma: a systematic review and meta-analysis. British Journal of Oral and Maxillofacial Surgery, Volume 58, Issue 1, 2020, Pages 3-24, ISSN 0266-4356. [PubMed PMID: 31785865] https://doi.org/10.1016/j.bjoms.2019.08.007

[27] Scully C, Bagan JV, Hopper C, Epstein JB (2008). Oral cancer: current and future diagnostic techniques. Am J Dent, 21, 199-209.

[28] Silverman S Jr, Rankin KV (2010). Oral and pharyngeal cancer control through continuing education. J Cancer Educ, 25, 277-8.

[29] Stewart, B.V.,Christopher, P.W (eds) (2014). World Cancer Report 2014. WHO, Geneva.

[30] Thomas SJ,Harris R,Ness AR,Taulo J,Maclennan R,Howes N,Bain CJ (2008). Betel quid not containing tobacco and oral leukoplakia: a report on a cross-sectional study in Papua New Guinea and a meta-analysis of current evidence. International journal of cancer. [PubMed PMID: 18688850]

[31] Varela-Centelles P,Castelo-Baz P,Seoane-Romero J (2017). Oral cancer: Early/delayed diagnosis. Br Dent J, 222, 643.

[32] Walsh T,Liu JL,Brocklehurst P (2013). Clinical assessment to screen for the detection of oral cavity cancer and potentially malignant disorders in apparently healthy adults. Cochrane Database Syst Rev, 21, 11.

[33] Warnakulasuriya S, Johnson NW, van der Waal I (2007). Nomenclature and classification of potentially malignant disorders of the oral mucosa. J Oral Pathol Med; 36(10):575-80. doi: 10.1111/j.1600-0714.2007.00582.x. [PubMed PMID: 17944749]

[34] Warnakulasuriya S, Kerr AR (2021). Oral Cancer Screening: Past, Present, and Future. *Journal of Dental Research*. 100(12):1313-1320. doi:10.1177/00220345211014795

[35] Warnakulasuriya, S (2009). Global Epidemiology of Oral and Oropharyngeal Cancer. Oral Oncology, 45, 309-316. https://doi.org/10.1016/j.oraloncology.2008.06.002

[36] Wetzel SL,Wollenberg J (2020). Oral Potentially Malignant Disorders. Dental clinics of North America. [PubMed PMID: 31735231]