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Level of Knowledge in Dental Residents and Students for Diagnosis and Treatment Plan

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ABSTRACT

Introduction: *The aim of this research is to examine the ability of Kerman dental students and residents in patient diagnosis and treatment plan.*
Materials and Methods: *To perform this research 6 questions consist of the most common cases that a dentist may deal with it in his working time, designed by the dental specialists. To do this research, at first referred to the education`s office of dental school and a list of all residents and students in years 5th and 6th was prepared, and then gave the questionnaire to them and asked them to filled it and gave back. The results were analyzed with ANOVA test, T-TEST and the SPSS version 21 program. The significant level in data analysis was $p<0.05$.*
Results: *In this study 168 questionnaires were distributed and 131 questionnaires were returned (The response percent=77.9%). 42 residents and 89 students participated in this study. 32 of the participants were male and 99 of them were female. 94 percent of the participants gave correct answer for diagnosis of the pericoronitis. Also 97.4 percent of the participants gave correct answer for treatment of carious teeth. Review of the correct answers in this study indicates that, based on all questions the average score is 8.5 from 14 (Rating from 0 to 14).*
Conclusions: *This study indicates that although the score that obtained from diagnosis and treatment plan are approximately appropriate, but the students have little information to deal with systemic cases such as request laboratory tests and diagnosis of leukemia.*

Keywords: Diagnosis; Treatment plan; Patient; Pericoronitis; Palpaitis

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INTRODUCTION

The medical science achieves its aims by diagnosing diseases, and treating and preventing them. This branch of science relies on a wide spectrum of other branches, including physics, biology, social sciences, engineering and human sciences [1]. Currently, given the spread of various diseases, the correct diagnosis of diseases is one of the most important principles of the medical science and the medical science aims to use knowledge-based technologies and deductive reasoning to solve clinical problems [2].
In the medical profession, the physicians use clinical judgment to evaluate their patients for the diagnosis, treatment and prevention of disease. During the clinical work-up, usually the history-taking procedures, physical examination, preparation of the list of problems and differential diagnosis, analyses (including laboratory tests, imaging procedures etc.), determination of diagnosis and finally treatment are carried out. Currently, ever-increasing advances in science and significant expansion of the medical field and man's knowledge about diseases have

resulted in specialization of medicine and its division into different branches. In the clinical work-up, a specific sequence should be followed for different activities [3].

The relationship between the patient and physician beings with the evaluation of the patient's medical history and ongoing problem, followed by an interview between the patient and physician. After examination for the signs and an interview for the symptoms of the disease, the physician might order medical tests or prescribe medications or other treatments. In this context, preparation of a list of differential diagnoses is useful so that similar diseases can be ruled out based on the data available.

There is almost the same trend in dentistry for the diagnosis and treatment of the patients' problems, consisting of the chief complaint; the reason for visiting the dentist, including the symptoms that are registered with the patient's own words, along with their duration of incidence; the description of the disease and the current complaint; the sequence of events; the disease signs and further explanations for them; the medications the patient is taking, including over-the-counter drugs and home remedies plus alternative medicine drugs and herbal dugs; the medical history, including other concomitant medical conditions; a history of hospitalization, traumas, previous infectious diseases or vaccinations; a history of known allergies; dental history, consisting of all the previous dental treatments and all the ensuing problems; social history, including the birth place, the residence, marital status, socioeconomic status and habits (including diet, the drugs taken or being taken at present, smoking and use of alcohol); a family history, consisting of a list of diseases in the family, which might affect the patient; re-evaluation of the systems; a set of questions which might not have been asked of the patient during history-taking procedures; questions on all the main body systems (heart, lungs, digestive system, urinary system, etc.); and physical examination to identify disease signs, during which the patient explains the disease symptoms, with the signs being detected by the dentist [4,5].

The decision-making process consists of the analysis of data above to reach a single list of differential diagnosis. During this process the physician thinks about what is necessary to reach a definitive diagnosis and chooses a correct path to prepare a proper treatment plan [6]. Treatment planning consists of preparing a rational sequence of plans for treating the patient, which should result in the resolution of disease symptoms and comfort, esthetic appearance and chewing function for the patient. The clinician can use the data collected from the patient's clinical evaluation, history and diagnostic tests to make a distinction between patients and healthy individuals and to reach a definition diagnosis. This ability is the key to one of the differences in opinions between experts and beginners and indicates the importance of correct and purposeful education [7].

Despite the importance of treatment planning, less attention has been paid to this issue in the dental curriculum. Evaluation of 70 dental schools in the United States and Canada in 1984 showed that the majority of these schools did not offer proper treatment planning and data collection courses. In addition, a study in 1989 showed that there was no specific distinction between the diagnosis of dental problems and treatment planning [8].

A rational treatment plan has a gradual initial stage and one alternating stage so that it reaches a stage at which it solves the problems that worry the patient, including pain and infection. In the next stage, the disease, such as dental caries and periodontal problems, is dealt with and the tooth is restored and reconstructed [9].

The majority of dental professors believe that the treatment plan is indispensable for the education of students and provision of dental services [10]. Despite its importance, treatment planning has received inadequate attention in the dental literature [11,12]. A study on the dental treatment planning of patients showed that despite the access of 94% of dental students to the patients' full data, only 81% of the students were able to present a correct treatment plan for the patients.

A literature review showed that no study to date has been carried out based on case presentation, patient description and treatment planning. Therefore, the aim of the present study was to evaluate the ability of postgraduate and undergraduate dental students in Kerman Faculty of Dentistry to reach a diagnosis and prepare a treatment plan for patients.

EXPERIMENTAL SECTION

The study was designed as a retrospective cross-sectional study with the ethical code of IR.kmu.ac.ir.1394.127. The study was approved by the Institutional Human Research and Ethics Committee of Kerman University of medical sciences, Kerman, Iran.

Seven questions were prepared by three oral medicine specialists for the purpose of this analytical cross- sectional study. The questions covered the most common conditions that a dentist might encounter in his/her career. Then the 7 questions were re-evaluated and confirmed by 7 oral medicine specialists, endodontists and periodontitis. After the final correction and applying the opinions of the specialists, the final questionnaire was submitted to 10 general dental practitioners and 10 undergraduate dental students who were asked to read the questions and express their

opinions if there were any ambiguities in understanding the questions. One question was removed based on their opinions and 6 questions remained on the final questionnaire. To carry out the study, the Faculty's Education Office was referred to and the list of all the undergraduate and postgraduate students entering the university in 2009 and 2010 was prepared. The questionnaire was submitted to the subjects who were asked to complete it and hand it in. The aim of the study was explained to each subject and if they were willing to take part in the study, the questionnaire was submitted to them. In addition, all the subjects were reassured that the data on the questionnaire would be kept confidential and would only be used for statistical analyses. Since the questionnaires were expected to evaluate the subjects' knowledge and clinical decision-making, they were collected almost 15 minutes after they were submitted to the subjects. In addition, the subjects' demographic data, including age, gender and the year they began their studies were recorded. Data were analyzed with SPSS 18, using t-test, regression analysis and ANOVA. Statistical significance was set at $P<0.05$.

RESULTS AND DISCUSSION

In the present study, 168 questionnaires were distributed and 131 questionnaires were returned (a response rate of 77%). Forty-two postgraduate and 89 undergraduate students participated in this study. A total of 32 and 99 subjects were male and female, respectively, with a mean age of 24.5±5.7 years and an age range of 23–39 years. To evaluate the questionnaire, the questions were first evaluated separately and then based on correct responses.

Question 1. A 24-year-old woman refers to the clinic, complaining of severe pain in the area of tooth #8 on the lower left side, which began 6 days previously. The pain aggravates during chewing and when the patient opens her mouth. There is no history of any known systemic condition. The patient is pregnant in her third semester (her second pregnancy). There is halitosis at mouth opening when the patient is clinically examined. The gingiva distal to tooth #8 is inflamed, red, swollen and tender to percussion. Probing was not possible due to the severe pain and tenderness.

A. Diagnosis: correcto response (pericoronitis)

B. Which radiographic examination do you order? correct response (periapical radiographic examination of mandibular tooth #8)

C. What is the treatment plan? correct response (symptomatic and palliative treatment)

A total of 94% of the subjects in this study provided a correct response in relation to diagnosis. However, 2.6% had mentioned gingival inflammation and infection, 0.9% pyogenic granuloma, 1.6% irreversible pulpits and 0.9% semi-impacted wisdom tooth.

In relation to radiography, 49.6% of the participants had provided a correct response, with 31.3% panoramic radiography requests, 17.4% no need for radiography and 1.7% had responded they did not know.

In relation to treatment, 67% of the participants had provided a correct response. Other suggested treatment modalities consisted of root canal therapy (2.6%), tooth extraction (24.3%), referral to a periodontist (0.9%) and surgical removal of the infected tissue (5.1%).

Table 1 shows the percentage and frequency of the correct response to question 1 in terms of gender and the students' levels (undergraduate or postgraduate)

Table 1: The students' responses absolute and relative frequency to Questions 1, 2, 3

Number	Question	Correct response	Correct		No correct	
			N	%	N	%
1	Diagnosis	Pericoronitis	123	94	8	6
	Which radiographic examination do you order?	Periapical radiographic examination of mandibular tooth#8	65	49.6	66	50.4
	What is the treatment plan?	symptomatic and palliative treatment	88	67.2	43	32.8
2	Carious teeth	Restoration of the teeth	128	97.4	3	2.7
	Tooth #8 on the lower right side	Extraction	129	98.2	2	1.8
	Edentulous spaces	Replacement of the lost teeth based on the patients' condition, with a bridge or implants	122	93.1	9	7
3	Diagnosis	Occlusal trauma and reversible pulpitis	68	52.2	63	47.8
	Treatment plan	Elimination of the premature contact, follow-up of the patient for 2 weeks, and if the symptoms of sensitively to cold do not subside, placement of a new restoration with a proper base, follow-up of the patient for another 2 weeks, and if the pain and sensitivity persist during chewing and precession, root canal treatment of the tooth	35	27	96	73

Question 2. A 57-year-old woman refers to you to replace her lost teeth. The patient has had her right maxillary #3 and #4 teeth extracted almost 2 year ago and now the edentulous space is visible when she speaks or smiles, which bothers her. Her medical history is noncontributory and intraoral examination reveals moderate oral hygiene, with calculus and marginal gingivitis on the lingual aspect of all her anterior lower teeth. The lower tooth #5 on the left and teeth #6 and #7 on the right have been restored and her upper left teeth #6 and #7 exhibit Cl II caries; her right upper teeth #3 and #5 and lower left tooth #8 have been extracted. Radiographic examination shows a deep carious lesion in toot #8 on the lower right side and intraoral examination reveals a probing pocket depth of 8 m on the distal aspect of this tooth.
Treatment plan for:
A. Carious teeth: correct response (restoration of the teeth)
B. Tooth #8 on the lower right side: Correct response (extraction)
C. Edentulous spaces: correct response (replacement of the lost teeth based on the patients' condition, with a bridge or implants).
In relation to treatment, 97.4% of the participants had provided a correct response (restoration of the teeth) with 1.8% suggesting crowns and 0.9% suggesting extraction. In relation to the treatment of tooth #8, 98.2% of the respondents had provided a correct response (tooth extraction), with 0.9% suggesting no need for treatment and 0.9% suggesting consultation with a periodontist. The treatments suggested for the edentulous space consisted of partial prosthesis or implant (93.1%), crown (5.2%) and replacement without mentioning the type of replacement (1.7%). Table 1 presents the frequencies and percentage of correct response to question 2 in terms of gender and student educational status (undergraduate or postgraduate).

Question 3. A 24-year-old man, complaining of a tooth restoration carried out the previous week, refers to your office (Figure 1). The tooth in sensitive to cold. The patient says when he drinks or eats something cold, he experiences a severe toothache which lasts for a few seconds. In addition, the tooth in sensitive when he chews on it. Intraoral examination shows a Cl II cavity restored with amalgam in tooth #5 on the maxillary right side. Articulation paper reveals a shining spot on amalgam, indicating premature contact. All the teeth on the right side of the maxilla respond normally to cold test, except for tooth #5, which exhibits a radiating pain for 2–3 seconds. In addition, all the teeth on the right side of the maxilla mount a normal response to a pulp tester, except for tooth #5 which is a little hyper-reactive (exhibiting a value less than normal). In addition, the tooth is sensitive to percussion.
A. Diagnosis: correct response (occlusal trauma and reversible pulpitis)
B. Treatment plan: correct response (elimination of the premature contact, follow-up of the patient for 2 weeks, and if the symptoms of sensitively to cold do not subside, placement of a new restoration with a proper base, follow-up of the patient for another 2 weeks, and if the pain and sensitivity persist during chewing and precession, root canal treatment of the tooth)
The responses provided by the respondents in relation to the diagnosis were as follows: irreversible pulpitis (19.1%), reversible pulpitis (20%), occlusal trauma (32.2%), pulp involvement (2.6%), deep caries (3.5%) and acute apical abscess (19.1%).

Figure 1: shining spot on amalgam of tooth caused by occlusal trauma and reversible pulpitis (Question 3)

In relation to the treatment plan, 27% of the participants suggested elimination of the premature contact, follow-up and RCT, with 67% suggesting elimination of the premature contact and 3.5% suggesting replacing the restorations. Table 1 presents the frequency and percentage of correct response to question 3 in terms of students' gender and educational status (undergraduate and postgraduate).

Question 4. A 44-year-old woman presents, with a swelling on her face (Figures 2 and 3). The swelling began 2 day previously and before it, the patient had a severe throbbing pain on the right side of her mandible. The patient explains that she had a toothache on the right side of her mandible. The patient has malaise now, with a slight fever. Extraoral examination reveals a swelling on the right side of the face, which is sensitive to palpation, has hard consistency and is a little warm. The mandibular teeth #5 and #6 on the right side mount a normal response to the cold test; however, the mandibular tooth #7 on the right side does not respond to the cold test. In addition, teeth #5 an #6 on the lower right side mount a response to the pulp tester at a range of 3–5, but tooth #7 do not respond to power 8 of the tester. Tooth #7 on the right side of the mandible is very sensitive to percussion and palpation and other teeth on this side exhibit no sensitivity.

A. Diagnosis: correct response (pulpal necrosis)

B. Treatment plan: correct response (access cavity preparation for drainage, root canal irrigation, calcium hydroxide intracanal medicament in association with prescription of antibiotics). In relation to diagnosis, the responses were as follows: pulpal necrosis (76.5%), cellulitis (11.3%), irreversible pulpitis (7%), reversible pulpitis (0.9%) and infection (0.9%). In relation to treatment plan, the responses consisted of drainage, antibiotics, RCT (92.7%), tooth extraction (6.4%), drainage, irrigation and use of calcium hydroxide intracanal medicament (0.9%). Table 2 presents the frequency and percentage of correct response to question 4 in terms of students' gender and educational status (undergraduate and postgraduate).

Table 2:The students' responses absolute and relative frequency to Questions 4, 5, 6

Number	Question	Correct response	Correct		No correct	
			N	%	N	%
4	Diagnosis	Pulpal necrosis	100	76.5	31	23.5
	Treatment plan	Access cavity preparation for drainage, root canal irrigation, calcium hydroxide intracanal medicament in association with prescription of antibiotics	121	92.7	10	7.3
5	Which radiographic examination do you order?	Panoramic	119	91.2	11	8.8
	Which laboratory tests do you order?	ALP, P, Ca, Anti HIV, FB, ESR and CBC	0	0	131	100
6	What other questions do you ask the patient during history taking?	Questions in relation to spontaneous bleeding of the nose, unusual bruises on the skin and body surfaces, a history of bleeding disorders in close relatives, use of anticoagulants such as aspirin, a history of weight loss in recent weeks	36	27.8	95	72.2
	What is your treatment plan?	A request for CBC test and consolation with a hematologist if necessary	65	49.6	66	50.4

Figure 2: Swelling in the face (Question 4)

Figure 3: Tooth affected by pulpal necrosis (Question 4)

Question 5. A 32-year-old woman refers to the clinic, complaining of tooth mobility since 4 months previously. The patient complains of a taste of pus and blood in her oral cavity and halitosis. Intraoral examination reveals widespread grade II mobility of posterior teeth and grade III mobility of anterior teeth. The probing pocket depths range from 3 to 5 mm; in addition, widespread plaque is observed on all the teeth.

A. Which radiographic examination do you order? Correct response (panoramic view)

B. Which laboratory tests do you order? Correct response (ALP, P, Ca, Anti HIV, FB, ESR and CBC)

In relation to radiography, the responses were as follows: 91.2% (panoramic view), 6.1% (periapical), 2.7% (bitewing plus periapical).

The list of laboratory tests is presented in Table 3, in association with their frequencies and percentages. Table 2 presents the frequency and percentage of correct response to question 5 in terms of students' gender and educational status (undergraduate or postgraduate).

Table 3: The students' responses absolute and relative frequency to laboratory tests (Question 5)

Laboratory test	N	%
FBS, CBC, Ca, ALP, VITC, AntiHIV	3	2.2
FBC,PT, PTT, CBC	26	19.8
Ca, CBC	6	4.5
CBC, ALP, PTH,TSH, FBS	16	12.2
FBS	5	3.8
CBC	35	26.7
DNA, PCR	1	0.7
CBC, FBS, HIV	17	12.9
P, Ca, ALP, HIV, CBC	7	5.3
Ca, P	10	7.6
TIBC, SI, ALP, CBC	15	11.4
HIV	5	3.8

Question 6. A 34-year-old man complaining of spontaneous bleeding of the gums refers to your office. Bleeding began almost 3 months previously and is exacerbated after eating hard foods and tooth brushing. The patient has not had any gingival bleeding previously. Patient examination reveals halitosis and the tooth grooves are brown in color. Periodontal examination reveals widespread gingival enlargement in association with spontaneous bleeding after examination with a probe. The patient exhibits malaise and has a slight fever.

A. What other questions do you ask the patient during history taking? correct response (questions in relation to spontaneous bleeding of the nose, unusual bruises on the skin and body surfaces, a history of bleeding disorders in close relatives, use of anticoagulants such as aspirin, a history of weight loss in recent weeks)

B. What is your treatment plan? Correct response (a request for CBC test and consolation with a hematologist if necessary)

The responses provided by the participants in relation to "other questions" consisted of the following: diseases and use of medications (47%), bruises and nose bleeding (25.2%), oral hygiene habits (4.3%), hematologic disorders and leukemia (2.6%) and a history of infections and weight loss or gain (0.9%). Almost half of the subjects (49.6%) had provided a correct response in relation to the treatment plan and other responses consisted of the following: consultation with a physician and oral hygiene instructions (4.7%), treatment for ANUG (6.7%), oral hygiene procedures and scaling (14.8%), use of mouthwashes, metronidazole and ibuprofen (12.6%), tooth extraction (3.3%), referral to a periodontist (1.7%) and gingival surgery (16.4%). Table 3 presents the frequency and percentage of correct response to question 6 in terms of students' gender and educational status (undergraduate and postgraduate).

Evaluation of correct responses in this study showed that the mean score of all the responses was 8.5 of 14 (a range of 0–14). No significant relationship was detected between the overall score and variables such as gender, educational status and the year the student entered the university (Table 4).

Table 4: Correlation between characteristics demographic and score of correct responses

Characteristics	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Sex	0.147	0.482	0.043	0.304	0.762
Age	-1.249	1.523	-2.765	-0.185	0.149
Education level	0.725	1.841	0.174	0.394	0.695
Education Year	0.031	0.346	-0.038	-0.089	0.929

This study evaluated diagnosis and treatment plans suggested by undergraduate and postgraduate dental students based on case reports. Evaluation of correct responses in this study showed a mean score of 8.5 out of 14 for correct responses, which is considered relatively good. No significant relationship was detected between the total score and variables such as age, gender and educational status.

Treatment planning is a process of compilation and consists of a rational sequence of therapeutic interventions to eliminate disease and restore patent's comfort, esthetic and function of the masticatory system. This plan directs the successful referral scheme of the patients, which is an important aspect of clinical dentistry and education in the curriculum of dental schools [13-15]. Despite the importance of treatment planning, inadequate attention has been

focused on it in dental literature. A survey in 70 dental schools in the United State and Canada in 1984 showed that the majority of dental schools offer preclinical treatment planning. This survey also showed that in the mid-1980s, there was no definite distinction between the diagnosis of oral and dental diseases and treatment planning. The treatment planning processes in the dental schools shows that they are very similar to each other. Usually, the dental schools screen patients before assigning them to students and the students are expected to complete the programming process based on a comprehensive treatment plan [16].

The results of the present study showed that 94% of the participants had provided a correct response in relation to the diagnosis of pericoronitis; in relation to the radiographic examination requested, 49.6% had provided a correct response, with 31.3% requesting panoramic views, 17.4% suggesting no radiographs and 1.7% choosing "I do not know". In addition, 67.1% of the participants had provided a correct response in relation to treatment.

The term pericoronitis is made up of 3 Greek combing forms of peri- (around), corona- (crown) and -itis (inflammation) and means an inflammation around the crown of a tooth. The diagnosis of this condition relies on clinical symptoms and signs in a clinical evaluation. Three methods are available for the treatment of pericoronitis, depending on the severity of the condition: 1) management of pain and elimination of inflammation; 2) a minor surgery of the gingival tissue; 3) extraction of the tooth. To manage pain, it is possible to administer acetaminophen or ibuprofen and if there is swelling or fever, oral antibiotics such as amoxicillin or erythromycin should be prescribed. When a decision is made to preserve the tooth, a minor surgery is carried out to remove the inflamed gingival tissue. However, in some cases the gingival tissue grows again, creating the same problem. In rare cases, the symptoms are so severe due to the rapid development of infection that the patient is managed in the operating room [17,18].

In relation to the treatment plan for carious teeth and edentulous spaces, 97.45% of the participants had provided a correct response for carious teeth (restoration of the teeth). The treatment modalities suggested for the edentulous spaces consisted of partial prostheses or implants (93.1%), crowns (5.3%) and replacements without mentioning the type of replacement (1.7%).

Different treatment modalities can be used, depending on the number of teeth lost or the severity of tooth destruction. Generally, there are three prosthetic treatments: removable, fixed and implant-supported prostheses. As the name implies, removable prostheses consist of treatments in which the prostheses are removable and the patients can remove them from the oral cavity. These prostheses in turn consist of two types: complete and partial. Complete prostheses are the well-known full dentures that are fabricated after the loss of all the teeth in one jaw or both jaws and the elderly usually wear such dentures. If an individual loses a number of his/her teeth, partial dentures are used, which are known as removable plaques and are retained by the remaining teeth with the use of metallic retainers. The major disadvantage of such prosthetic appliances, apart from being removable and the relevant problems, is their inability to prevent resorption of the remaining bone; therefore, these appliances lose their retention sooner or later and become loose, requiring impression taking and correction. Meanwhile, these appliances require special care and should be removed from the oral cavity during night. Fixed prostheses are the most commonly used treatment modalities all over the world to replace two or three lost teeth in situations in which the neighboring teeth are present. In addition, fixed appliances are the principal treatment modality to replace destroyed teeth that cannot be restored with the use of conventional restorative techniques. The major disadvantage of such treatment modality is the preparation of intact teeth and many patients do not accept such an option [19].

The responses provided by the participants in relation to the treatment of patients with reversible pulpitis consisted of eliminating premature restoration contacts, patient follow-up and RCT or elimination of premature contacts and replacing the restoration.

In relation to the diagnosis of the dental abscess, the responses provided by the participants consisted of pulpal necrosis (76.5%), cellulitis (11.3%), irreversible pulpitis (7%), reversible pulpitis (0.9%) and infection (0.9%) and the treatment plan consisted of drainage, RCT and antibiotics (92.7%), tooth extraction (6.4%), drainage, irrigation and use of intracanal calcium hydroxide (0.9%).

If the dental pulp cannot defend itself after being infected with bacteria, the odds of abscess formation are very high at root apex. Such infections will reach the gingival tissue from the root apex, causing swelling and severe pain. Usually treatment is more complicated in such a condition and in some cases it might be necessary to extract the tooth. The most common symptoms and signs of an abscess consist of fever, a feeling of pain at mastication, bad breath, discomfort, malaise, gingival redness and swelling in the upper and lower jaws. If the tooth pulp becomes necrotic due to infection, the pain disappears. However, this does not mean that the infection has resolved. The infection is active and will spread, destroying tissues. There are various reasons for dental abscesses; one of the most common reasons is that when the carious lesion or cavity becomes large enough to reach the pulp cavity, an inflammatory reaction is initiated in the tooth. When the pulp becomes necrotic, the infection spreads from the tooth to the periodontal ligament and the underlying bone undergoes abscess formation. In most cases, if measures are

taken to resolve infection in the initial stages, it might be possible to save the necrotic tooth. In any form of abscess, the pulp chamber is affected negatively and cannot recover from the injury. When the blood supply is cut off, the nutrition source is destroyed and the pulp becomes necrotic rapidly

Dentists examine their patients' teeth with a special tool. If the tooth is abscessed, when the dentist examines it, the patient feels pain. In addition, the dentist asks the patient whether or not he/she has severe pan when he/she chews something or closes the mouth hard. Furthermore, if the gums are red and swollen, the dentist believes that the tooth is abscessed. In addition, dentists order radiographs to evaluate bone destruction around the abscess

To eliminate infection, the abscess should be drained, which is carried out through the tooth or by endodontic treatment. This procedure is also recommended to eliminate any root tissue after resolution of the infection. In addition, the tooth might be extracted so that drainage is carried out through the tooth socket. Finally, the third technique is to drain the abscess through the swollen gingival tissue. Antibiotics are prescribed to eliminate infection to decrease the patient's pain and discomfort due to the abscessed tooth, and irrigation is carried out with warm solution; use of analgesics such as ibuprofen is recommended [20,21].

Carious lesions that affect the dental pulp pose the patients to the greatest risk and if they are not treated, they result in pulpal necrosis and involvement of periradicular tissues in association with pain and discomfort. With the progression of caries and advancement of infection toward the dental pulp, immune and defensive reactions are mounted in the pulp. At this stage, the tooth might respond to usual stimuli but the pain may disappear when the stimuli are removed. In such a situation, the pulp is affected by reversible pulpitis and the effective treatment consists of removal of caries, elimination of stimuli and permanent restoration of the tooth. Sharp and deep pain after dinking very cold drinks, too, indicates reversible pulpitis. When the tooth is affected by reversible pulpitis, a sharp, short and intermittent pain is felt when the tooth is exposed to heat.

The reason for pulpal irritation might be a deep cavity, fracture, recent dental procedures or trauma. If the tooth does not recover in two weeks or if the situation exacerbates and sensitivity to cold persists or even when it is sensitive to liquids at room temperature, it is possible that there is a fracture or irreversible pulpitis and the tooth cannot recover, necessitating RCT.

If the tooth is not treated when it has reversible pulpitis, caries will progress to reach the pulp. At this stage, the microorganisms or their products enter the pulp and the patient will clinically have spontaneous pain or pain is triggered by a stimulus; however, it does not disappear after the stimulus is removed and persists. In irreversible pulpitis pulpal necrosis, the delayed pain due to heat is long and continues for more than 1 minute and is associated with throbbing, indicating the necrosis of soft tissues and abscess formation. Both situations are serious and require immediate intervention. Pain on mastication or percussion might indicate possible trauma or fracture. In cases in which there is severe pain, an abscess might be present. In addition, a premature contact on a restoration or a crown might simulate these symptoms and signs, which are easily eliminated by a dentist. The results of the present study showed that almost none of the participants were aware of the complete list of laboratory tests necessary for a patient with tooth mobility.

Tooth mobility might have different reasons, including trauma, orthodontic treatment, periodontal diseases, Down syndrome, diabetes, AIDS, Papillon-Lefèvre syndrome, hypophosphatasia, hyposphatemia and dentin dysplasia[22]. It is obvious that the tests requested in such conditions should focus on these reasons.

In relation to the patient who had referred with a complaint of spontaneous bleeding of the gums, the suggested questions to be asked were about the use of medications and diseases, bruises and nose bleeding, observation of personal hygiene, blood disorders, leukemia, a history of infection, and weight loss or gain. Almost half of the subjects (49.6%) had provided a correct response in relation to the treatment plan and some had suggested tooth extraction (3.3%) and gingival surgery (16.4), which are noteworthy.

This study showed that in general the participants gained more than half of the total score, which is higher than that achieved in dental schools in the United States [23] and in general, the participants were better in suggesting proper treatment compared to diagnosis.

This study showed that the participants provided more correct answers and more appropriate treatments for questions on the diagnosis of pericoronitis and pulpitis and restorative and prosthetic treatment plans compared to cases such as tooth mobility or gingival bleeding, consistent with the results of a study carried out by Tokede et al [18]. Such a finding might be explained by some possible explanations. The first and possibly the most important reason is that due to the relatively easy process of the diagnosis of pericoronitis and its emergency nature, the participants had greater knowledge in this respect. This explanation is particularly probable because patients who complain of multiple problems or those with a large number of important and more technical explanations make it difficult for students to reach a correct diagnosis and prepare a proper treatment plan [24,25]. When an experienced clinician diagnoses routine cases, he/she normally uses scientific and deductive constructs that are usual processes for patients [26,27].

In relation to cases such as restoration or replacement treatments for the patients' teeth, the students archived the highest scores in relation to the diagnosis of partial edentulism and caries, which resulted in their better performance in selecting some diagnoses. In addition, the students were better in selecting a proper treatment pan compared to correct diagnosis. Studies have shown that an improvement in diagnostic abilities has positive effects on the treatment plan and the results of decisions [28].

CONCLUSION

The diagnostic and treatment planning procedures should consist of a comprehensive plan for all the patient's needs and problems. Determination of the sequence and classification of techniques in stages and/or treatments (prevention, disease control, emergency, reconstruction etc.) are important in the treatment of patients. Correct diagnosis and treatment consist of the use of judgment in the decision-making process. Use of the adjustment process for accurate decision-making results in correct diagnosis and treatment. This study indicates that although the score that obtained from diagnosis and treatment plan are approximately appropriate, but the students have little information to deal with systemic cases such as request laboratory tests and diagnosis of leukemia.

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