



Knowledge and performance of senior dental students of Zanjan University of Medical Sciences (Iran) regarding the principles of oral biopsy and cytology

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ABSTRACT

Background: The present study was designed to evaluate the knowledge and attitude of the sixth-year dental students of Zanjan University of Medical Sciences regarding the principles of oral biopsy and cytology.

Materials and Methods: This cross-sectional study was conducted on 70 of the final year dental students of Zanjan University of Medical Sciences in 2021. The data was collected in the census method. The data collection tool was a researcher-made questionnaire, the first part of which included demographic information (n=3) and the second part related to students' knowledge (n=10) and performance (n=4) of the principles of biopsy and oral cytology. Before distributing the questionnaire, its validity and reliability were confirmed. The data was entered into SPSS24 software and Spearman's rank correlation coefficient and Independent sample t-test were used to analyze the data.

Results: The mean and (\pm SD) of the age of the students was 24.84 ± 1.72 years and 31 (44.3%) were men. The mean (\pm SD) scores of students' knowledge and performance of biopsy were $4.41 (\pm 1.12)$ and $0.68 (\pm 0.60)$, respectively. Also, students' knowledge and performance regarding oral cytology were $0.51 (\pm 0.63)$ and $0.47 (\pm 0.58)$, respectively. There was no statistically significant relationship between gender and age variables with knowledge and performance levels in the biopsy and cytology sections (P -Value >0.05).

Conclusion: Our study showed students' knowledge and performance of oral biopsy was moderate, while their knowledge and performance of oral cytology was very poor, therefore, it seems necessary to provide solutions to increase students' knowledge and performance.

Keywords: Knowledge; Performance; Biopsy; Cytology; Dental student.

Introduction

Clinical tests play an important role in the diagnosis of benign and malignant lesions of the mouth and teeth. However, these tests do not have the ability to definitively diagnose many oral lesions. Correct

diagnosis of oral lesions is the primary key to successful treatment, which requires proper cooperation between the clinician and the pathologist. The first step in the correct treatment of any lesion is its correct diagnosis [1].

Some oral lesions can lead to the death of patients if they are not diagnosed on time or even with a short-term delay in treatment [2]. Therefore, early diagnosis of the disease leads to increased life expectancy, improved quality of life, reduced psychological problems and reduced costs [3]. Examining the patient's history and main complaint, clinical examinations and para-clinical tests are the basic principles of correct diagnosis of oral diseases. Biopsy is one of the para-clinical tests that help in diagnosing oral lesions. One of the most effective ways to correctly diagnose the lesion is to take one or more biopsies from the lesions and histopathological evaluation by an expert pathologist [4]. Biopsy is actually the removal of a piece of tissue from a living organism, which has the highest accuracy compared to other diagnostic methods. The most important step after taking a biopsy is processing and transferring the desired sample. This step includes immediately placing the sample in a fixative solution with the appropriate percentage in a suitable container (preferably plastic), pasting the patient's profile on it, and finally transferring the container for examination [5].

Most oral cancers originate from premalignant lesions, which can help in early cancer detection. Screening is one of the methods that can help in the timely and early detection of cancer. Examining mucosa cytology is a method used in oral mucosa cancer screening [6]. Cytology is an auxiliary, fast, non-invasive, cheap method in the long-term monitoring of changes in the appearance of the epithelium, which does not require anesthesia and is done by two methods, exfoliative and using a brush. Early and timely diagnosis of malignant lesions is necessary to achieve a good prognosis. The lack of knowledge and skills of dentists in the field of patient examination, oral cytology and biopsy principles delay or make treatment impossible. Zargarani et al. showed that the knowledge of dental students regarding the principles of oral biopsy is low [7]. In separate studies, Sharif et al. [8], Start et al. [9], and Seoane et al. [10] observed several problems in transferring biopsy samples to the laboratory. Jayabalan et al. showed that dentists have relatively low knowledge of oral cytology [11]. Similar results were observed in the studies of Beeula et al. [12] and Silva et al. [13]. Considering the low level of knowledge of dentists and dental students in the field of biopsy and oral cytology principles on one hand and the limited number of studies conducted in this field in Zanjan, the present study was designed and implemented with the aim of investigating the knowledge and performance of the

sixth year dental students of Zanjan university of medical sciences regarding the principles of oral biopsy and cytology.

Materials and Methods

I. Study Design and Subjects

This cross-sectional study was designed to evaluate the knowledge and attitude of the sixth-year dental students of Zanjan university of medical sciences regarding the principles of oral biopsy and cytology in 2021. In this study, since all final year students of Zanjan Dental Faculty were investigated, therefore the sampling method was census and there was no need to calculate the sample size. Inclusion criteria consisted of final year dental students and consent to participate in the study. Exclusion criteria consisted of incomplete questionnaires and failure to pass oral pathology course.

II. Data Collection

In the current study, the data collection tool was a two-part questionnaire: the first part included demographic information and the second part related to students' knowledge and performance of the principles of biopsy and oral cytology. The questions related to knowledge and performance of the principles of biopsy and oral cytology were extracted from similar studies in different databases and interviews with the relevant experts. This researcher-made questionnaire included 13 questions. In the biopsy section, there were 7 questions related to knowledge (score range 0-7) and 2 questions (score range 0-2) related to performance. In the cytology section, there were 3 (score range 0-3) and 2 questions (score range 0-2) related to knowledge and performance, respectively. One score was given for each correct answer and zero score was considered for no answer/wrong answer. Scores between 7-9, 5-7, and less than 5 indicate good, moderate, and poor knowledge, respectively. To evaluate the validity, the questionnaire was provided to 14 professors and dental specialists which the content validity index (CVI) was obtained more than 0.56 and content validity ratio was more than 0.79 for all questions. Then, to determine reliability, the questionnaire was completed 2 times with a gap of one week by 15 students, and Inter Class Correlation (ICC)=0.8890 was obtained. Finally, our questionnaire, which had appropriate validity and reliability, was provided to all students for completion.

III. Statistical analysis

Data were collected and analyzed using SPSS version 24. In descriptive analyzes, mean and standard deviation (SD) were used for quantitative variables, and number (%) was used for qualitative variables. Spearman's rank correlation coefficient was applied for relationship between age with knowledge and performance scores with age and Independent sample t-test was also used to compare knowledge and performance scores in male and female students. Finally, P-Value<0.05 was considered as a significant level.

IV. Ethics considerations

Before data collection, the aims of the research were explained to the participants, and informed consent was then obtained. This study was performed according to the principles expressed in the Declaration of Helsinki and was approved by the Ethics Committee of Zanjan University of Medical Sciences (ID: IR.ZUMS.REC.1400.287).

Results

A total of 70 final year dental students were examined. The mean and (\pm standard deviation) of the age of the students was 24.84 ± 1.72 years, and the minimum and maximum ages were 23 and 31 years, respectively. There were 31 (44.3%) men and 39 (55.7%) women. Table 1 shows the distribution of the frequency of students' correct answers to the knowledge and performance questions according to the biopsy and cytology sections. As can be seen, the most knowledge in the biopsy section was related to the need to record the additional information needed for the samples, so 90% of the students had the necessary knowledge in this matter. The least knowledge was related to the size of the tissue piece needed to be sent to the laboratory

(22.9%). In the performance section, the students reported poor performance in relation to the required concentration of the fixative solution, so only 14.3% of the students had a correct performance in this case. In the cytology section, students' knowledge was low, especially about the fixative substance used during cytology so only 8.6% had the necessary knowledge of the best fixative substance. Also, students' performance in relation to the tools needed for sampling during cytology was also low.

Table 2 shows the mean and standard deviation, minimum and maximum scores of students' knowledge and performance according to biopsy and cytology sections. The mean (\pm S.D) scores of students' knowledge and performance of biopsy were $4.41 (\pm 1.12)$ and $0.68 (\pm 0.60)$, respectively, which shows that the students' knowledge and performance about oral biopsy is in the moderate range. Also, students' knowledge and performance regarding oral cytology were $0.51 (\pm 0.63)$ and $0.47 (\pm 0.58)$, respectively, which also shows that students' awareness and performance regarding oral cytology is low.

Table 3 shows the association between gender with knowledge and performance scores in biopsy and cytology sections. As can be seen, the independent sample t-test test showed that the mean scores of knowledge and performance in male and female students in the biopsy and cytology sections are not statistically significant.

Table 4 shows association between age with knowledge and performance scores in biopsy and cytology sections. As can be seen, spearman's rank correlation coefficient showed that there is no significant statistical relationship between these two variables in the biopsy and cytology sections.

Table 1. Frequency distribution correct answers to knowledge and performance questions according to biopsy and cytology sections.

Questions	Correct answer (%)
<i>Demographic data</i>	
<i>Biopsy section</i>	
<i>Knowledge</i>	
<i>Transferring the biopsied sample to the laboratory</i>	32 (45.7)
<i>The size of the biopsied tissue piece to be transported to the laboratory</i>	16 (22.9)
<i>The time interval between the end of sampling and placing the sample in the fixative container</i>	40 (57.1)
<i>The best solution selected as a fixative solution</i>	53 (75.7)
<i>The best concentration of fixative solution</i>	58 (82.9)
<i>Additional information required for samples</i>	63 (90.0)

Questions	Correct answer (%)
How to specify sample information	47 (67.1)
Performance	
The volume used of the fixative solution	10 (14.3)
The container used to send the biopsied sample	38 (54.3)
Cytology section	
Knowledge	
The most common fixative substance during oral cytology	6 (8.6)
Diagnosable pathologies by cytology 1	19 (27.1)
Diagnosable pathologies by cytology 2	11 (15.7)
Performance	
Tools needed for sampling during oral cytology 1	19 (27.1)
Tools needed for sampling during oral cytology 2	14 (20)

Table 2. Mean and standard deviation, minimum and maximum scores of students' knowledge and performance according to biopsy and cytology sections.

Variable	Number	Mean	S.D*	Min	Max
Biopsy section					
Knowledge	70	4.41	1.12	0	7
Performance	70	0.68	0.60	0	2
Cytology section					
Knowledge	70	0.51	0.63	0	2
Performance	70	0.47	0.58	0	2

*S.D: standard deviation.

Table 3. Relationship between sex with knowledge and performance scores in biopsy and cytology sections.

Section	Variable	Number	Mean	S.D*	Mean difference	P-Value**
Biopsy section						
Knowledge	Sex	Male	31	4.25	0.28	0.303
		Female	39	4.53		
Performance	Sex	Male	31	0.61	0.13	0.372
		Female	39	0.74		
Cytology section						
Knowledge	Sex	Male	31	0.64	0.23	0.123
		Female	39	0.41		
Performance	Sex	Male	31	0.35	0.21	0.137
		Female	39	0.56		

*S.D: standard deviation.

** : Independent sample t-test test.

Table 4. Relationship between age with knowledge and performance scores in biopsy and cytology sections.

Section	Spearman's rank correlation coefficient	P-Value
Biopsy section		
Knowledge	0.087	0.437
Performance	-0.100	0.412
Cytology section		
Knowledge	-0.103	0.398
Performance	0.08	0.509

Discussion

Early diagnosis of the type of lesion in high-risk people is very important and is mainly based on mucosal cytology and lesion biopsy. The lack of knowledge and skills of dentists in the field of patient examination, oral cytology and biopsy principles may delay the treatment or even make the treatment impossible. Therefore, the present study was conducted with the aim of investigating the knowledge and performance of dental students in Zanjan regarding oral cytology and biopsy principles.

In our study, students' knowledge and performance of the principles of oral biopsy was at a moderate level. Similar studies in Isfahan and Mazandaran are also in line with this finding [14,15]. In the same way, the results of Manju et al. and Kumar et al.'s studies in India reported moderate awareness of dentists regarding oral biopsy [16,17]. In general, the results of past studies in Iran show that the awareness of dental students and general dentists regarding oral biopsy is moderate. The reason may be that people have the same educational curriculum during their education and have received the same amount of training in this field. These results show the importance of changing the educational curriculum to improve students' knowledge and performance in this field.

The results of our study showed that 57% of students have the necessary knowledge of the immediate transfer of samples to the laboratory. Also, 54% of the students knew that the samples should be transported in plastic containers with screw lids. The reason for using such containers is that it prevents the leakage of formalin as a fixative solution. The purpose of performing an oral biopsy is to reach a correct histopathological diagnosis, so the sample must be processed and transferred correctly because the lack of adequate care will cause the sample (due to some changes) to have no diagnostic value which may lead to repeated biopsy with physical and mental problems [7,18].

In our study, 75% of students chose formalin as the most common fixative solution for biopsied samples, but only 14% of students had the necessary knowledge about the volume of solution required for each biopsied sample. Similarly, in the study of Ardakani et al., 73% of dentists were aware of formalin as the most important fixative solution. Also, in line with our study, in this study, only 13.5% of dentists knew about the required volume of fixative solution [19]. However, this study was conducted on general dentists. In the study of Murgod et al., only 53% of dentists chose formalin as a fixative solution, which is lower than the results obtained from our study [55]. The reason for the lower level of awareness in this study can be the difference in the study population and the type of education received during the education [20]. In our study, 90% of the students stated that there is a need to record additional information such as age, gender, medical history, clinical diagnosis, and radiography of the injury. Similar results were observed in Ardakani et al.'s study. Entering all the information helps to interpret the results correctly and is therefore very important [19].

The results of the present study showed that dental students in Zanjan have poor knowledge and performance in the field of oral cytology so that the mean scores of knowledge and performance of the students were 0.51 ± 0.63 and 0.47 ± 0.58 , respectively. Beeula et al.'s study on general dentists in India showed that dentists' awareness and performance of oral cytology was low, which is consistent with the results obtained from our study [17]. Similarly, Silva et al also showed that the awareness of dentists in the use of exfoliative cytology in the clinic is low [13]. The results of Mathivadani et al.'s study showed that 65% and 66% of dental students, respectively, have the necessary knowledge of the purpose of exfoliative cytology and how to perform the tests [21]. On the other hand, Jayabalan et al also stated that students' performance in preparing cytology samples is low [22], which is consistent with the results of our study. All these cases show that the knowledge and performance of students in the field of oral cytol-

ogy is low. Considering that exfoliative cytology is a non-invasive method for evaluating oral lesions and is considered an excellent method for screening patients [23,24], it is expected that students have the necessary knowledge and performance in this field. Therefore, it is suggested to provide educational programs and related workshops to get to know more. The difference in the level of knowledge of students and dentists in different studies can be due to the different quality of education in different universities, different measurement tools, different sample size and demographic characteristics of the people under investigation. Also, using a questionnaire to check the level of knowledge is a method based on the student's self-expression, which can be associated with errors [25,26].

The level of knowledge of students and dentists about biopsy and oral cytology depends to a large extent on the educational materials taught in the university. However, there is no separate unit for oral cytology in the dental curriculum of Iran and the material is mainly taught to students in the pathology unit. Studies have shown that the awareness of dentists who have passed the biopsy training course is significantly higher than those who have not passed this course [14]. This issue shows the need to revise the educational curriculum and the importance of the role of education to raise the awareness of dental students.

One of the things that can contribute to the low performance of students and dentists in the field of biopsy and oral cytology is the failure to perform the biopsy procedures and transfer the sample to the laboratory during the time of studying at the university and after. In this regard, Beeula et al reported that 98% of dentists have not yet performed oral cytology in their clinic [12]. This rate was 85% for the study of Silva et al. [13]. Worry about insufficient skill in performing biopsy, error in determining sampling location and sample size, as well as the possibility of spreading tumor cells to other parts of the body are among the factors that make dental students and even dentists reluctant to perform biopsy which could be due to the lack of importance of practical teaching of sampling techniques during university education [20]. The results of the present study showed that there is no significant relationship between gender and the level of knowledge and performance of students in the field of biopsy and oral cytology. In line with our study, Zargarani et al. also showed that there is no significant difference in the knowledge score of male and female students and general dentists [7]. Also, in another study in Yazd, there was no significant relationship between gender

and awareness score [19]. The reason for this lack of significant relationship can be due to the same access of students of both sexes to scientific resources in the university environment. On the other hand, awareness expresses the level of knowledge and information of a person, which is the result of the influence of factors such as study, quantity and quality of education, which caused awareness to be influenced by the way of education and not by gender [26].

In this study, there was no significant relationship between the age of the students and the knowledge and performance scores in the field of oral biopsy and cytology. While some studies showed a significant relationship between general dentists' awareness of oral biopsy and age [19]. The reason for this inconsistency can be due to the small age range of the students, because we only examined the incoming students of one year, who were mostly very close to each other in terms of age.

Strengths and limitations

Perhaps one of the strengths of our study is the simultaneous examination of knowledge and performance by a valid and reliable questionnaire. However, the study also has limitations, the first limitation of the study is the cross-sectional nature of the study, which makes it impossible to make a firm judgment about the cause and effect relationships. The second limitation is that the study was conducted in a single center and only in Zanjan, therefore, the results may not be generalized to all dental students in Iran and multi-center studies are recommended. It is also highly recommended that more backgrounds be involved and multivariate analyses be applied to such data for future studies.

Conclusions

Our study showed students' knowledge and performance of oral biopsy was moderate, while their knowledge and performance about oral cytology was very poor, therefore, it seems necessary to provide solutions to increase students' awareness and performance.

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Conflict of Interest

There is no conflict of interest to declare.

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