

# Knowledge of Xerostomia and Angular Cheilitis in Geriatric Population among Clinical Dental Students: An Institutional Cross-Sectional Study

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**ABSTRACT** **Aim:** Assessing the knowledge of clinical dental students regarding prevalent geriatric oral diseases is crucial in evaluating their clinical competency. This study focuses on analyzing dental students' knowledge of angular cheilitis (AC) and xerostomia in elderly patients. **Materials and Methods:** In this analytical cross-sectional investigation, clinical dental students from Universitas Airlangga were involved. We employed simple random sampling to select a minimum of 76 students and gathered data, including demographic information and knowledge about AC and xerostomia, through an online questionnaire. Respondents were then categorized into three groups based on their knowledge level: poor, moderate, and good. We utilized coefficient contingency and odds ratio analysis to explore relationships and effects between demographic factors and knowledge levels. **Results:** The study findings indicated that a significant majority of respondents demonstrated a high level of comprehension regarding AC (58.4%). Conversely, a notable proportion of respondents exhibited limited knowledge regarding xerostomia (66.3%). Furthermore, our correlation analysis, which aimed to identify potential associations between knowledge levels and intrinsic factors such as gender, clinical interest, and proximity to geriatric individuals, did not reveal any statistically significant relationships ( $P > 0.05$ ). **Conclusion:** Within the population of clinical dental students, there is a commendable level of knowledge concerning AC in the geriatric demographic. However, a substantial segment of students lacks adequate understanding when it comes to xerostomia.

**KEYWORDS:** *Angular cheilitis, clinical dental students, geriatric population, knowledge level, xerostomia*

## INTRODUCTION

Indonesia has a population of 270.2 million people, with the percentage of elderly people having doubled over the last five decades to reach 9.92% or 26.82 million people in 2020.<sup>[1,2]</sup> Oral lesions and disorders are commonly observed in the elderly population due to their susceptibility to acquiring various degenerative or infectious diseases. The presence of chronic or acute oral lesions and disorders can lead to a hindrance in oral health-related quality of life.<sup>[3-5]</sup> One of the common oral problems found in the elderly is xerostomia where the prevalence of xerostomia varies greatly depending

on the geographic area and age group, but the highest prevalence is found in the elderly group.<sup>[6,7]</sup> In addition, angular cheilitis (AC) is also common in the elderly, with a prevalence of about 11%, a three-fold incidence in denture wearers up to 28%, and twice as often in men.<sup>[8]</sup>

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In the elderly, the secretion and properties of saliva change with age, which can result in dry mouth conditions and taste aberrations.<sup>[9]</sup> Total or partial salivary loss has serious oral consequences, manifesting as discomfort from dry mouth (xerostomia) and exhibiting multiple signs and symptoms primarily on the mucous membranes, lips, tongue, salivary glands, and teeth, and affecting eating, swallowing, food intake, and talking, as well as affecting several aspects of health.<sup>[9,10]</sup>

Aside from changes in the oral mucosa, there are systemic conditions or possibly long-standing factors in the oral cavity in the elderly, such as mechanical trauma and irritation, lower salivary levels, mucosal-skin diseases, malnutrition, vitamin and microelement deficiency, diabetes mellitus, hypertension, circulatory failure, heart disease, gastrointestinal disease, drugs used to treat various diseases (both with general or local effects), tobacco and alcohol. They can also change the sensitivity of the oral flora to different viral, fungal, or bacterial infections; hence, they are responsible for the presence of various lesions, one of which is AC.<sup>[9,11]</sup> The level of knowledge of the elderly regarding oral health is still low. Only 5.21% of the elderly receive dental and oral care, indicating that the awareness of the elderly to come to the dentist is still low.<sup>[12]</sup>

The proficiency of dentists in effectively addressing the healthcare needs of the elderly population holds significant importance. Clinical dental students, who represent the upcoming generation of oral health professionals, bear the responsibility for managing the oral health concerns of the elder population. This research investigated the level of knowledge among clinical dental students pertaining to two of the most prevalent oral and maxillofacial diseases observed in older individuals, namely xerostomia and AC. Additionally, AC and xerostomia are included in the competency list of a general dentist in Indonesia. These mentioned factors underscore the importance of evaluating the knowledge of clinical dental students concerning these oral and maxillofacial diseases.

## MATERIALS AND METHODS

### Study design and study participant

This is an analytical observational study with a cross-sectional design approved by the Ethics Commission of the Faculty of Dental Medicine, Universitas Airlangga, with number 426/HRECC/FODM/VII/2021. The study was conducted between September and November 2021, and the sample comprised 77 participants who were clinical dental students at the Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

The minimum requirement for the participants was determined using the Slovin formula, and the participants were recruited using accidental sampling. The participants voluntarily participated in the study and filled out an informed consent form.

### Data collection

Data collection in this study was carried out by distributing online questionnaires to respondents. The questionnaire consisted of two blocks, namely the AC knowledge questionnaire for the elderly and the xerostomia knowledge questionnaire for the elderly. This dichotomous questionnaire is assessed using the Gutman scale, where “right” is 1 and “wrong” is 0. The total knowledge level score will be grouped into three categories: good (76%–100%), moderate (56%–75%), and poor (<56%).

### Inclusion and exclusion criteria

Every participant in the study received detailed information regarding the research's purpose, potential risks, and advantages. They were required to give their informed consent using digital methods before being able to access the online questionnaire. The study had specific requirements for inclusion, such as being a clinical dental student, have passed clinical oral medicine rotation, and having internet access. Individuals who did not meet the criteria for informed consent, lacked stable internet access, and did not complete the questionnaire were not included in the study. Furthermore, participants who moved to different states during the study, were undergraduates, had no internet connectivity, or faced any other obstacles in completing the online questionnaire were also excluded from the study.

### Questionnaire format, validity, and reliability

The questionnaire used in this study was developed by the Department of Oral Medicine, Faculty of Dental Medicine, Universitas Airlangga. The tool comprises 29 questions aimed at assessing respondents' knowledge regarding the management of AC and xerostomia in geriatric patients. All questions are delivered in Bahasa Indonesia, and the Gutman scale is employed as the scoring system, where “true” receives a score of 1, and “wrong” receives a score of 0.

The questionnaire underwent validity testing using the Pearson correlation test ( $P < 0.05$ ), and the assessment of internal consistency using Cronbach's  $\alpha$  yielded a robust value of 0.768, indicative of strong reliability. Respondents' knowledge levels were subsequently classified into three categories: “good” (76%–100%), “moderate” (56%–75%), and “poor” (<56%), based on their test results.

**Statistical analysis**

The data were subjected to analysis using GraphPad Prism version 9.0 for Macintosh, and the findings were subsequently presented utilizing diverse formats encompassing frequency, percentage, cross-tabulations, and diagrams for each variable. To investigate the correlation between gender, clinical interests, physical proximity to geriatric individuals, and the knowledge of xerostomia management, an additional analysis employing correlation analysis was conducted. The primary objective of this analysis was to ascertain the relationship between respondents' sociodemographic and professional background on their knowledge level. Statistical significance was determined based on the *P*-value, with values below 0.05 denoting a statistically significant outcome.

**RESULTS**

A total of 77 respondents were included in the study, and their sociodemographic characteristics are presented in Table 1. The majority of the respondents were women (77.9%). The respondents consist of clinical dental students from three academic classes. Among these, 70.1% are first-year clinical students, 26.0% are second-year students, and 3.9% are third-year students. The selection of respondents adheres to the inclusion and exclusion criteria.

According to the findings presented in Table 2, a significant proportion of the respondents had good knowledge about AC (58.4%), while 33.7% had a satisfactory level of knowledge. However, a small percentage of respondents (7.8%) demonstrated a lack of knowledge about the conditions.

Almost all respondents had a good level of knowledge in each category of the questionnaire, and the most lacking level of knowledge was in the category regarding the etiology of AC [Table 3]. Based on Table 2, the majority of people have a poor level of knowledge about xerostomia, namely as many as 51 people (66.3%), followed by a moderate level of knowledge for as many as 23 people (29.9%), and a good level of knowledge for as many as three people (3.9%) [Table 2]. Based on Table 3, almost all respondents have less knowledge in each category of the questionnaire [Table 3].

Table 4 presents the results of the coefficient contingency, which aimed to determine the correlations between various factors and the knowledge of xerostomia management. The findings revealed that there was no statistically significant association observed between the demographic factors and the knowledge of managing

**Table 1: Sociodemographic characteristics of the respondents**

Variable	Angular cheilitis (n = 77)		Xerostomia (n = 77)	
	Frequency	Percentage	Frequency	Percentage
Sex				
Male	17	22.1	17	22.1
Female	60	77.9	60	77.9
Class				
2018	3	3.9	3	3.9
2019	20	26.0	20	26.0
2020	54	70.1	54	70.1
Age				
20	1	1.3	1	1.3
21	13	16.9	13	16.9
22	35	45.5	35	45.5
23	18	23.4	18	23.4
24	8	10.4	8	10.4
25	1	1.3	1	1.3
26	1	1.3	1	1.3

**Table 2: Distribution of the knowledge of angular cheilitis and xerostomia**

Knowledge level	Angular Cheilitis		Xerostomia	
	Frequency	Percentage	Frequency	Percentage
Good (76%–100%)	45	58.4	3	3.9
Moderate (56%–75%)	26	33.7	23	29.9
Poor (<56%)	6	7.8	51	66.3
Total	77	100	77	100

xerostomia (*P* > 0.05). Additionally, the same analysis of the knowledge of AC management is presented in Table 5.

**DISCUSSION**

The field of geriatric oral medicine is burgeoning within the dental profession, primarily because of the increasing population of elderly individuals in the contemporary world. According to the World Health Organization, there is a projected threefold increase in the geriatric population by the year 2050.<sup>[13]</sup> This phenomenon implies the possibility of a higher prevalence of oral and maxillofacial conditions related to physiological changes in the geriatric population. AC is one of the most prevalent conditions found in the geriatric population. It may be caused by their main predisposing factor, reduced vertical dimension, and salivary stagnation, which are often found in the elderly.<sup>[13]</sup> Xerostomia is another condition often found in the elderly, characterized by a subjective complaint of mouth dryness.<sup>[12]</sup> This condition may be caused by aging processes that lead to salivary gland impairment,

**Table 3: Distribution of angular cheilitis and xerostomia knowledge level per questionnaire category**

No.	Questionnaire category	Knowledge level					
		Good		Moderate		Poor	
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
1.	Definition of angular cheilitis	76	98.7	0	0	1	1.3
2.	Etiology of angular cheilitis	50	64.9	0	0	27	35.1
3.	Diagnosis of angular cheilitis	52	67.5	21	27.3	4	5.2
4.	Management of angular cheilitis	70	90.9	6	7.8	1	1.3
5.	Definition of xerostomia	19	24.7	0	0	58	75.3
6.	Etiology of xerostomia	25	32.5	0	0	52	67.6
7.	Diagnosis of xerostomia	6	7.8	33	42.9	38	49.4
8.	Management of xerostomia	1	1.3	16	20.8	60	78

**Table 4: Coefficient contingency correlation analysis between the demographic factors and the knowledge on the management of xerostomia**

Demographic factors	Coefficient contingency			Odds ratio (OR) and 95% CI
	Correlation coefficient ( <i>r</i> )	<i>R</i> squared	Sig. ( <i>P</i> -value)	
Gender				
Male	0.106	0.02042	0.3589	2.158 (1.271–3.799)
Female				
Clinical interests				
Pediatric patients	-0.034	0.0021	0.768	1.807 (0.7557–4.565)
Adult patients				
Geriatric patients				
Physical proximity to geriatric individuals				
High	0.215	0.05891	0.712	1.324(0.5411–3.350)
Moderate				
Low				
None				

**Table 5: Coefficient contingency correlation analysis between the demographic factors and the knowledge on the management of angular cheilitis**

Demographic factors	Coefficient contingency			Odds ratio (OR) and 95% CI
	Correlation coefficient ( <i>r</i> )	<i>R</i> squared	Sig. ( <i>P</i> -value)	
Gender				
Male	-0.3556	0.1422	0.1589	1.857 (1.105–3.212)
Female				
Clinical interests				
Pediatric patients	0.09013	0.00254	0.4357	0.7733 (0.3148–1.826)
Adult patients				
Geriatric patients				
Physical proximity to geriatric individuals				
High	-0.0114	0.00013	0.9216	1.354 (0.5601–3.380)
Moderate				
Low				
None				

resulting in reduced salivary volume or altered composition.<sup>[14,15]</sup> The geriatric population is also prone to this condition due to their dependence on various pharmacotherapeutics with xerogenic side effects, such

as antihypertensive and anticholinergic medications.<sup>[16]</sup> According to the Competency Standards for Indonesian Dentists released by the Indonesian Medical Council in 2015, AC and xerostomia are included in the list of



competencies for general dentists in Indonesia, with a note indicating their competency to independently treat these cases. This underscores the importance of evaluating the competencies of Indonesian clinical dental students related to these diseases because they are highly prevalent among the geriatric population. Additionally, these conditions are particularly important to address due to the heightened vulnerability of the geriatric population to oral diseases, including infectious and degenerative conditions.<sup>[9,13]</sup> However, despite the significance of these conditions, there exists a notable research gap regarding dental students' knowledge of these conditions in elderly patients. To bridge this gap, our study aimed to investigate the knowledge levels of dental students concerning xerostomia and AC, as well as the factors influencing their knowledge. The findings of our study revealed that a majority of the respondents demonstrated a satisfactory level of knowledge regarding AC in the elderly population. However, concerning xerostomia in the elderly, most respondents exhibited insufficient knowledge. Our findings could be affected by the comparatively lower clinical exposure to xerostomia in contrast to AC. This particular condition has also been addressed in the study conducted by Shamala *et al.*, (2023) where significant gaps in knowledge, attitude, and practice were reported among dental students in relation to the management of oral cancer, where gaps were attributed to the limited clinical exposure to the disease.<sup>[17]</sup> Furthermore, our analysis indicated that various sociodemographic factors, including gender, clinical interest, and physical proximity to the geriatric population, did not significantly influence the knowledge of dental students regarding xerostomia and AC.

Although we were unable to find other studies that specifically examined the same variable as ours, we were able to identify several studies that focused on the knowledge of dental students and dentists regarding geriatric dentistry. Upon reviewing these studies, we discovered minimal disparity in the results compared to our own findings. It appears that only a minority of dental professionals and students possess adequate knowledge in oral and dental management for the geriatric population. Our study aligns with the research conducted by Tahani and Manesh,<sup>[20,21]</sup> who reported a significantly low percentage (3%) of dentists in their study, demonstrating a good understanding of the complex oral and dental needs of the elderly.<sup>[18]</sup> These respondents acknowledged that their limited knowledge could be attributed to the lack of gerodontology training during their dental education.

Similarly, a survey conducted in Iran by Alaei *et al.*<sup>[19]</sup> also revealed a lack of awareness among most dentists regarding gerodontology. Furthermore, Hatami *et al.*<sup>[20]</sup> reported that the majority of students exhibited a low-to-moderate level of knowledge and attitude toward geriatric dentistry. These findings are consistent with our own study, which showed a very low level of clinical interest among students in treating geriatric patients.

This study analyzed the relationship between three demographic factors: gender, clinical interest, proximity to geriatric individuals, and the level of knowledge using coefficient contingency analysis. The selection of these factors was based on the theory of knowledge acquisition, which suggests that both internal and external factors can influence an individual's knowledge level.<sup>[21]</sup> Interestingly, the results of the coefficient contingency analysis revealed that none of the demographic factors correlate with the knowledge of the management of xerostomia and AC. These results contradict prevailing theories in the field of knowledge acquisition, which propose that factors such as gender play a role in determining individuals' knowledge levels. One possible explanation for this finding is the overrepresentation of females in the study, which may have led to a dominance of female respondents. This limitation arises from the disproportionate number of students based on gender at the study location. Further analysis reveals that the relationship between clinical interest and the knowledge level of xerostomia and AC also yielded insignificant results. Similarly, other factors, such as clinical interest and proximity to geriatric individuals, which can be categorized as experiential factors, were not found to significantly affect the knowledge level. This finding challenges previous beliefs and warrants further investigation into the factors that significantly correlate with knowledge acquisition. Future research should explore additional factors and consider a more balanced representation of genders to obtain a comprehensive understanding of the factors influencing the knowledge levels of the respondents.

Our study revealed significant disparities in knowledge levels between the two administered questionnaires. Notably, a majority of students displayed a low (66.3%) to moderate (29.9%) level of knowledge regarding xerostomia, while a significant majority demonstrated a good knowledge of AC (58.7%). These intriguing findings may be attributed to the limited exposure to clinical cases during the students' training. The intricate pathogenesis and management of xerostomia could also contribute to this knowledge discrepancy. To address these knowledge gaps, it is essential to incorporate a

gerodontology module at the undergraduate level. Previous studies by Tahani *et al.*<sup>[19,20]</sup> have highlighted the inadequacy of geriatric dentistry modules in the dental education system of Iran.<sup>[22]</sup> In contrast, Kossioni *et al.*<sup>[17,20]</sup> reported that many European countries have successfully introduced focused modules on geriatric dentistry, with 86.2% of schools incorporating such modules.<sup>[23]</sup> However, there is limited information regarding the introduction and standardization of geriatric dentistry modules in Indonesia. It is evident that enhancing the knowledge of dental students is imperative, necessitating the implementation of standardized learning methodologies across dental schools at a national level. A deficiency in geriatric dentistry competence has been noted among dental students and dental professionals worldwide.<sup>[24]</sup> Nevertheless, a prior study conducted by Rahardjo *et al.*<sup>[20,22]</sup> found that the majority of dental students in Indonesia hold positive awareness and attitudes toward older adult patients.<sup>[25]</sup> This finding may suggest the potential for an increase in competence if more advanced education in geriatric dentistry is introduced. One viable approach to tackle these challenges is the integration of a specialized gerodontology module with a specific emphasis on oral medicine. This module would address the unique physiological aspects associated with the geriatric population, which differ from those observed in adults and other stages of aging.<sup>[26,27]</sup> As a result, geriatric individuals become more susceptible to various oral conditions.<sup>[13,28]</sup> By implementing these strategies, we can effectively bridge the knowledge gaps and enrich the education of dental students, ultimately leading to improved oral healthcare provision for the geriatric population.

The present study has certain limitations that should be taken into consideration. First, the data relied solely on self-reported information, which introduces a potential bias and should be interpreted cautiously. Furthermore, it is important to note that the total number of completed surveys only represents one dental school out of the 32 dental schools in Indonesia. Consequently, the generalizability of the study's findings needs to be verified. Despite these limitations, this survey-based study holds significance as one of the first within Indonesia to shed light on the level of knowledge among clinical dental students regarding common oral lesions in geriatric patients, specifically AC and xerostomia. Additionally, it explores the factors that may influence the knowledge level of these students. However, in order to obtain a more representative model and identify factors associated with the acquisition of knowledge on common oral lesions in geriatric patients, a more robust study design

is warranted. This would entail a random sampling of all clinical dental students across Indonesia.

Furthermore, it is crucial to underscore the significance of conducting follow-up studies on a nationwide scale, encompassing all dental institutions in Indonesia. These studies should delve into the attitudes, preparedness, and willingness of clinical dental students when it comes to managing cases related to geriatric oral medicine. Moreover, leveraging the outcomes of these studies for advocacy purposes with stakeholders involved in dental curriculum development is a pivotal step toward implementing a dedicated geriatric oral medicine module within the Indonesian dental education system. This concerted effort will prove instrumental in shaping a comprehensive special care dentistry module with a specific focus on geriatric oral medicine. Through these initiatives, we can aspire to elevate the standard of care provided to geriatric patients, ultimately leading to an enhancement in their overall quality of life.

## CONCLUSION

In conclusion, dental students generally lack sufficient knowledge about AC and xerostomia in the elderly. This knowledge gap may be attributed to inadequate emphasis on gerodontology or geriatric dentistry in dental education curricula. Consequently, students may be less competent in addressing the needs of the growing elderly population. To address this issue, it is crucial to enhance education and understanding of these two conditions to prevent their occurrence and provide appropriate management for AC and xerostomia in elderly individuals. Furthermore, this research did not establish any significant associations between various factors of the respondents and their knowledge levels.

## Author contribution

Not applicable.

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## Conflicts of interest

There are no conflicts of interest.

### Authors contributions

F.Y.M.: Concepts, design, definition of intellectual content, literature search, manuscript review, guarantor. G.D.J.: Statistical analysis; manuscript preparation & editing, manuscript review. E.T.F.: Statistical analysis, manuscript preparation & editing, manuscript review. K.W.C.: Statistical analysis, manuscript preparation & editing, manuscript review. D.R.: Concepts, design, definition of intellectual content, Manuscript review, guarantor. S.W.: Data acquisition, data analysis, manuscript preparation & editing, manuscript review.

### Ethical policy and institutional review board statement

The Ethical Commission of Faculty of Dental Medicine Universitas Airlangga have granted ethical clearance for this study (registration number 426/HRECC/FODM/VII/2021).

### Patient declaration of consent

The subjects participate in this study have signed approval forms for the publication of their given data.

### Data availability statement

The data used to support the findings of this study are included within the article.

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