



# Knowledge of Dental Students about Erythroplakia as an Oral Potentially Malignant Disorder

Kelvin Alfian Nola Anggarista<sup>1</sup> Meysinta A. Datau<sup>2</sup> Fatma Yasmin Mahdani<sup>3</sup> Desiana Radithia<sup>3</sup>  
Diah Savitri Ernawati<sup>3</sup> Meircurius Dwi Condro Surboyo<sup>3</sup>

<sup>1</sup> Profession Program, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia

<sup>2</sup> Dental Science Program, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia

<sup>3</sup> Department of Oral Medicine, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia

Address for correspondence Nurina Febriyanti Ayuningtyas, MKes, PhD, SpPM(K), Department of Oral Medicine, Faculty of Dental Medicine, Universitas Airlangga Jalan Prof. Dr. Moestopo No 47, Surabaya 60132, Indonesia (e-mail: nurina-ayu@fkg.unair.ac.id).

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## Abstract

**Background** Erythroplakia is a rare oral potentially malignant disease (OPMD) lesion with prevalence ranging from 0.02 to 0.83%, but it has a higher possibility of malignant transformation, ranging from 14 to 50%. Early detection is crucial for better patient prognosis, but it is challenging for preclinical and clinical dental students to recognize erythroplakia.

**Objective** The aim of this study was to identify the level of knowledge of dental students about erythroplakia as an OPMD lesion based on their academic level.

**Methods** This analytical cross-sectional study used a simple randomized sampling design. Data were cross-tabulated to describe the knowledge of erythroplakia.

**Results** In total, 167 respondents completed the questionnaire, with the majority of 130 (77.84%) being females and 65 (38.92%) were older than 21 years. The majority of respondents, 122 (73.05%), had moderate knowledge, while 31 (18.57%) had poor knowledge and 14 (8.38%) had good knowledge of erythroplakia in terms of etiology, predisposition factors, clinical presentation, diagnosis, treatment, and prognosis.

**Conclusion** Most of the dental students included in the study had intermediate level of knowledge of erythroplakia as an OPMD lesion.

## Keywords

- ▶ oral cancer
- ▶ dental student
- ▶ erythroplakia
- ▶ level of knowledge

## Introduction

Oral malignancy is the sixth most common cancer globally affecting an estimated 263,900 people, and over the course of a decade this number has surged by over 50%. Patients with oral cancer has a predicted lifespan ranging from 80 to 85%, but at stage III/IV, it is only 25% with the possibility of recurrence ranging from 40 to 50% after 5 years of treatment.<sup>1</sup>

Oral potentially malignant disease (OPMD) is an oral epithelial lesion that has the potential to turn into oral cancer. Around 50% of oral cancers develop from OPMD.<sup>2–4</sup>

The causes of OPMD is multifactorial and can be related to several risk factors such as hereditary, tobacco use, and immune dysregulation.<sup>3</sup> Dyskeratosis congenital and epidermolysis bullosa are examples of OPMD caused by hereditary factors,<sup>5</sup> while oral submucous fibrosis (OSF) and palatal lesions in smokers are examples of OPMD caused by tobacco

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use.<sup>6</sup> OPMD caused by the immune system can take the form of oral lichen planus (OLP), oral lichenoid reactions, graft versus host disease (GvHD), and oral lupus erythematosus. Leukoplakia, erythroplakia, and erythroleukoplakia are examples of OPMD caused by various circumstances.<sup>7</sup> OSF is the most common OPMD lesion, followed by leukoplakia, actinic cheilitis, and erythroplakia. The prevalence of OSF is 4.96%, while that of leukoplakia is 4.11%, actinic cheilitis is 2.08%, and erythroplakia is 0.17%.<sup>8,9</sup>

Erythroplakia is a red lesion with a smooth, velvety, or granular surface that is not clinically or pathologically defined by other lesions. Risk factors for erythroplakia lesions are not known with certainty, but predisposing factors such as chewing tobacco, smoking, alcohol, and betel nuts are factors that may influence the development of erythroplakia. The diagnosis of erythroplakia lesions can be made based on the analysis of the clinical picture of the lesion, its etiology, and predisposing factors. The clinical picture of erythroplakia in the form of red lesions in the oral cavity is often mistaken for acute erythematous candidiasis, erosive OLP, and oral manifestation of systemic/discooid lupus.<sup>10</sup>

The prevalence of erythroplakia in the general population ranges from 0.02 to 83%.<sup>11</sup> The clinical behavior of oral erythroplakia is distinct from leukoplakia including incidence and grade of malignant transformation and morphologic appearance. Erythroplakia lesions have clear clinical characteristics with reddish lesions, and the incidence of erythroplakia is infrequent, thereby posing a challenge for research purposes.<sup>12</sup>

Rare cases of erythroplakia in clinical practice may negatively affect the knowledge level of clinical dental students and preclinical dental students in the diagnosis and management of the lesions. Despite its rarity, adequate knowledge regarding erythroplakia is pivotal due to their higher risk of transforming into malignancy compared with the other OPMDs. Therefore, emphasis on early detection, diagnosis, and treatment of erythroplakia lesions is important for dental students to be able to recognize it in patients with erythroplakia before they transform into malignancy.<sup>13,14</sup>

As future health care providers, dental students will play an important role in early detection and diagnosis of erythroplakia. According to the Indonesian Medical Council regulation number 40 of 2015 concerning the competency standards of Indonesian dentists, a dentist carrying out a treatment should master the theoretical concepts of biomedical science relevant to dental and oral diseases and be able to establish a diagnosis, prognosis, and a treatment plan. These competencies have been achieved since the preclinical stage in their study, where a dentist will have an academic and professional competence obtained through professional education based on academics, so that after completing education, dental students will have the ability to practice with professional expertise.<sup>15,16</sup>

Based on this, dental students should have knowledge regarding the etiology, predisposing factors, and clinical features of erythroplakia as an OPMD, so that they can determine the appropriate management and treatment to

make referrals to an oral medicine specialist. Therefore, it is important to identify the level of knowledge of dental students regarding the etiology, predisposing factors, and clinical features of erythroplakia as an OPMD.

## Materials and Methods

### Study Design and Participants

This is a cross-sectional quantitative observational study utilizing questionnaires. Respondents consists of two types of dental students, preclinical and clinical, based on their academic level. The dental education system in Indonesia has two stages: preclinical, which lasts seven semesters, and clinical, which lasts four semesters. The study is conducted at the Faculty of Dental Medicine, Universitas Airlangga, Indonesia. Respondents were selected based on the following inclusion criteria: completion of the oral medicine class for preclinical students and completion of oral medicine rotation for clinical students. Using the Slovin formula ( $e = 0.05$ ), the minimum sample size needed was calculated to be 167 students, with 90 dental undergraduate students from the 2018 batch and 77 dental professional students from the 2020 batch. The research was conducted in online mode from March to November 2021 and was approved by the Health Research Ethical Clearance Commission in the Faculty of Dental Medicine, Universitas Airlangga, on July 30, 2021, with certificate number 409/HRECC.FODM /VII/2021. Informed consent was obtained from all respondents to participate in the study.

### Questionnaire Format

To conduct the research, a 13-item questionnaire was developed and tested for validity and reliability using SPSS version 28 for Windows. The questionnaire was divided into two sections: one section consisted of sociodemographic data from respondents, while the other section measured the knowledge level of the respondents.

The data were collected through a Google form questionnaire, which included a clear explanation of the research aims. The questionnaire link was shared through social media, and respondents were required to provide consent by ticking a box before beginning the questionnaire. The questionnaire used a Guttman scale, which required respondents to provide a firm answer of "true" or "false." Each correct answer was scored 1, while each incorrect answer was scored 0.

## Results

### Demographic

The study included a total of 167 students, comprising 90 preclinical and 77 clinical students. Their sociodemographic data are presented in **Table 1**. Out of the total respondents, 130 (77.84%) were females and 37 (22.16%) were males. The age distribution of the participants was as follows: 7 (19%) were 20 years old, 65 (38.92%) were 21 years old, 44 (26.35%) were 22 years old, 28 (16.77%) were 23 years old, 22 (13.17%) were 24 years old, and 1 (0.6%) was 25 years old.

**Table 1** The frequency distribution of respondents by gender and batch of dental students at Airlangga University

Category		f	%
Gender	Male	37	22.16
	Female	130	77.84
Age	20	7	4.19
	21	65	38.92
	22	44	26.35
	23	28	16.77
	24	22	13.17
	25	1	0.60
Batch	Preclinical	90	53.89
	Clinical	77	46.11

**Etiology and Risk Factors**

► **Table 2** presents the knowledge level of the dental students pertaining to the etiology and predisposing factors of erythroplakia. The correct answer rates for the statement on tobacco chewing were high for both preclinical (95.56%) and clinical (94.80%) students. Similar percentages were observed for the statement on alcohol consumption as a risk factor. However, it is noteworthy that the rate of correct

answers for the statement on betel nut chewing was significantly lower for preclinical students (78.89%) than for clinical students (93.50%). Furthermore, both groups displayed a low rate of correct answers for the statement on aging as a predisposing factor.

**Location of Erythroplakia**

► **Table 3** displays the preferred location for erythroplakia onset, with a range of 0 to 5 correct answers out of 7 possible choices. The correct locations for erythroplakia onset included the base of the mouth, tongue ventral, buccal mucosa, palatal, and lateral tongue. The majority of respondents chose only the three most common locations for erythroplakia lesions, with 41 (45.56%) preclinical students and 27 (35.06%) clinical students selecting these options. Only a small percentage of respondents scored 5 out of 5.

In terms of clinical features of erythroplakia, 42 (46.67%) preclinical students preferred the three most common clinical images found in erythroplakia lesions, while 34 (44.16%) clinical students selected the four most common clinical images.

For questions related to the management of erythroplakia, most respondents from the preclinical and clinical students preferred one management approach for erythroplakia lesion treatment. Specifically, 23 (25.57%) respondents from the class of 2018 and 24 (31.17%) respondents from the class of 2020 chose this option.

**Table 2** Results of the distribution of knowledge regarding the etiology and predisposing factors of erythroplakia

Aspect	Percentage of answer “true”		Percentage of answer “false”	
	Preclinical (%)	Clinical (%)	Preclinical (%)	Clinical (%)
Chewing tobacco	95.56	94.8	4.44	5.2
Alcohol consumption	93.33	98.7	6.67	1.3
Chewing betel nut	78.89	93.7	21.11	6.5
Aging	53.33	67.54	46.67	32.46

**Table 3** Results of the overall frequency distribution of knowledge about erythroplakia

Aspect	Batch	0		1		2		3		4		5	
		f	%	f	%	f	%	f	%	f	%	f	%
Clinical features Location of erythroplakia	Preclinical (n = 90)	-	-	6	6.67	10	11.11	41	45.56	30	33.33	3	3.33
	Clinical (n = 77)	-	-	14	18.18	13	16.88	27	35.06	21	27.27	2	2.59
Clinical features	Preclinical (n = 90)	3	3.33	4	4.45	21	23.33	42	46.67	18	20.00	2	2.22
	Clinical (n = 77)	-	-	1	1.3	12	15.58	20	25.97	34	44.16	10	12.99
Diagnosis and treatment	Preclinical (n = 90)	-	-	23	25.57	21	23.33	21	23.33	11	12.22	13	14.44
Treatment management	Clinical (n = 77)	1	1.30	24	31.17	21	27.27	15	19.48	8	10.39	8	10.39
Diagnosis and treatment	Preclinical (n = 90)	16	17.78	32	35.56	22	24.44	18	20.00	2	2.22	-	-
Supporting examination	Clinical (n = 77)	7	9.09	31	40.26	25	32.47	13	16.89	1	1.29	-	-

**Table 4** The frequency distribution of knowledge about diagnosis and prognosis of Erythroplakia

Aspect	Percentage of answer "correct answer"		Percentage of answer "wrong answer"	
	Preclinical (%)	Clinical (%)	Preclinical (%)	Clinical (%)
Diagnosis and treatment	85.56	96.1	14.44	3.9
Prognosis	85.56	76.62	14.44	23.38

### Diagnosis

► **Table 4** presents true or false questions related to the diagnosis of erythroplakia. The majority of preclinical and clinical students answered these questions correctly, with 77 (85.56%) preclinical students and 74 (96.10%) clinical students providing correct answers. Only a small number of respondents answered these questions incorrectly, with 13 (14.44%) preclinical students and 3 (3.90%) clinical students providing incorrect answers.

Another area of inquiry was the prognosis of erythroplakia. Specifically, respondents were asked whether erythroplakia can be cured. The majority of both preclinical and clinical students answered correctly, with 77 (85.56%) preclinical students and 59 (76.62%) clinical students providing correct responses. However, some respondents answered incorrectly, with 13 (14.44%) preclinical students and 18 (23.38%) clinical students providing incorrect responses.

### Discussion

This research aimed to assess the knowledge level of dental students about erythroplakia based on gender and age demographics. The study found that there was no significant difference in knowledge between male and female respondents. Knowledge of betel nut chewing as a risk factor for erythroplakia among respondents was good, and they generally understood that erythroplakia occurs due to tobacco-related habits,<sup>17</sup> alcohol consumption,<sup>18</sup> and chewing betel nut.<sup>19</sup> Moderate knowledge was observed regarding the age aspect as a predisposing factor for erythroplakia. As proven in the study by Keser and Pekiner,<sup>12</sup> age is a predisposing factor for erythroplakia. Older people have a higher prevalence of erythroplakia. This theory is supported by Pires et al<sup>20</sup> who found 684 cases of leukoplakia, speckled leukoplakia, erythroplakia, and actinic cheilitis in patients aged 41 to 80 years.<sup>20</sup>

In terms of the location of erythroplakia, the study presented seven answer options, with five correct answers being the floor of the mouth, ventral tongue, buccal mucosa, palatal, and lateral tongue. The respondents showed a moderate level of knowledge regarding this question. Questions about the clinical picture of erythroplakia were presented with eight answer options, and a maximum score of 5 was achieved by selecting the five correct answers of red, clearly demarcated, velvety surfaces, smooth surfaces, and irregular edges. The preclinical students showed a moderate level of knowledge, while the clinical dental students showed good knowledge. The results of the study are consistent with existing theories that erythroplakia often appears as reddish plaques with smooth and velvety surfaces, as clearly demarcated, and

irregular edges on the floor of the mouth, ventral tongue, buccal, palatal, and lateral mucosa of the tongue.<sup>10,21</sup>

Regarding the location and clinical picture of erythroplakia, the study found that preclinical students have moderate knowledge, while the clinical dental students have good knowledge. The research also revealed that students of both batches have poor knowledge about the management of erythroplakia and the choice of a supportive test for erythroplakia.

Moreover, the study found that the diagnosis of erythroplakia cannot be established just by looking at the clinical picture. Conventional examination by looking at the clinical picture of lesions are not accurate enough to establish a diagnosis of erythroplakia. Other supporting examinations, including light-based detection system, oral cytology, toluidine blue (tolonium chloride), and image-based deoxyribonucleic acid (DNA) ploidy analysis are needed for the diagnosis with the potential to become malignancy.<sup>22</sup> The competence given to dental education students is limited to the definition, etiology, and risk factors of a disease, while dental professional students receive additional competencies regarding diagnosis and treatment management during professional education. The Indonesian dental council states that one of the competencies that must be mastered by dentists is establishing a diagnosis and determining the prognosis of oral disease/disorders through interpretation, analysis, and synthesis of patient examination results.

A dentist should be able to plan steps to treat oral disease and must be able to determine the right referral.<sup>16</sup>

Both preclinical and clinical dental students demonstrated good prognostic knowledge, likely due to the fact that the former acquired oral medicine subjects, while the latter underwent training in the oral medicine department. This process facilitated the recall of knowledge about erythroplakia. The respondents' high level of knowledge implies that the educational program at the university effectively instills basic knowledge necessary for recognizing erythroplakia as an OPMD lesion, even if the students have not directly encountered patients with erythroplakia. Early detection can lead to appropriate treatment procedures and improved patient survival rates.

### Conclusion

This study revealed that the majority of dental students at Airlangga University had intermediate level of knowledge about erythroplakia as an OPMD lesion. This was found to be true for both preclinical and clinical students, with the latter having a particular focus on erythroplakia as a lesion of oral

potentially malignant disorder. The study suggests that the education received by dental students at Airlangga University is effective in instilling basic knowledge about erythroplakia, which enables early detection and appropriate treatment procedures to increase the patient's survival rate. However, it is important to note that this research is limited to a single center and may not reflect the knowledge levels of students in other universities with dentistry courses.

#### Ethical Approval

This study received an ethical clearance certificate from Universitas Airlangga Faculty of Dental Medicine Health Research Ethical Clearance Commission under registration number 462 / HRECC.FODM / VIII / 2021.

#### Conflict of Interest

None declared.

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