



Letter to Editor

Remineralization of Dentine using Nanoparticles: A New Era of Dentistry

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Dear Sir,

Remineralization is a process of restoring dissolved minerals that have been previously lost by the action of acids to tooth structure. It is a repair process for non-cavitated lesions and relies on calcium and phosphate ions supported by fluoride to reconstruct new surfaces on existing crystal remnants remaining after demineralization.

Aiming at strengthening and re-establish the function of the affected tissues and preventing a future loss of tooth structure. Compared with enamel, remineralization of dentine is more difficult due to less amount of residual mineral crystals and the rich presence of organic matrix, that consists of type I collagen fibrils, and non-collagenous extracellular proteins. Remineralization of the carious lesions could be possible and suggested by previous works based on the fact that cariogenic bacteria produce organic acids during the metabolism of fermentable carbohydrates such as lactic, acetic, formic and propionic, which dissolve the inorganic structure of dentine, leaving the collagen matrix unaffected. The unaffected collagen would serve as a scaffold for the deposition of minerals and would provide nucleation sites for remineralization that reinforce the matrix, and therefore allow the re-mineralization of the dentine. That way, more of natural tooth tissues would be retained since less dentine is removed during cavity preparation. Consequently, the structural integrity of the tooth and the pulp vitality are preserved. A part from the previous mentioned acids, there are other sources of acids that have great potential to cause demineralization such as gastric acid juice, which contains hydrochloric acid, and fruit juices and soft drinks. Different approaches using various materials have been used to enhance remineralization of dentine such as; fluoride-releasing restorative materials, artificial saliva solutions, calcium hydroxide, bioactive glass S53P4, resin infiltration technology, portland cement as a source of slow releasing calcium ions, sodium trimetaphosphate and saturated Ca(OH)_2 , casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) complexes.

Recently, the use of nanotechnology to promote the precipitation of nanoparticles within the dentine collagen matrix is becoming the focus of research in the field. Nanoparticles are functional materials or structures at the nanometer scale of approximately 0.1-100.0 nm, have spherical, cubic and needle-like surface characteristics. The nanoparticles provide superior antimicrobial activity with great physical properties that can be used to deliver antibiotics and bioactive components and hence can control the formation of cariogenic oral biofilms. The action of the nanoparticles is mainly attributed to their small size and high surface area enabling a greater presence of atoms on their surfaces, which provides maximum contact with the environment and releases high levels of ions. In addition, the surface charge, degree of hydrophobicity, and the ability of the nanoparticles to adsorb or be collected on the surface are desired properties for these particles. Nano-sized carbonated apatite (n-CAP), nano-hydroxyapatite (n-HAp) and zinc-carbonate/nanohydroxyapatite ($\text{ZnCO}_3/\text{n-HAp}$), calcium fluoride nanoparticles (CaF_2), calcium phosphate (CaPO_4) nanoparticles, carbonated-hydroxyapatite nano-crystals (CHA) and bioactive glass nanoparticles seem to be capable to increase the mineral content of enamel and dentine and demonstrate promising results. A significant challenge with the use of these nano-materials is to achieve an effective and deep infiltration of the demineralized dentine collagen with nanoparticles without precipitation on the surface. Nowadays, there is growing research interest in using nanoparticles in the field of restorative dentistry as a filler component in restorative materials and showed promising results such as bioactive glass and silica nanoparticles. It has been demonstrated that silica nanoparticles have the ability to infiltrate and remain embedded in the dentine collagen matrix, and hence considered as one of the materials that have the potential to enhance dentine remineralization, as well as block the dentinal tubules for treating the dentine hypersensitivity.

Best regards,

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Original Article

Evaluation of Intern Students Knowledge of Complete Denture Impression Practice in Benghazi University

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ABSTRACT:

Objectives: The aim of treatment with complete denture is to restore function and esthetics and maintain patient health. Making an accurate impression is a very critical factor for success or failure of the complete dentures. The aim of this study is to evaluate the knowledge of intern dental students about procedures followed in impression practice for complete denture construction in the city of Benghazi.

Materials and method: This descriptive cross-sectional study was done amongst dental intern students in Benghazi city, Libya. A total of 120 students were selected randomly. A survey was conducted through a printed standard questionnaire with 13 multiple-choice questions, only 81 questionnaires returned. Data from the completed questionnaires were collected and analyzed, the statistical analysis was done using SPSS statistical software version 23 (SPSS, IBM, Armonk, NY, USA).

Results: Low knowledge scores were found regarding the final impression material, the tray fabrication steps (spacer and relieve holes) and the timing of previous denture discontinuation prior to the primary impression step. Also, a low level of knowledge was found regarding the stage of posterior palatal seal establishment. The scores for all the questions were calculated and tabulated; the scores 1,2 and 3 are low knowledge (57%), good knowledge (43%) and excellent knowledge 0% respectively.

Conclusion: The percentage of low knowledge level was significantly higher than expected, as observed in the overall results indicating that there are procedures and information about complete denture impression practice that remains unknown to the interns, which influence the denture satisfaction of the patient. Changes in the undergraduate education system to focus on these aspects may facilitate the interns to gain more knowledge regarding complete denture impression procedures especially final impression.

Keywords: *knowledge, impression, technique, intern, final, primary.*

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INTRODUCTION:

The main aim of treatment with complete denture is to restore function and esthetics and maintain patient health¹. Making an accurate impression is a critical factor for either success or failure of the complete

denture. A primary impression is made with an irreversible hydrocolloid (alginate) in a stock perforated tray and a final impression is recorded using a custom tray, usually made of acrylic resin. According to clinical preferences there are many materials for the

final impression like zinc oxide and eugenol (ZOE) paste, poly-sulphide rubber, polyether, polyvinylsiloxane and alginate. Application of the simplified technique should be restricted to well-formed and moderate edentulous foundations, since modification of stock metal trays to conform to resorbed or excessively flabby edentulous ridges will be difficult^{2,3}. An abbreviated impression technique help to decrease the number of patient appointments, without increasing the number of adjustment or relining procedures⁴.

The teaching process in Benghazi university involves theoretical part which covers primary and final impression materials and techniques used in complete denture construction for patients with well-developed dental arches and also patients with compromised foundations like resorbed, knife-edge and flappy ridges. The practical part in the clinic involves the practice with alginate and impression compound (cake) as primary impression materials according to the presence of bony undercuts, stock metal trays are used in this step which should be perforated with use of alginate material and non-perforated with impression compound. Special trays are constructed on study cast with light or self-cure acrylic resin without spacer and stoppers because ZOE is the most commonly used material when there is no undercut, perforations are not made in this technique. Special tray with spacer and stopper will be constructed when elastomeric impression material is used due to the presence of undercut, the mechanism of adhesion of the material to the tray usually depends on perforating special tray more than using adhesive. The aim of this study was to evaluate the knowledge of intern dental students about procedures followed in impression practice for complete denture construction at the faculty of dentistry in Benghazi university.

MATERIALS AND METHODS: A descriptive cross-sectional study was conducted amongst dental intern students in Benghazi, Libya. A total of 120 students were selected randomly. A survey was conducted through a printed standard questionnaire with 13 multiple-choice questions regarding the materials and techniques used in impression practice and the questionnaire was scored according to the impression technique school followed by removable prosthodontic department in Benghazi university. Data from the

returned 81 completed questionnaires were collected and analyzed, the statistical analysis was done using SPSS statistical software. This work carried out under the approval of institutional ethical committee (0154) in university of Benghazi, Libya.

RESULTS: Dental students' knowledge, attitudes, and practice of steps followed in complete denture were well reflected in the study's specific sample (dental students), 81 interns of both sexes and 23-25 years old were enrolled in the current study. The percentage of various scores for each question was calculated and tabulated. The following results were the implications of the scores 1 and 2 (low knowledge, excellent knowledge). (**Table.1**) (**figure.1**)

Diagnosis of an edentulous patient all the intern students included in this study (100%) were taking patient history and performing oral examination.

impression making: 36(44.4%) of the intern students were asking the patients to discontinue the use of previous denture 48-72 hours before making an impression, 30(37%) less than 48 hours, and 15(18.5%) No discontinuation of the previous denture. Many intern students in our study 58 (71.6%) were using Irreversible hydrocolloid for making a primary impression, 17(21%) were using Impression compound, and 6(7.4%) were using Putty elastomeric impression material. In this study 76(93.8%) of the students were making final impression for complete denture fabrication, while 5 (6.2%) were not.

Custom tray fabrication: The percentage of the intern students whose giving tissue stop while custom tray fabrication were 61(75.3%), and the reminder 20(24.7%) were not giving tissue stop.

The material that many of our intern student were using 57(70.4%) for custom tray fabrication was light cure resin material, 19 (23.5%) were using self-cure resin material, 3(3.7%) were using shellac base plate, only one student was using vacuum forming sheet, and one student was using the old denture as custom tray.

Border molding and final impression: 78(96.3%) were performing border molding prior to final impression, while 3(3.7%) were not.

The material used to carry out border molding procedure prior to final impression by the majority of

our intern students 69 (85.2%) was Low fusing compound (green stick), 8(9.9%) were using elastomeric impression material, 3 (3.7%) were using low self-cure resin, and one student was using zinc oxide eugenol impression paste.

Taking the final impression: 45(55.6%) of the intern students were using Zinc oxide eugenol impression paste, at the same time 32 and 39 intern students were making relieve holes and providing spacer while they

using zinc oxide eugenol as a final impression material respectively , 27(33.3%) were using elastomeric impression material, at the same time 20 and 21 of the intern students whose using elastomeric impression material as final impression were making relieve holes and providing spacer respectively. 8(9.9%) were using Irreversible hydrocolloid, only one student was using tissue conditioners as final impression material.

Table 1: Sample Questionnaire

Questions	Excellent knowledge (the right answer)	Low knowledge (other than the right answer)
1.Before starting with the complete denture fabrication procedure, do you take the patient's case history and perform oral examination?	81 (100%)	0
2 .How much time before making an impression do you ask the patient to discontinue the use of previous denture ?	34 (42%)	47 (58%)
3 .Which material do you use for making a primary impression ?	59 (72.8%)	2(27.2%)
4 .Do you make a final impression for a complete denture?	76 (93.8%)	5(6.2%)
5 .Do you give tissue stop while fabricating the custom tray ?	61(75.3%)	19 (23.5%)
6 .Which material do you use for fabrication of custom tray ?	57(70.4%)	24(29.6%)
7 .Do you carry out border molding procedure ?	78 (96.3%)	3(3.7%)
8 . Which material do you use to carry out border molding procedure prior to final impression ?	69(85.2%)	12(14.8%)
9.Which material do you use for making the final impression ?	ZOE45(55.5%) Elastomeric27(33.3%)	9(11.1%)
10. Do you provide a spacer while fabricating a custom tray?	Elastomeric 21(25.9%)	ZOE 39(48.1%)
11. Do you make relief holes in the custom tray before making the wash impression?	Elastomeric 20 (24.6%)	ZOE 32 (39.5%)
12 .At what stage do you establish the posterior palatal seal ?	22(27.2%)	59(72.8%)
13. Which agent do you use for disinfecting the impression?	56(69.1%)	25(30.9%)

In the Primary impression stage many of the intern students 32(39.5%) did establish the posterior palatal seal, 25(30.9%) on the master cast stage, 22(27.2%) at the border molding stage, two of our students were not specific regarding posterior palatal seal

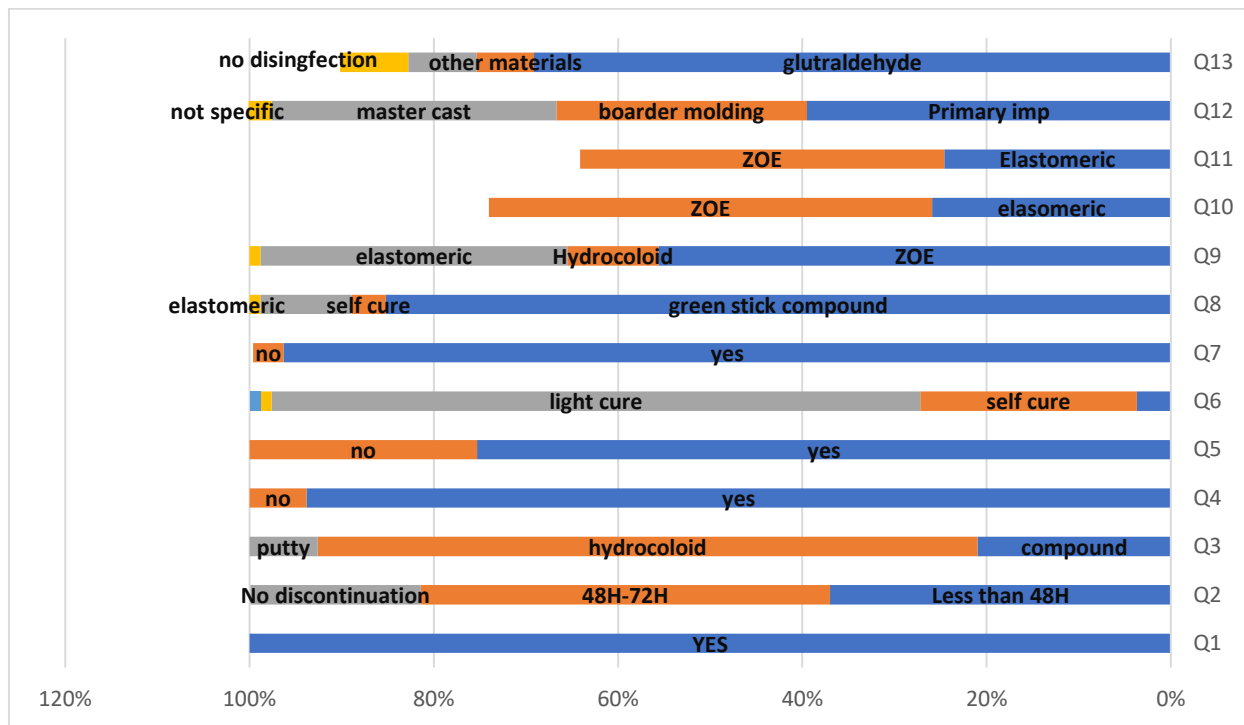


Figure 1: The bar chart shows percentage of interns against respective questions

disinfecting the impression: 56(69.1%) of the intern student were using Glutaraldehyde material for disinfection of their final impression prior sending it to the technician, 5(6.2%) were using Iodophors, 6(7.4%) were using Chlorine compounds, 8(9.9%) were using Phenolics, and 6(7.4%) were not disinfecting their impressions. Comparatively examining the outcomes, the intern's Low knowledge scores was found regarding the final impression material and the tray fabrication steps (spacer and relieve holes)

also the timing of previous denture discontinuation prior to the primary impression step, A low level of knowledge was found in the stage of posterior palatal seal establishment.

various scores for all of the questions was calculated and tabulated. the scores 1,2 and 3 (low knowledge and good knowledge and excellent knowledge respectively). The percentage of individual scores obtained were 57%, 43%, 0% . (Figure 2)

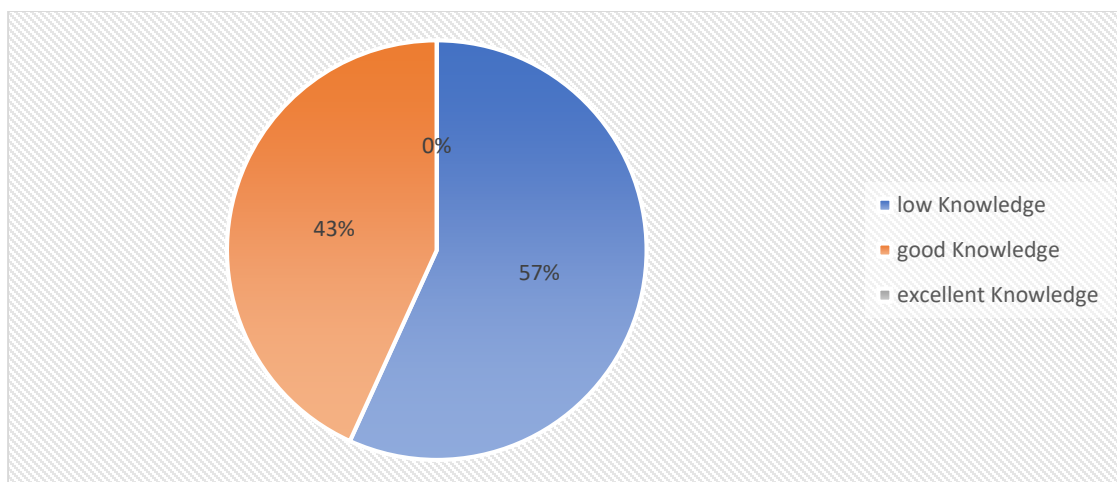


Figure2: Percentage of individual scores

DISCUSSION:

Patients who need replacement dentures require a detailed history, clinical examination, and panoramic radiograph that may reveal findings in edentulous arches like: retained root fragments, impacted teeth, foreign bodies, radiolucencies, radiopacities, mental foramina at or near the crest of the residual alveolar ridge, and maxillary sinus pneumatization and approximation to the crest of the residual alveolar ridge^{5,6}. Examination of the degree of muscular activity and the region of denture extension without displacement is important for selection of impression technique⁷. All the intern students included in this study (100%) were taking patient history and were performing oral examination, 44.4% of the intern students were asking the patients to discontinue the use of previous denture 48-72 hours before making an impression, 37% less than 48 hours, 18.5% No discontinuation of the previous denture.

Impression materials are divided into non-elastic or elastic, non-elastic materials are rigid when set and therefore exhibit very little elasticity and any significant deformation to the impressions results in permanent deformation, impression compound and Zinc-oxide eugenol are examples of rigid non-elastic impression material⁸⁻¹⁰. Primary impressions for dentures are made most commonly with alginate material which is

inexpensive and can produce impressions with reasonable surface details but it has poor dimensional stability, poor tear strength, distortion if unsupported, requires good mixing otherwise air bubbles result, and minimum 3mm thickness required. Primary impressions for complete dentures, border molding of trays can be made with impression compound, the impression can be reheated and modified. It is muco-compressive, good for full impressions with no flabby ridge, it should be avoided with deep undercuts as it is very rigid, it has poor dimensional stability and poor reproduction of surface detail⁸⁻¹⁰. The corrective technique for making the preliminary impression is quick, simple and reliable, in which the defects of the primary impression with compound can be corrected with the use of alginate, the impression compound provides better support for the alginate impression material, and the under extended borders in the impression compound are corrected in the alginate impression hence it can also be called as "corrective primary impression technique". The over-extended areas of the compound impression can be identified, marked and corrected in the custom tray¹¹. 71.6% of intern students in our study were using irreversible hydrocolloid for making a primary impression, 21% were using impression compound, and 7.4% were using Putty elastomeric impression material.

The main objective in custom tray construction is to provide a rigid tray for retention of the impression

material and offering distinct clinical accuracy compared to the stock tray. Dimensional changes due to polymerization of elastomeric impression materials are proportional to the thickness of the material, a uniform thickness of material can be achieved by designing and using custom tray, therefore dimensional accuracy and stability can be provided¹²⁻¹⁴. The wax spacer which is used directly under the visible light-cured resin material may leave a wax residue remaining in the tray causing contamination that may interfere with adhesion of elastomeric impression materials to the impression tray leading to distortion in the impression. Therefore, tray surface should be cleaned using boiling water, pressurized steam or a wax remover. Burnishing tin foil over the wax spacer may be recommended to avoid this contamination¹⁵. The retention of impression material to the tray during removal of the set impression from the oral cavity is necessary, adhesion between impression material and tray can be improved by perforating or roughening of the custom tray surface with tungsten carbide burs and application of adhesive solutions for at least 15 minutes^{16,18}. In this study 93.8% of the students were making final impression for complete denture fabrication, while 6.2% were not. 75.3% of the intern students said that custom tray fabricated with spacer and tissue stops, and the reminder 24.7% did not use spacer and tissue stops. According to the followed school for making final impression in Benghazi university custom tray should be made with spacer and stoppers only if elastomeric impression material was used.

The material that many of our intern student were using 70.4% for custom tray fabrication was light cure resin material, 23.5% were using self-cure resin material, 3.7% said that they were using shellac base plate, only one student was using vacuum forming sheet, and one student was using the old denture as custom tray.

The conventional method that uses modelling plastic impression compound and zinc oxide eugenol impression paste is the most popular materials used for complete denture impression because of their fast setting, reproducing fine details, easy handling and having no significant dimensional changes subsequent to hardening, but its short manipulation time that it hardens quickly in the mouth and does not remain in a plastic stage till the functional movements are completed^{16,17}. Elastomeric impression material has

been recommended for border molding and final impressions as it can be used for single step border molding using putty and it accurately records the fine details during final impression using light body. polyvinylsiloxane putty and light-body impression material are well suited for making complete denture impressions especially in the hands of an inexperienced operator^{17,18}. In this survey 78(96.3%) were performing border molding prior to final impression, while 3(3.7%) were not. The material used to carry out border molding procedure prior to final impression by the majority of our intern students 69 (85.2%) was Low fusing compound (green stick), 8(9.9%) were using Elastomeric impression material, 3 (3.7%) were using low self-cure resin, and one student was using zinc oxide eugenol impression paste. for making the final impression 45(55.6%) of the intern students were using Zinc oxide eugenol impression paste, at the same time 32 and 39 intern students were making relieve holes and providing spacer while they using zinc oxide eugenol as a final impression material respectively , 27(33.3%) were using Elastomeric impression material, at the same time 20 and 21 of the intern students whose using elastomeric impression material as final impression were making relieve holes and providing spacer respectively. 8(9.9%) were using Irreversible hydrocolloid, only one student was using Tissue conditioners as final impression material.

Glutaraldehyde is called chemo-sterilizer, it is a high level disinfectant because it is a broad spectrum chemical agent with fast killing capability, it can destroy all types of micro-organisms including bacterial and fungal spores, tubercle bacilli and viruses. It is a colorless liquid with pungent odor. It has many health hazards including irritation to skin, eyes and respiratory tract^{19,20}.

In this study 69.1% of the intern student said that Glutaraldehyde material is ideal for disinfecting final impression prior sending it to the technician, 6.2% said that Iodophors are better for disinfecting, 7.4% of students said Chlorine compounds are used , 9.9% of them support using Phenolics, and 7.4% were not disinfecting their impressions.

CONCLUSION: The percentage of low knowledge level was significantly higher than expected as observed in the overall results indicating that there are procedures and

information about complete denture impression practice that remains unknown to the interns which influence the denture satisfaction of the patient. Changes in the undergraduate education system to focus on these aspects may facilitate the interns to gain more knowledge of complete denture impression procedures especially final impression.

REFERENCES:

1. Aisha Zakaria Hashem Mostafa, Sarab Muzil Alanazi, and Samaher Mohammad Almarshedy Custom double tray for a special impression technique for flabby maxillary residual ridge: Case report. National Library of Medicine. 2022 Mar; 10(3): e05593.
2. Abree NS, Fleck S, Askinas SW. The results of a brief survey of complete denture prosthodontic techniques in predoctoral programs in North American dental schools. *J Prosthodont* 1998; 5: 219-225.
3. Hyde TP, McCord JF. Survey of prosthodontic impression procedures for complete dentures in general practice in the United Kingdom. *J Prosthet Dent* 1999; 51: 295-299.
4. Duncan JP, Taylor TD. Teaching an abbreviated impression technique for complete dentures in an undergraduate dental curriculum. *J Prosthet Dent* 2001; 85: 121-125.
5. Emad Ahmed Awad, Ayman Al-Dharab. Panoramic radiographic examination: a survey of 271 edentulous patients. *Int J Prosthodont*. 2011 Jan-Feb;24(1):55-7.
6. A Pinar Sumer, Mahmut Sumer, Ahmet Umut Güler, Işıl Biçer. Panoramic radiographic examination of edentulous mouths Quintessence Int. 2007 Jul-Aug;38(7):399-403.
7. S. Winkler, Essentials of Complete Denture Prosthodontics, AITBS, New Delhi, India, 2nd edition, 2009.
8. Martins F, Branco P, Reis J, Navarro I and Mauricio P. Dimensional stability of two impression materials after a 6-month storage period. *Acta Biomater Odontol Scand*. 2017(3): 84-91.
9. Sears AW. Hydrocolloid impression technique for inlays and fixed bridges. *Sci Educ Bull*.1970(3): 55-62.
10. Wassell RW, Barker D and Walls AWG. Crowns and other extra-coronal restorations: Impression materials and technique. *Br Dent J*. 2002(192): 679-90.
11. Aquaviva Fernandes, Neha Dua and Manisha Herekar. Corrective Primary Impression Technique. *The Open Dentistry Journal*. 2010;4:27-28.
12. Gordon GE, Johnson GH, Drennon DG. The effect of tray selection on the accuracy of elastomeric impression materials. *J Prosthet Dent*.1990;63:12-15.
13. Eames WB, Sieweke JC, Wallace SW, et al. Elastomeric impression materials: effect of bulk on accuracy. *J Prosthet Dent*.1979;41:304-307.
14. Thongthammachat S, Moore BK, Barco MT II, et al. Dimensional accuracy of dental casts: influence of tray material, impression material, and time. *J Prosthodont*. 2002;11:98-108.
15. Johnston JF, Phillips RW, Dikema RW. Modern Practice in Crown and Bridge Prosthodontics. 3rd ed. Philadelphia, Pa: WB Saunders Co; 1971:181.
16. Maruo Y, Nishigawa G, Oka M, et al. Tensile bond strength between custom tray and elastomeric impression material. *Dent Mater J*.2007;26:323-328.
17. Abdullah MA, Talic YF. The effect of custom tray material type and fabrication technique on tensile bond strength of impression material adhesive systems. *J Oral Rehabil*. 2003;30:312-317.
18. Cho GC, Donovan TE, Chee WW, et al. Tensile bond strength of polyvinyl siloxane impressions bonded to a custom tray as a function of drying time: Part 1. *J Prosthet Dent*. 1995;73:419-423.
19. Merchant VA, Kay McNeight M, James Ciborowski C, Molinari JA. Preliminary investigation of a method for disinfection of dental impressions. *J. Prosthet. Dent*; 1984;52(6):877-9.
20. Gorman SP, SCOTT EM, Russell AD. Antimicrobial activity, uses and mechanism of action of gluteraldehyde. *J. Appl. Microbiol*.1980; 48(2):161-90.



Original article

Clinico-pathological analysis of Odontogenic Tumors over 28-year-period in Benghazi, Libya

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ABSTRACT:

Background: Odontogenic tumors (OTs) are rare lesions that unique to the jaws constituting about < 1% of all oral tumors. They are a complex group of heterogeneous behavior that range from tumor like lesions, benign tumors to malignant neoplasms with potential to metastases.

Aim of study: To describe the relative incidence of odontogenic tumors (According to World Health Organization classification 2022) at Oral Pathology Department in Benghazi and compare the finding with the literatures.

Methods: A retrospective study of 106 OTs was documented for the demographic data. Statistical analysis was carried out by software SPSS.

Results: OTs constituted 1.2% of all diagnosed oral lesions with 97% of them were benign tumors. Ameloblastoma was the most common type (37.7%) followed by odontomas (24.5%). The peak incidence was around the third decade with male: female ratio 1:1.12. mandible was the most common site (64%).

Conclusion: OTs are relatively uncommon lesions among our sample that is similar to other literatures with some variations.

Keywords: *Odontogenic tumors, retrospective study, incidence, World Health Organization classification, Benghazi.*

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INTRODUCTION:

Odontogenic tumors (OTs) are uncommon lesions that are unique to the gnathic bones. They are accounted for < 1% of all oral tumors.^{1, 2} From a biological point of view, the majority of these lesions are benign neoplasms and some exhibit malignant behavior with metastatic capacity, while the rest represent as hamartomas lesions.¹

Odontogenic tumors can be originated either from the odontogenic epithelium such as dental lamina, reduced enamel epithelium, rests of Serres or rests of Malassez, or from odontogenic mesenchymal tissues such as dental follicle, dental papilla, pulp or periodontal ligament, or from both.³ Several classification schemes based on the origin of the tumor have been devised.⁴ The first histological typing of OTs "histological typing of OTs" was published by the

World Health Organization (WHO) in 1971 and was reviewed and updated in 1992 and 2005.⁵

In 2017, the WHO updated the classification to reclassify the "keratocystic odontogenic tumor" and "calcifying cystic odontogenic tumor" as odontogenic cysts. Furthermore, primordial odontogenic tumors were included as mixed tumor and cemento-ossifying fibroma as mesenchymal tumors. In addition, the fibro-odontoma was included as a benign variant of the odontoma.⁶ Recently, the 5th edition of the World Health Organization classification was available online (Table 1). The most important update was adding Adenoid ameloblastoma as a new entity to the epithelial odontogenic neoplasms.⁷

Retrospective studies have been conducted around the world that reported variable geographic distribution. These variations are attributed to the high cultural and genetic diversity.^{8, 9} Knowledge of the clinical presentation of OTs and their epidemiology are necessary to understand the characteristics and behaviour of these lesions and can be valuable in developing a clinical differential diagnosis.^{6, 10}

This study aims to investigate the frequency and distribution of histologically diagnosed odontogenic tumors at the department of oral pathology in Benghazi, and compare data with the literatures.

Table 1: 2022 WHO classification of odontogenic tumors

Benign epithelial odontogenic tumors	Benign mesenchymal odontogenic tumors
Adenomatoid odontogenic tumor	Odontogenic fibroma
Squamous odontogenic tumor	Cementoblastoma
Calcifying epithelial odontogenic tumor	Cemento-ossifying fibroma
Ameloblastoma, unicystic	Odontogenic myxoma
Ameloblastoma, extraosseous/peripheral	
Ameloblastoma, conventional	
Adenoid ameloblastoma	
Metastasizing ameloblastoma	
Benign mixed epithelial & mesenchymal odontogenic tumors	Malignant odontogenic tumors
Odontoma	Sclerosing odontogenic carcinoma
Primordial odontogenic tumor	Ameloblastic carcinoma
Ameloblastic fibroma	Clear cell odontogenic carcinoma
Dentinogenic ghost cell tumor	Ghost cell odontogenic carcinoma
	Primary intraosseous carcinoma, NOS
	Odontogenic carcinosarcoma
	Odontogenic sarcomas

METHODS:

The archival records of the oral pathology department- University of Benghazi were revised retrospectively from January 1990 to December 2018. A total of 106 cases were diagnosed as OTs during this period. The histopathological diagnosis was based on 2022 WHO histopathologic classification.

All collected cases were reviewed and analyzed for the demographic features including, age of patient, gender, tumor location, and histopathological type. This study was taken out with permission from the institutional authorities. Statistical analysis was carried out using SPSS.

RESULTS:

A total of 106 OTs cases were diagnosed from 1990 to 2018 which constituted 1.2 % of all registered biopsies (8995 diagnostic samples). Of the cases 103 (97%) were benign OTs while only 3 cases were diagnosed as malignant OTs (Table 2).

Ameloblastoma was the most frequently diagnosed odontogenic tumor 40 (37.7 %) followed by odontoma 26 (24.5%) and adenomatoid odontogenic tumors 10 (9.4%). Male to female ratio of all registered OTs was 1:1.12 (table2).

Table 2: Relative frequency and gender distribution of Odontogenic Tumors 1990-2018

Diagnosis	No.	%	Male No(%)	Female No(%)	M: F Ratio
AME	40	37.7	25 (62.5)	15 (37.5)	1.6:1
AOT	10	9.4	4 (40)	6 (60)	1 : 1.5
CEOT	5	4.7	2 (40)	3 (60)	1 : 1.5
OD					
compound OD (12)	26	24.5	10 (38.5)	16 (61.5)	1 : 1.6
complex OD (13)					
OM	7	6.6	4 (57.1)	3 (42.9)	1.3 : 1
OF	4	3.8	2 (50)	2 (50)	1 : 1
CB	1	0.9	-	1 (100)	0 : 1
AF	2	1.9	2 (100)	-	1 : 0
COF	8	7.5	-	8 (100)	1 : 0
AC	3	2.8	1	2	1:2
Total	106	100	50 (47.2%)	56 (52.8%)	1:1.12

AME=Ameloblastoma, AOT=Adenomatoid odontogenic tumor, CEOT=Calcifying epithelial odontogenic tumor, OD=Odontoma, OM= Odontogenic myxoma, OF= Odontogenic fibroma, CB=Cementoblastoma, AF=Ameloblastic fibroma, COF= Cemento-ossifying-fibroma, AC=Ameloblastic carcinoma.

The peak incidence of OTs was in the third decade. Patient age ranged widely between 5 -75 with a mean age of 26.51 years. Age was not reported in two cases. (table 3)

Of a total of 106 lesions in our series, the location was reported in 103 cases. The mandible showed the highest prevalence with overall 66 cases (64%) while 35 cases of OTs (34%) were identified in the maxilla (Mandible: maxilla ratio was 1.9:1). Only two cases (1.9%) were found peripherally in the gingiva. (table 4).

According to ameloblastoma, unicystic type comprised 21 cases (53.8%), multicystic variant were

17 (43.6%), with only one case (2.6 %) of peripheral ameloblastoma. The histological pattern of one case was not specified (Figure 1). Male to female ratio was 1.6:1 and the mean age of occurrence was (30.88) (Tables 2- 3). Regarding the site, the posterior mandible was the most affected site (71.4%) (Figure 2). Regarding odontoma (26 cases), 13 cases were diagnosed as complex odontoma and 12 cases were identified as compound odontoma. Male to female ratio was (1:1.6) with the mean age of 17.56 years. The percentage of occurrence in the mandible and maxilla were (60%), (40%) respectively (tables 2-3 and 4)

Table 3: Age group distribution of Odontogenic tumors by life decade

Diagnosis	Age Range	Mean Age (SD)	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79
AME (40)	13-75	30.88± 13.48	-	8	12	11	6	1	1	1
AOT (10)	10-30	17.9± 6.19	-	7	3	-	-	-	-	-
CEOT(5)	5-70	45± 27.99	1	-	-	-	-	2	-	1
OD (26)	9-40	17.56±7.67	2	15	7	-	1	-	-	-
OM (7)	11-55	24.57±14.89	-	4	1	1	-	1	-	-
OF (4)	20-56	35.5±15.17	-	-	1	2	-	1	-	-
CB (1)	00	00	-	-	-	1	-	-	-	-
AF (2)	6-15	10.50±6.36	1	1	-	-	-	-	-	-
COF (8)	9-60	32.5±16.16	1	-	2	3	-	1	1	-
AC (3)	22-50	31.67±15.89	-	-	2	-	-	1	-	-
Total (106)	5-75	26.65±14.53	5	35	28	18	7	7	2	2

Table 4: Site distribution of Odontogenic tumors 1990-2018

tumor type	Mandible No, %	Maxilla No, %	Gingiva No, %
AME (39)	34 (87.2 %)	4(10.3%)	1(2.6%)
AOT (10)	1(10%)	9(90%)	-
CEOT (4)	-	4(100%)	-
OD (25)	15(60%)	10(40%)	-
OM (7)	4(57.1%)	3 (42.9%)	-
OF (4)	1(25%)	2(50%)	1(25%)
CB (1)	1(100%)	-	-
COF (8)	6(75%)	2(25%)	-
AF (2)	1(50%)	1(50%)	-
AC (3)	3(100%)	-	-
Total (103)	66 (64%)	35 (34%)	2 (1.9%)

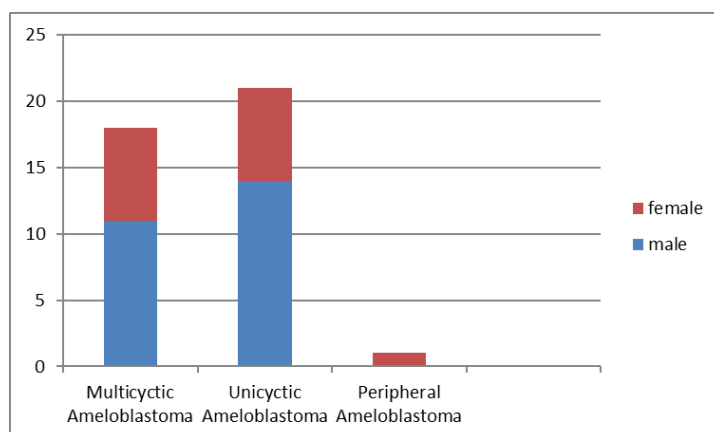


Figure (1): the frequency of histological types of ameloblastoma with gender predominance

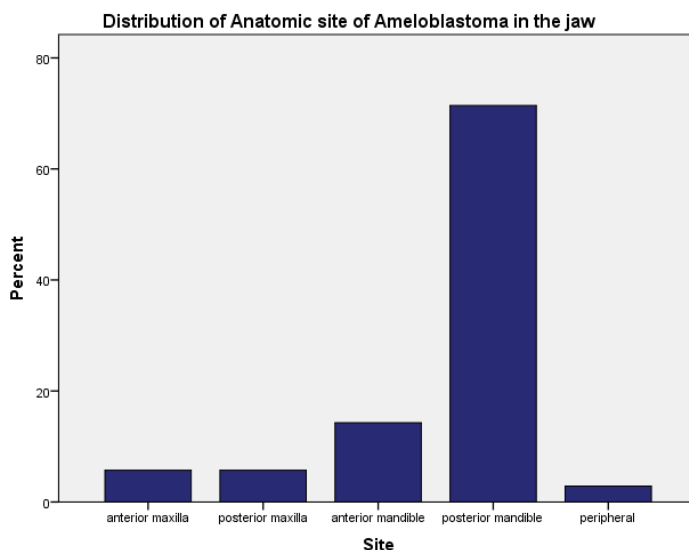


Figure (2): distribution of anatomical sites of ameloblastoma in the jaws

DISCUSSION:

Odontogenic tumors are relatively uncommon lesions with diverse clinical and histopathological features that are derived from tooth forming tissue.^{11, 12} This study was done in Benghazi University to document the prevalence of odontogenic tumors.

The relative frequency of OTs in our sample was 1.2% of the total biopsied specimens recorded in Oral Pathology Department in Dental faculty of Benghazi University in a period between 1990 to 2018. This low

frequency is similar to those reported in other studies,^{1, 13-17} while higher incidence was conducted by some researchers.^{11, 18-21}

This data confirms that benign tumors are the most frequently seen (97%) while malignant OTs representing only (3%) that in agreement with the previous literatures.^{6, 8, 15, 22-25}

We have observed predominance of OTs in female (52.8%) more than male (47.2%) with male: female ratio 1:1.12 that are corroborating in other studies.^{6, 9,}

11, 14, 26, 27 However, the male predilection conducted by other researchers.^{11, 18, 28, 29}

The peak incidence of OTs was in the third decades with the mean age of 26.51 years. This result was similar to that found in the other literatures.^{11, 16, 18, 21, 27, 30-33} Less mean age less than a decade was shown by some authors.^{23, 25} A remarkable preference for mandible was documented (64%) which concurs with other papers.^{1, 6, 9, 11, 13, 15-19, 34}

Ameloblastoma was by far the most frequent tumor in this data with percentage (37.7%). This is concordance with many studies.^{6, 11, 13, 19, 26, 35} The second most common tumor was odontoma (24.5%) and this was similar to a result reported by Silva et al.⁶ However, this differs from the previous papers which considered Ameloblastoma and odontogenic Keratocyst were more frequent.^{1, 5, 21, 28, 32, 36, 37} The explanation for this marked variations was the WHO 2005 classification which classified OKC as Odontogenic tumors.

Of all ameloblastoma cases, 53.8% were unicystic type, 43.6% were multicystic variant while the peripheral ameloblastoma only constituted 2.6%. These results are similar to a study done by Filipe, et al.¹⁴ Most studies showed that multicystic type was the most frequent type.^{1, 6, 18, 26, 38}

Ameloblastoma was more common in mandible (87.2%) than maxilla (10.3%). This result was in agreement with previous studies.^{8, 21, 26, 33, 39} The peak incidence of ameloblastoma was 30.88 which is consistent with other studies.^{40, 41} The occurrence of tumors in a younger age group was observed in other reports.^{9, 11, 15, 16, 21, 32} In this research, ameloblastoma was shown male predilection (62.5%) compared with female (37.5%) in support of recent studies.^{1, 9, 11, 15, 18, 32}

Regarding odontoma, the peak of incidence was in the second decade that seems similar to previous reports.^{15, 21, 33} Moreover, similar male to female ratio (1:1.6) was documented by Chrysomali et al.¹ Some studies reported equal distribution in the mandible and maxilla.^{1, 33} However, in this sample higher percentage was noticed in the mandible.

AOT represented the third most common tumor in our data (9.4%), similar percentage was pointed out by the literature taken out in India.⁴² while slightly lower percentage reported by Sharma et al.⁴³

In 2017, WHO classification recognized COF as odontogenic tumor⁶ that was the cause of missing data about it in the most previous studies. In our data, 8 cases were reported (7.5%) representing the fourth common odontogenic tumor.

The odontogenic myxoma was reported as the third most common tumor by de Medeiros et al.⁶ and the second one in other publications^{11, 25, 31}. However, in

our sample it represented the fifth common tumor (6.6%).

In this sample, 5 and 4 cases were reported as CEOT and odontogenic fibroma respectively. The less frequent tumors were ameloblastic carcinoma (3 cases), ameloblastic fibroma (2 cases) and cementoblastoma (one case).

CONCLUSION:

With the comparison with previous study, we found some variations in the profile of incidence and prevalence of the OTs and this due to different changes and updates among WHO classification. Moreover, the geographic variations and study design also play a crucial role in the epidemiology. The present study reflects not only the differences in the distribution of OTs but also similarities among the previous population samples assessed around the world.

To sum up, our data documented the odontogenic cases in Benghazi and was compared with previous literatures. Epidemiological studies are important because they allow to know more precisely the occurrence of these lesions in the diverse population, which help to identify the groups at risk with a view of the most common clinical features related to them.

REFERENCES:

1. Chrysomali E, Leventis M, Titsinides S, Kyriakopoulos V, Sklavounou A. Odontogenic tumors. *Journal of Craniofacial Surgery*. 2013;24(5):1521-5.
2. El-Naggar AK, Chan JK, Grandis JR. WHO classification of head and neck tumours 2017.
3. Cawson RA, Odell EW. Cawson's essentials of oral pathology and oral medicine e-book: Elsevier Health Sciences; 2017.
4. Wright JM, Tekkesin MS. Odontogenic tumors: where are we in 2017? *Journal of Istanbul University Faculty of Dentistry*. 2017;51(3 Suppl 1):S10.
5. Sharma PN, Ranka RK, Chaudhary MS, Gawande MN, Hande AH, Zade PF. Odontogenic tumors: A review of 93 cases in the Vidharba region of Maharashtra. *Journal of Oral and Maxillofacial Pathology: JOMFP*. 2020;24(1):185.
6. da Silva L-P, Pinto L-P, de Souza L-B. Clinicopathological analysis of odontogenic tumors over 22 years period: experience of a single center in northeastern Brazil. *Medicina oral, patologia oral y cirugia bucal*. 2018;23(6):e664.
7. Soluk-Tekkesin M, Wright JM. The World Health Organization Classification of Odontogenic

Lesions: A Summary of the Changes of the 2022 (5 th) Edition. Turkish Journal of Pathology. 2022;38(2):168-84.

8. Sekerci A-E, Nazlım S, Etoz M, Deniz K, Yasa Y. Odontogenic tumors: a collaborative study of 218 cases diagnosed over 12 years and comprehensive review of the literature. *Medicina oral, patologia oral y cirugia bucal*. 2015;20(1):e34.

9. Avelar RL, Antunes AA, Santos TdS, Andrade ESdS, Dourado E. Odontogenic tumors: clinical and pathology study of 238 cases. *Revista Brasileira de Otorrinolaringologia*. 2008;74:668-73.

10. Regezi JA, Sciubba JJ, Jordan RC. Oral pathology: clinical pathologic correlations: Elsevier Health Sciences; 2016.

11. Jing W, Xuan M, Lin Y, Wu L, Liu L, Zheng X, et al. Odontogenic tumours: a retrospective study of 1642 cases in a Chinese population. *International journal of oral and maxillofacial surgery*. 2007;36(1):20-5.

12. Philipsen HP, Reichart PA. Classification of odontogenic tumours. A historical review. *Journal of oral pathology & medicine*. 2006;35(9):525-9.

13. da Silva L-P, Serpa M-S, Jefferson-da-Rocha Tenório G-J, do Nascimento F, de Souza-Andrade E-S, Veras-Sobral A-P. Retrospective study of 289 odontogenic tumors in a Brazilian population. *Medicina oral, patologia oral y cirugia bucal*. 2016;21(3):e271.

14. Jaeger F, de Noronha MS, Silva MLV, Amaral MBF, Grossmann SdMC, Horta MCR, et al. Prevalence profile of odontogenic cysts and tumors on Brazilian sample after the reclassification of odontogenic keratocyst. *Journal of Cranio-Maxillofacial Surgery*. 2017;45(2):267-70.

15. Osterne RLV, de Matos Brito RG, Alves APNN, Cavalcante RB, Sousa FB. Odontogenic tumors: a 5-year retrospective study in a Brazilian population and analysis of 3406 cases reported in the literature. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*. 2011;111(4):474-81.

16. da-Costa DOP, Mauricio AS, de-Faria PAS, da-Silva LE, Mosqueda-Taylor A, Lourenço SQC. Odontogenic tumors: a retrospective study of four Brazilian diagnostic pathology centers. *Medicina oral, patologia oral y cirugia bucal*. 2012;17(3):e389.

17. Koivisto T, Bowles WR, Rohrer M. Frequency and distribution of radiolucent jaw lesions: a retrospective analysis of 9,723 cases. *Journal of endodontics*. 2012;38(6):729-32.

18. Luo H-Y, Li T-J. Odontogenic tumors: a study of 1309 cases in a Chinese population. *Oral oncology*. 2009;45(8):706-11.

19. Elarbi M, El-Gehani R, Subhashraj K, Orafi M. Orofacial tumors in Libyan children and adolescents. A

descriptive study of 213 cases. *International journal of pediatric otorhinolaryngology*. 2009;73(2):237-42.

20. Mamabolo M, Noffke C, Raubenheimer E. Odontogenic tumours manifesting in the first two decades of life in a rural African population sample: a 26 year retrospective analysis. *Dentomaxillofacial Radiology*. 2011;40(6):331-7.

21. Siriwardena B, Tennakoon T, Tilakaratne W. Relative frequency of odontogenic tumors in Sri Lanka: Analysis of 1677 cases. *Pathology-Research and Practice*. 2012;208(4):225-30.

22. Mosqueda-Taylor A, Ledesma-Montes C, Caballero-Sandoval S, Portilla-Robertson J, Rivera LMR-G, Meneses-García A. Odontogenic tumors in Mexico: a collaborative retrospective study of 349 cases. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*. 1997;84(6):672-5.

23. Ochsenius G, Ortega A, Godoy L, Peñafiel C, Escobar E. Odontogenic tumors in Chile: a study of 362 cases. *Journal of Oral Pathology & Medicine*. 2002;31(7):415-20.

24. Santos JN, PEREIRA PINTO L, Figueredo CRLVd, Souza LBd. Odontogenic tumors: analysis of 127 cases. *Pesquisa Odontológica Brasileira*. 2001;15:308-13.

25. Fernandes AM, Duarte ECB, Pimenta FJGS, Souza LN, Santos VR, Mesquita RA, et al. Odontogenic tumors: a study of 340 cases in a Brazilian population. *Journal of oral pathology & medicine*. 2005;34(10):583-7.

26. Saghravanian N, Jafarzadeh H, Bashardoost N, Pahlavan N, Shirinbak I. Odontogenic tumors in an Iranian population: a 30-year evaluation. *Journal of oral science*. 2010;52(3):391-6.

27. Goteti SH. Odontogenic tumors: A review of 675 cases in Eastern Libya. *Nigerian Journal of Surgery*. 2016;22(1):37-40.

28. Sriram G, Shetty RP. Odontogenic tumors: a study of 250 cases in an Indian teaching hospital. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*. 2008;105(6):e14-e21.

29. Johnson NR, Savage NW, Kazoullis S, Batstone MD. A prospective epidemiological study for odontogenic and non-odontogenic lesions of the maxilla and mandible in Queensland. *Oral surgery, oral medicine, oral pathology and oral radiology*. 2013;115(4):515-22.

30. Barnes L, Eveson JW, Sidransky D, Reichart P. Pathology and genetics of head and neck tumours: IARC; 2005.

31. Ladeinde AL, Ajayi OF, Ogunlewe MO, Adeyemo WL, Arotiba GT, Bamgbose BO, et al. Odontogenic tumors: a review of 319 cases in a Nigerian teaching hospital. *Oral Surgery, Oral*

Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2005;99(2):191-5.

32. Tawfik MA, Zyada MM. Odontogenic tumors in Dakahlia, Egypt: analysis of 82 cases. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2010;109(2):e67-e73.

33. Varkhede A, Tupkari JV, Sardar M. Odontogenic tumors: a study of 120 cases in an Indian teaching hospital. 2011.

34. Avelar RL, Primo BT, Pinheiro-Nogueira CB, Studart-Soares EC, de Oliveira RB, de Medeiros JR, et al. Worldwide incidence of odontogenic tumors. Journal of Craniofacial Surgery. 2011;22(6):2118-23.

35. Naz I, Mahmood MK, Akhtar F, Nagi AH. Clinicopathological evaluation of odontogenic tumours in pakistan-A seven years retrospective study. Asian Pacific journal of cancer prevention. 2014;15(7):3327-30.

36. Philipsen HP, Reichart PA. Revision of the 1992-edition of the WHO histological typing of odontogenic tumours. A suggestion. Journal of oral pathology & medicine. 2002;31(5):253-8.

37. Mosqueda Taylor A. New findings and controversies in odontogenic tumors. 2008.

38. Ebenezer V, Ramalingam B. A cross-sectional survey of prevalence of odontogenic tumours. Journal of maxillofacial and oral surgery. 2010;9(4):369-74.

39. Lawal AO, Adisa AO, Olusanya AA. Odontogenic tumours: A review of 266 cases. Journal of clinical and experimental dentistry. 2013;5(1):e13.

40. Lima-Verde-Osterne R, Turatti E, Cordeiro-Teixeira R, Barroso-Cavalcante R. The relative frequency of odontogenic tumors: A study of 376 cases in a Brazilian population. Medicina oral, patologia oral y cirugia bucal. 2017;22(2):e193.

41. Reichart P, Philipsen H, Sonner S. Ameloblastoma: biological profile of 3677 cases. European Journal of Cancer Part B: Oral Oncology. 1995;31(2):86-99.

42. Gupta B, Ponniah I. The pattern of odontogenic tumors in a government teaching hospital in the southern Indian state of Tamil Nadu. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2010;110(1):e32-e9.

43. Sharma PN, Ranka RK, Chaudhary MS, Gawande MN, Hande AH, Zade PF. Odontogenic tumors: A review of 93 cases in the Vidharba region of Maharashtra. Journal of Oral and Maxillofacial Pathology. 2020;24(1):185.



Original article

Multiple keratoacanthoma Involving Lower Lip: Case Report and literature review

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ABSTRACT:

Keratoacanthoma (KA) is a benign epithelial proliferative lesion which frequently occurs on the sun exposed areas of the skin. KA originates within the pilosebaceous apparatus of the skin, may be solitary or multiple and character by spontaneous resolution. Keratoacanthoma is believed to have a good prognosis despite its clinical and histological resemblance to well differentiated squamous cell carcinoma (SCC). The aim of this paper is to briefly review and discuss the literature about multiple keratoacanthoma involving the lower lip in a 67-year-old male.

Key Words: *Keratoacanthoma, multiple, lower lip, squamous cell carcinoma.*

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INTRODUCTION:

Keratoacanthomas (KA) are common cutaneous skin tumors originating from the hair follicles.¹ The lesions present typically as crateriform tumors and are more frequent in men.² Unlike squamous cell carcinoma (SCC), KA is a benign and regress spontaneously.³

The lesion occurs frequently on the sun exposed areas of face, neck, forearms that is predominantly found more in elder male individuals.^{4,5} Etiology of KA still remains obscure; however actinic rays, HPV, trauma, genetic factors and immunocompromised status have been implicated.^{2,4,6}

Clinically, KA may appear as a sporadic solitary lesion or as multiple lesions. Peak incidence occurs between the ages of 50 and 69 years, although the tumors have been reported in patients of all ages. Both sexes are about equally affected, although there is a slight predilection for males. Keratoacanthomas mainly develop on the face (lower lip, cheek, nose, and eyelid), neck, and hands. It appears as firm, roundish,

skin-colored or reddish papules that rapidly progress to dome-shaped nodules with a smooth shiny surface and a central crateriform ulceration or keratin plug that may project like a horn.

The clinical course of KA is an unusual one as it is a self-limiting lesion and undergoes spontaneous regression. It appears as an exophytic mass that exhibits rapid Growth over a few weeks to months. It develops in three phases: proliferative, mature, and involution. Rapid

growth occurs in the first stage.^{7,8} The second stage is characterized by stabilization and a regression of the tumor is observed in the third stage, leaving a scar with an area of depression.⁸

Histopathological features reveal a close resemblance to well-differentiated squamous cell carcinoma. Complete excision with a safety margin is the ideal treatment for KA.

CASE REPORT

A male patient aged 67 years was referred to oral diagnosis clinic at the department of oral pathology, oral medicine, diagnosis and radiology, faculty of dentistry, university of Benghazi for evaluation of an exophytic growth on the lower lip with one year duration. There was no associated history of previous local trauma. Patient is nonsmoker, medical history revealed diabetes mellitus on metformin tablets. Facial examination revealed well-demarcated multiple sessile exophytic nodular growth located at the junction of vermilion border and the mucosa of lower lip with brownish and blackish coloration. The lesions measured approximately 1.0 cm in its greatest diameter. The lesions were non-tender, firm with no discharge. Palpation of neck did not disclose any suspicious lymph nodes. The boundaries of the reported lesions were indurated.

An initial differential diagnosis of squamous cell carcinoma or keratoacanthoma. An incisional biopsy was performed under local anesthesia and the specimen was examined histopathologic- ally.

The histopathologic examination revealed a tumor made of neoplastic epithelial proliferation. The epithelial cells look benign and mature in general although some areas exhibited dyskeratotic changes. The underlying connective tissue is sharply demarked from the neoplastic epithelium and revealed mild chronic inflammatory cell infiltrate (Fig.2). At the periphery, basal cell nuclear hyperchromatism, conspicuous nucleoli, and cellular pleomorphism (Fig.3) were evident in the tissue sections.

The correlation among the history, clinical picture, and histopathological findings strongly suggested keratoacanthoma.



Fig. 1. Clinical photograph showing giant keratoacanthoma at time of presentation.

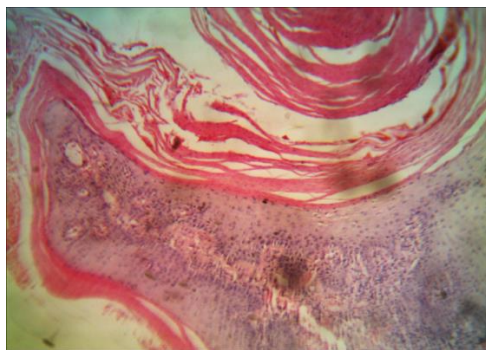


Fig. 2. Photomicrograph of histopathological features of keratoacanthoma showing a neoplastic epithelial proliferation with an evident epithelial lip, keratin-filled crater and stroma infiltrated with chronic inflammatory cell infiltrate. (Hematoxylin and eosin, x-400)

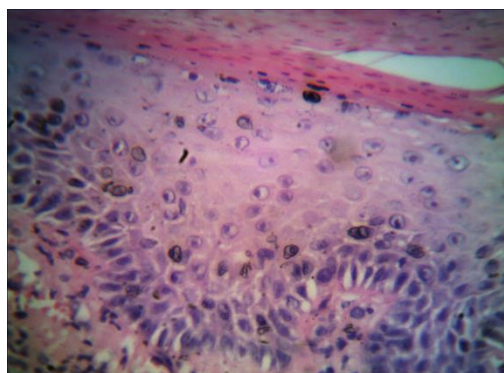


Fig. 3. Photomicrograph of keratoacanthoma showing epithelial dyskeratosis, basal cell nuclear hyperchromatism, conspicuous nucleoli, and cellular pleomorphism. (Hematoxylin and eosin, x.400).

DISCUSSION:

The first description of the 'crateriform ulcer of the face' was given by Jonathan Hutchinson in 1889,⁹ and since then many different synonyms like molluscum sebaceum, self-healing-epithelioma and keratocarcinoma have been used. In the 1940's, Freudenthal proposed the name keratoacanthoma (KA) to distinguish these lesions from squamous cell carcinomas.^{10,11}

Most keratoacanthomas occur on sun-exposed areas. The face, neck, and dorsum of the upper extremities are common sites, while truncal lesions are rare. The lesions are usually solitary but can be multiple, typically are solitary beginning as firm, roundish, skin-colored or reddish papules that rapidly progress to dome-shaped nodules with a smooth shiny surface and central crateriform ulceration or keratin plug that may project like a horn.

The exact etiology of keratoacanthoma is unknown. Exposure to ultraviolet light is the primary cause, however, several precipitating factors have been implicated are immune-compromised or immune-suppressed patients,¹² chemical carcinogens (tar, mineral oil, and cigarette smoking),¹³ trauma (body peel, carbon dioxide laser ablation),¹⁴ surgical scar human, genetic factors, papilloma virus (HPV specifically types 9, 11, 13, 16, 18, 24, 25, 33, 37, and 57).^{15,16} Recently, the association of keratoacanthoma with tattoos has been reported.^{17,18}

The clinical course of KA is usually typical of the lesion. Can be explained in three distinct clinical stages, which initiates as a 'proliferative stage' followed by a 'mature stage' and finally an 'involution stage'. It begins as nodule grows rapidly in size over a period of 4-5 weeks, remains static for another 4-8

weeks before undergoing spontaneous involution with the expulsion of keratin and complete resolution observed in the next 6-8 weeks period of time,¹⁸ leaving a scar with an area of depression.

The time course from origin to spontaneous involution takes about 4 to 6 months, leaving scar. However, some keratoacanthomas do not fit this pattern, and may be persist for a year or more before undergoing spontaneous resolution.¹⁹ As in our case the lesion persisted for almost one year

Although the KA usually appears as a solitary lesion, multiple tumors may be found and may be associated with various syndromes like Muir-Torre, xeroderma pigmentosum and nevus

sebaceous of Jadassohn.¹⁸ Other multiple lesion variants have also been described such as Ferguson Smith type and eruptive Przyborski type.²⁰

The distinction between keratoacanthoma and squamous cell carcinoma has been a matter of discussion since the first descriptions of this condition.²¹ Histopathological examination remains the gold standard for the distinction of squamous cell carcinoma and keratoacanthoma.^{22,23}

Cribier et al ²⁴ analyzed a large series of squamous cell carcinoma and keratoacanthoma to determine the reliability of common histopathological criteria that have been proposed as distinctive markers between these lesions. They showed that only 5 of 14 criteria are of a certain value in differentiating squamous cell carcinoma from keratoacanthoma. These criteria are: sharp outline between stroma and proliferation; epithelial lip; ulceration; pleomorphism or anaplasia; and mitoses. Keratoacanthomas typically progress through three clinical stages: a rapidly proliferating stage, a stable mature stage, and then a stage of involution. The entire process occurs from 4 to 9 months and may heal with a scar.¹⁸

Treatment:

KA generally heals spontaneously and leaves a scar. However, its rapid growth causes tissue destruction. Thus, the treatment of choice is complete surgical excision. ²⁵ Other methods have been described such as the use of cryotherapy, electro-dissection and curettage, radiotherapy, CO2 laser surgery, intra-tumor or topical treatment with 5-fluoracil, corticosteroid, and methotrexate.²⁶

CONCLUSIONS:

Keratoacanthoma is a benign of epithelial origin character a fast-growing lesion which regresses and confines spontaneously. It is character with unique clinical features but unfortunately makes it very similar to squamous cell carcinoma. A detailed study of histopathological features still remains the most recommended diagnostic feature.

REFERENCES:

1. Schwartz RA. Keratoacanthoma: a clinico-pathologic enigma. *Dermatol Surg.* 2004;30(2):326–33 (discussion 333).
2. Vergilis-Kalner IJ, Kriseman Y, Goldberg LH. Keratoacanthomas: overview and comparison between Houston and Minneapolis experiences. *J Drugs Dermatol.* 2010;9(2):117–21.
3. Mandrell JC, Santa Cruz D. Keratoacanthoma: hyperplasia, benign neoplasm, or a type of squamous cell carcinoma? *Semin Diagn Pathol.* 2009;26(3):150–63
4. Hardman FG. Keratoacanthoma on the lips. *Br J Oral Surg.* 1971; 9: 46-53.
5. Schwartz RA. Keratoacanthoma. *J Am Acad Dermatol.* 1994; 30:1-19; quiz 20-2.
6. De Visscher JG, Van der Wal JE, Starink TM, Tiwari RM, van der Waal I. Giant keratoacanthoma of the lower lip. Report of a case of spontaneous regression. *Oral Surg Oral Med Oral Pathol Oral RadiolEndod.* 1996; 81: 193-6.
7. Chauhan A, Chaudhary S, Agnihotri PG, Aadithya B. A solitary crateriform ulcer of the lower lip: a case report with review of literature. *Indian J Dermatol.* 2011 Jul;56(4):435-8.
8. Bansal M, Manchanda K, Pandey SS. Verrucous cell carcinoma arising from an underlying giant keratoacanthoma. *Int J Low Extrem Wounds.* 2012 Jun;11(2):85-7.
9. Hutchinson J. *Trans Pathol Soc London* 1889;40: 275–281
10. Musso L, *Proc R. Soc Med* 1950: 43: 838.
11. Miedzinski F. *Postepy Dermatol (Poznan)* 1990;7:61–70.7
12. Wagdy Dessoukey M, Omar M F, Abdel Dayem H. *J Am Acad Dermatol* 1997: 37: 478–480
13. Miot HA, Miot LD, da Costa AL, Matsuo CY, Stolf HO, Marques ME. Association between solitary

keratoacanthoma and cigarette smoking: a case-control study. *Dermatol Online J.* 2006;12(2):2.

14. Pattee SF, Silvis NG. Keratoacanthoma developing in sites of previous trauma: a report of two cases and review of the literature. *J Am Acad Dermatol.* 2003;48(2 suppl): S35-S38.

15. Hsi ED, Svoboda-Newman SM, Stern RA, Nickoloff BJ, Frank TS. Detection of human papillomavirus DNA in keratoacanthomas by polymerase chain reaction. *Am J Dermatopathol.* 1997 Feb. 19(1):10-5.

16. Lu S, Syrjanen SL, Havu VK, Syrjanen S. Known HPV types have no association with keratoacanthomas. *Arch Dermatol Res.* 1996 Mar. 288(3):129-32.

17. Chorny JA, Stephens FV, Cohen JL. Eruptive keratoacanthomas in a new tattoo. *Arch Dermatol* 2007; 143:1457-8.

18. Kluger N, Minier-Thoumin C, Plantier F. Keratoacanthoma occurring within the red dye of a tattoo. *J Cutan Pathol* 2008; 35:504-7.

19. Schwartz RA. Keratoacanthoma. *J Am Acad Dermatol.* 1994; 30:1-19; quiz 20-2

20. Schwartz RA. Keratoacanthoma: a clinico-pathologic enigma. *Dermatol Surg.* 2004; 30:326-33.

21. Rook A, Whimster I. Keratoacanthoma-a thirty-year retrospect. *Br J Dermatol* 1979; 100:41-7.

22. Fisher ER, McCoy MM, Wechsler HL. Analysis of histopathologic and electron microscopic determinants of keratoacanthoma and squamous cell carcinoma. *Cancer* 1972; 29:1387-97

23. Kern WH, McCray MK. The histopathologic differentiation of keratoacanthoma and squamous cell carcinoma of the skin. *J Cutan Pathol* 1980; 7:318-25.

24. Cribier B, Asch P-H, Grosshans E. Differentiating squamous cell carcinoma from kerato-acanthoma using histopathological criteria. *Dermatology* 1999; 199:208-12.

25. Yang JH, Kim DH, Lee JS, Cho MK, Lee SH, Lee SY, et al. A case of cutaneous horn originating from keratoacanthoma. *Ann Dermatol.* 2011 Feb;23(1): 89-91.

26. Chauhan A, Chaudhary S, Agnihotri PG, Aadithya B. A solitary crateriform ulcer of the lower lip: a case report with review of literature. *Indian J Dermatol.* 2011 Jul;56(4):435-8.



Original Article

Nurses' Awareness of Patient Privacy and Confidentiality in Benghazi Medical Centre (BMC): A Cross-sectional Study.

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ABSTRACT:

Background:- Respect for the privacy of patients and the confidentiality of their information, personal data is a fundamental principle of patient rights. All healthcare providers, especially physicians and nurses play a crucial role as guardians of patient safety and rights therefore this study aimed to assess the knowledge and awareness of patients' rights among nurses at the Benghazi Medical Center.

Methods: A cross-sectional descriptive study was conducted with 184 nurses at the gynecology and obstetrics department of the Benghazi Medical Center, using a self-administrated questionnaire. The questionnaire consisted of three parts: personal characteristics, and the knowledge towards privacy part (21 statements), and confidentiality (11 statements). Data analysis was carried out using SPSS version 23. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to describe the knowledge of privacy and confidentiality among nurses. A relation test was used to measure the association between privacy and confidentiality with personal data. Also, statistical significance was set at a P- value of <0.05.

Results: 67.9% of the nurses reported that they had experienced patient rights. The knowledge about privacy among nurses in the target hospital was high, and the most common knowledge was: during the examination, treatment, and care, all healthcare professionals should be careful about the protection of patient privacy (91.8%) and nursing care to protect privacy in the work environment (91.3%). Concerning confidentiality, nurses had a high level of knowledge in general, and the highest level of knowledge was in the statement 'patients must get all kind of health service in an environment that is suitable for confidentiality'. The result found there was no association between personal characteristics and privacy and confidentiality.

Conclusion:- It was concluded that nurses commonly encounter patient rights issues in their workplace. However, the majority of the nurses who participated in the study had a very good level of knowledge about privacy and confidentiality. Age, educational level or length of working experience was insignificantly associated with the level of knowledge of privacy and confidentiality.

Keywords: *patient privacy, Confidentiality, Nurses' awareness, cross-sectional study.*

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INTRODUCTION:-

The concept of patient rights has been considered a component of the human rights concept since the Universal Declaration of Human Rights was adopted.^{1,2} Respect for the privacy of patients and the confidentiality of their information, personal data and medical records (diagnosis, examinations, tests, x-rays and reports) is a fundamental principle of patient

rights. All healthcare providers, especially physicians and nurses play a crucial role as guardians of patient safety and rights.^{3,4} One of the most significant issues to consider in nursing is the secrecy of the patient's data to maintain the patient's rights, because those nurses are responsible for patient care 24 hours a day, and they have a greater role in observing patient care.⁵

In a healthcare setting, privacy means the need for patients to keep their emotions, thoughts, and physical interactions private and to limit intrusion into matters that only affect their physical and psychological well-being.⁶ While confidentiality is defined as information or data about patients that is not disclosed, consent is

required for disclosure.⁷ Confidentiality of personal information and privacy is vital for establishing and maintaining an effective and respectful clinical relationship. The right to these concepts constitutes a social merit as it encourages the explicit discussion of health-related problems between health staff and patients.⁸ The results of some studies showed the patient's rights charter differs from one country to another^{8, 9} but there are main principles agreed upon the patient has the right to privacy and secrecy of information and socio-medical data. However, the majority of the patients state that their rights are not respected in practice.¹⁰ Furthermore, previous qualitative research has shown that many patients are unwilling to give away some of the personal information needed for their treatment. They may even provide inaccurate or incomplete information about their medical history because they believe healthcare providers may disclose this information to unauthorized third parties.¹¹ In recent years, the nursing literature reflects a growing concern for patient rights, with particular emphasis on privacy, the protection of patient data and the nurse's role as an advocate for patients.¹² Besides, it was observed that studies were mostly concentrated on the level of knowledge of medical staff members and hospital patients regarding patient rights.^{13,14} However, the principles of confidentiality and privacy are often neglected during patient care in developing countries. According to the literature reviewed, few studies regarding patient privacy and confidentiality were conducted in Libya and there was less attention on health professionals' attitudes towards patients' rights. Therefore, the present study aimed to identify the awareness and the knowledge of nurses towards patient privacy and confidentiality at the Benghazi Medical Centre (BMC). Furthermore, to determine whether there is a relationship between nurses' knowledge of privacy and confidentiality and nurses' socio-demographic characteristics (age, education level and years of experience)

MATERIAL AND METHODS:

Research Design and Study Setting: This was a descriptive cross-sectional study. It was conducted in the department of the Gynecology and Obstetric in a tertiary care teaching hospital (the Medical Benghazi Center, BMC) to determine nurses' awareness and knowledge towards the right to privacy and confidentiality of patients. The BMC is one of the largest general hospitals offering free services to the community in Benghazi city, and it is the biggest hospital with multi-specialty departments in this district.

Study Population: All the Nursing staff working in the Gynaecology and obstetrics department at the time of this study were included, nurses in other departments were excluded. Specific areas of the district were selected for the research due to time constraints and convenient accessibility.

Sample size: A total of (184) nurses were purposively selected for this study. Nursing staff were selected for inclusion in this study based on involvement with patients and who frequently handle patients' health records. Exclusion criteria were nurses who worked in the hospital for less than 3 months, and radiologists, pathologists and other non-direct patient care specialists. Besides nurses who did not give consent to participate in the study.

Data Collection: Data was collected from January 2022 to the end of February 2022

using a self-administered questionnaire designed by the researchers based on the previously published study.¹⁵ The questionnaire was divided into three different parts. The first part included the descriptive characteristics of the participants. The second part includes questions about the patient's rights experience with "yes" and "no" answer options for the first and second questions and source of hearing about patients' bill of rights, the third part includes a privacy and confidentiality related clause consisting of 33 Likert-type style items with options "strongly agree & agree", "strongly disagree & disagree" and "I do not know".

Pilot study:- To determine the effectiveness of the research tool, a pilot study was carried out on approximately ten nurses to assess the clarity of the statements in the questionnaire and to estimate the time required for completing it. The results of this pilot study helped to set the study in its final application form.

Validity and reliability:- The questionnaire was used previously study and proved that it was valid and reliable. However, a pilot study was carried out and the questionnaire was given to ten Public Health Faculty members of the University of Benghazi after collecting the comments, slight comments were applied. The reliability of the tool was tested using Cronbach's alpha to calculate the overall internal consistency for the item scale of the knowledge of nurses on privacy and confidentiality, and the coefficient was 0.73 for the privacy scale 0.82 for the confidentiality scale.

Statistical Analysis: Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics (frequencies, percentages, means, and standard deviations) were

used to describe the awareness of patients' rights among nurses.

RESULTS:

Results from table 1 above show the demographic information of the study sample. The majority of participants 57.1% (n=105) graduated from nursing school. Approximately half of the participants were married and 28.3. % (n=52) were from the age group

Table (1): Socio-demographic and professional details of the nurses participated in the study (n=184)

	Variable	Frequency	%
Graduated from	Professional health high school (2 years)	49	26.6%
	Nursing school (4 years)	105	57.1%
	Post graduate and above	30	16.3%
Marital status	Married	91	49.5%
	Single	83	45.1%
	Divorced	4	2.2%
	Widowed	6	3.2%
Number of children	None	107	58.2%
	1	12	6.5%
	2	21	11.4%
	2 and more	44	23.9%
Age group	20-26	50	27.2%
	27-33	52	28.3%
	34-40	39	21.2%
	41 or more	43	23.4%
Length of experience	3-9 m	17	9.2%
	1-5y	50	27.2%
	6-10y	33	17.9%
	11-15y	30	16.3%
	16 and over	54	29.3%
How many night shifts do you have in a week	None	105	57.1%
	1	10	5.4%
	2	25	13.6%
	3	19	10.3%
	4 four	25	13.6%
	Total	184	100.0%

(27 – 33), and 58.2% (n = 107) of them did not have a child. About 29.3% (n=54) of participants had experience of more than sixteen years while only 27.2% (n=50) had experience from 1 to 5 years. 13.6% (n=25) of participants had from 2 to 4 shifts in a week, however, more than half of nurses 57.1% (n=105) had no shifts in their work.

Inquiries about the experience with patients' rights:-

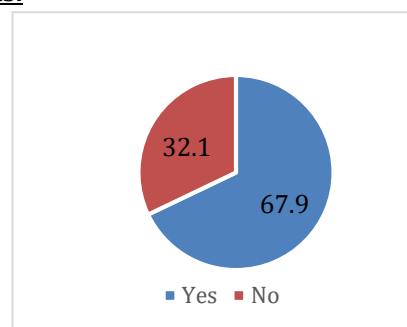


Figure (1) shows the distribution of the sample based on experience with patient rights. It was detected that most of the nurses 67.9% had received an education concerning patient rights while 32.1% of participants didn't have any type of education related to patient rights

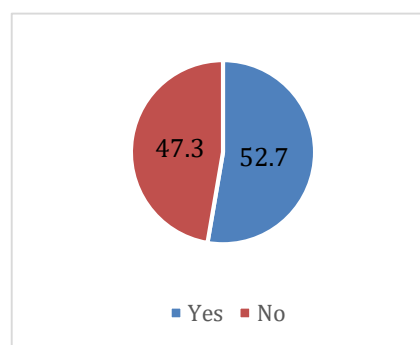
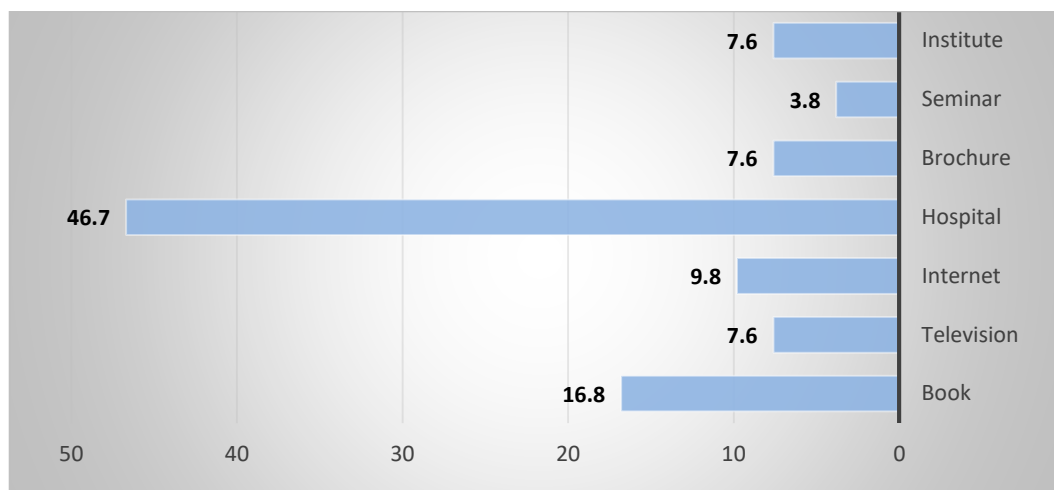


Figure (2) nurses faced problems concerning patients' rights. Approximately 52.7% mentioned that they had experienced a problem regarding patient rights however, around 47.3% of nurses did not face any problems

Source of hearing about patients' rights among the participants

Figure 3 shows that among those who have heard about patient rights, 46.7% gained their information from the hospital and 16% of participants had

information from the book, whereas 9.8% gained the information from the Internet and 7.6% of nurses heard about patient's right from TV, Brochure and Institute.



Figure(3) Source of hearing about patients' rights among the participants (n =184)

Table (2): The knowledge and awareness of patient privacy among nurses(n= 184)

Item	Mean (SD)
Protecting privacy and observing this in the work environment are important for me	4.429±.820
I approach with due care to protect privacy in the work environment	4.331±.749
I pay attention that in the work environment, patients' personal data are not overheard by people other than healthcare professionals.	4.190±1.014
I pay attention that in the work environment, patients' personal data are not overheard by people other than healthcare professionals.	4.190±1.014
I feel uncomfortable when I hear a conversation related to patient's status	3.880 ±1.079
Patient's trust in the doctor/nurse is harmed when they share information about the patient's private life, with other people	3.777±1.288
it is important that the patient's body is not seen by other patients and professionals during the treatment	4.157±1.146
I feel uncomfortable when patient's body or certain parts of his/her body are seen	3.831 ±1.267
During the physical treatment, parts of the body other than the treated part should be covered or concealed with proper clothes.	4.402±0.906
During the examination, treatment and care, all healthcare professionals should be careful about the protection of patient privacy	4.478±.809
Mortality does not legitimize breach of privacy	3.956±1.249
Right to privacy is a right with a legal aspect	4.135±0.922
Privacy is related to the human rights	4.326 ±0.850
Protection of privacy ensures balance in the interpersonal relation	4.331±0.877
During the transfer of patients within the hospital, his/her privacy should not be breached	4.385±0.815

Those not directly related with the patient's treatment should not accompany the patient during the medical intervention	4.391±0.861
Paying attention to patient privacy enhances patient's satisfaction.	4.271±0.970
Relation between the healthcare personnel and the patient is based on trust.	4.489±0.809
Treatment and care can never be a justification for the breach of privacy.	4.184±0.985
Health care professional should not be disturbed when the patient cared is of different gender.	4.076±1.032
Protection of patient privacy is so important that it cannot be left to sensitivity of the healthcare professional about the issue	4.201±0.951
Healthcare personnel is obliged to protect patient privacy M=4.2092 SD=5.1898 STD error Mean=0.382	4.407±0.824

Table(3): the knowledge and awareness of patient confidentiality among nurses

Item	Mean (SD)
The patient should be informed of any attempt related to him/her.	4.217±.927
Patients may demand all kind of information related to their health status, verbally or in writing.	4.168±.910
Patients must get all kind of health service in an environment that is suitable for confidentiality	4.407±.7768
In any medical intervention, patient's consent must be obtained and he/she should benefit from services within the frame of the consent.	4.380±.751
Every relative has right to the health records of his dying patient	3.222± 1.43
Patient's request for his/her medical history can be obliged	4.005± 1.02
Patient's consent is necessary before his health information is released to third party (ies)	4.179 ± .98
Staff can reveal the next of kin of a dead patient to his relatives for processing death certificate	4.157±.99
Application for patient's folder for impersonal uses should be in writing to the director of health information services	3.793± 1.27
Patient's condition may be discussed with other people than for treatment, learning and research purposes	3.981±.09
Services of an untrained interpreter is dangerous to confidentiality M=4.0410, SD =6051 , STD. Error Mean= .04461	3.929 ±1.14

It was ascertained that most of nurses marked "agree" to most items. Nurses have the highest mean score with 4.489 ± 0.809 for the item "Relation between the healthcare personnel and the patient is based on trust". Also, participants had a high score mean of 4.42 ± 0.820 for the item "during the examination, treatment and care, all healthcare professionals should be careful about the protection of patient privacy". while nurses had a lower score mean of 3.77 ± 1.288 for the item "Patient's trust in the nurse is harmed when they share information about the patient's private life, with other people". The lowest mean score for nurses was for the item "I feel uncomfortable when I hear a conversation related to patient's status" (3.880 ± 1.079).

Table (3) showed that The nurses have the highest mean score with 4.40 ± 0.77 for the item "Patients must get all kinds of health service in an environment that is suitable for confidentiality", Additionally participants had a higher score mean about 4.38 ± 0.751 for the item in "any medical intervention, patient's consent must be obtained and he/she should benefit from services within the frame of the consent". While the lowest mean score 3.222 ± 1.433 for nurses was for the item "every relative has right to the health records of his dying patient".

Relationship between nurses' knowledge of patient privacy , confidentiality and demographic variables:-

The results from this study showed that there was no relation between knowledge of privacy and

demographic variables (age, education level, length of experience, age ($p=0.181$), education level ($p=0.655$), and length of experience ($P=0.725$). Also, the finding indicated that there was not statistically significant relationship between variables (age, education level, length of experience) and knowledge of nurses toward patient confidentiality.

DISCUSSION:

Patient's rights are one of the fundamental aspects of human rights and an essential component for attaining quality health care and optimal healthcare outcomes. Observing patients' rights is the most important ethical issue in a hospital which should be considered. Since nurses are the majority of employees in hospitals and are responsible for providing direct patient care, they should pay more attention to their rights to maintain the quality of clinical services and ensure patient satisfaction with health services. Therefore, this study aimed to assess the knowledge and awareness of patients' rights in terms of privacy and confidentiality among nurses working at the Benghazi Medical Center.

The results of the current study indicated that more than two-thirds of nurses in the target hospital had acquired knowledge of patient rights from multiple sources. Most nurses learned about patient rights during their occupational lives then from books. Other sources of prior knowledge were the internet, TV, brochures, and institutes, and the least common source was seminars. This means that nurses did not receive sufficient education on patient rights during their study, which accounted for only 7.6% of hearing about patient rights at their institution. These results were consistent with a study conducted in Turkey, which found that most nurses did not receive education about important topics of patient rights and were aware of patient rights through sources outside of school.¹⁶ However, another study showed that the majority of healthcare professionals acquired knowledge of confidentiality while in school.¹⁷ According to the present study findings, around half of nurses had problems related to patient rights. In a study by Utkualp et al. reported that around a third of nurses encountered a problem related to patient rights.¹⁸ Similarly, another study in Turkey, nurses faced challenges concerning patient rights in their practice.¹⁶

This study demonstrated that the majority of nurses had a high level of knowledge about privacy. This result could be attributed to the fact that hospital administration paid attention to patients and their rights, and nurses had information on matters related to patient rights and privacy. A study by Öztürk et al. (2020) showed that nurses working in the public hospitals in Trabzon respected patient privacy highly.¹⁹ This study's finding was congruent with a study conducted in Colombo, Sri Lanka which reported that, level of nurses' knowledge regarding the right to maintain privacy was remarkably high.²⁰ On the same line, a study in Egypt reported that nurses recognized privacy as a human right and had the responsibility to protect patients' privacy.²¹

Higher levels of nurses' knowledge about privacy were observed in all statements. The majority of the target nurses had a sufficient level of knowledge and paid attention to patient privacy during the examination, treatment and care which all healthcare professionals should be careful about protecting privacy, and the relationship between healthcare personnel and the patient is based on trust. Furthermore, nurses approach it with due care to protect privacy in the work environment, and it was important to protect privacy and observe in the workplace for nurses. Nurses were aware that privacy is a human right, and privacy must be maintained during physical treatment or transfer of patients within the hospital. However, around two third of participants know that patients' trust in the doctor or nurse is harmed when they share information about the patient's private life with other people. Concerning confidentiality, it was obvious that nurses in the targeted hospital had a high level of knowledge and awareness about it in general. This was supported by findings of previous studies that reported that health professionals had relatively good knowledge related to patient confidentiality.²² Also, a study conducted in Saudi Arabia supported the findings of the current study.²³ In congruence with this study findings, a high awareness level of confidentiality was revealed among nurses, this could be because the nurses knowing their important role in protecting patient records and do not disclose their information.²¹ In addition, most of the nurses' were aware of items such as getting patients all kind of health services in a suitable environment for confidentiality and knowing that patient consent must

be obtained and they should benefit from services within the frame of the consent, which had the highest awareness level regarding confidentiality. Nurses were aware that patient consent is essential before giving any information to third parties. This finding may be attributed to nurses who believed that consent is a legal requirement and that patients have the right to consent or refuse to share their information. A study in Korea indicated that patients legal rights are infringed on clinical practices, where around 20% of nurses provided information about a diagnosis or information about a patient to a third party without permission from the patient.²⁴ Another previous study mentioned that it is essential for nurses to be careful when keeping patient information, as some of it can be sensitive and cause harm to patients if disclosed.²⁵ Conversely, the nurses' answers in the current study were varied as to whether relatives had the right to see and request health records of their dying patients. The present study highlights that no significant association was found between nurses' knowledge of privacy and confidentiality with age, education level and years of experience. However, a study by Nejad et al. (2011) found that there was a direct and significant association between the level of knowledge and work experience.²⁶ Another study conducted in Saudi Arabia to measure patient rights among nurses showed a significant relationship between older age, years of experience, and being a specialist nurse which could be attributed to gaining more experience will lead to increase knowledge, more respect and improve the nurse and patient interaction.²⁷ A study by Tegegne et al. (2022) revealed that the sex of health professionals, training in medical ethics, and the number of ethical dilemmas faced was all significantly related factors of health professional knowledge towards patients' confidentiality.²²

Ethical considerations: Ethical approval was sought from the gynaecology and obstetrics department at the Medical Benghazi Center, BMC. Verbal Consent was obtained from each respondent after researchers explained to them the purpose of the study and their freedom to choose to participate in the study. The secrecy of the information is ensured by excluding any names, addresses or other personal data from the participants.

The limitation: There are some limitations to this study, firstly, The findings of this study may not be

generalizable because of the use of the convenience sampling method. Secondly, time and financial constraints, which could impact the representativeness of the sample. Finally, there was a possibility of information bias as the nurses might answer acceptably to the researchers, rather than the truth.

Recommendation: This study recommended providing education for medical students during their graduate studies. Maintaining the confidentiality of patient information and not sharing the patient information with other healthcare workers in public places and regular training for health care professionals in all patients' rights aspects. Further study was recommended to measure patient rights for all healthcare professionals and patients.

CONCLUSION:

It was concluded that nurses commonly encounter patient rights issues in their workplace. However, the majority of the nurses who participated in the study had a very good level of knowledge about privacy and confidentiality. Age, educational level or length of working experience was insignificantly associated with the level of knowledge of privacy and confidentiality.

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Conflicts of interest There are no conflicts of interest.

REFERENCES:

1. Bani Issa W, Al Akour I, Ibrahim A, et al. Privacy, confidentiality, security and patient safety concerns about electronic health records. *Int Nurs Rev.* 2020;67(2):218-230. doi:10.1111/inr.12585
2. Zaybak A, Eser I, Ismailoglu EG. An analysis of the attitude of patients towards using their patient rights at a university hospital. *IÜFN Hem Derg.* 2012;20:104-111.
3. Adib-Hajbaghery M, Faraji M. Comparison of effect between group discussion and educational booklet on Iranian nursing students' attitude and practice toward patient privacy. *J Educ Eval Health Prof* 2016;13:29
4. Teke A., Ucar M., Demir C., Celen O., Karaalp T., "Evaluation of knowledge and attitudes of the nurses working in a training hospital about

- patients' rights" TAF. Prev. Med. Bull., vol.6, no.4, pp.259-66, 2007
5. Williams A. A study of practising nurses perception and experiences of intimacy within the nurse-patient relationship. *J Adv Nurs*. 2001; 35(2):188-96.
 6. Sert, G. The right of privacy in health care services in the medical ethics and medical law perspective [unpublished doctoral dissertation] ; 2007, Marmara University, Istanbul, Turkey.
 7. Medical Defense Union. An introduction to confidentiality; 2018 Available at <https://www.themdu.com/guidance-and-advice/guides/introduction-to-confidentiality>.
 8. Almoajel A. Hospitalized Patients Awareness of Their Rights in Saudi Governmental Hospital. *Middle East Journal of Scientific Research* 2012; 11 (3): 329-335.
 9. WHO. Declaration on the Promotion of Patient's Rights in Europe, WHO Regional Office for Europe, Copenhagen. 1994. Available at: www.who.int/genomics/public/eu_declaration1994.pdf
 10. Atac A, Filizkaya N. Hekim-hasta ilişkisi ve hasta hakları ile ilgili bir anket çalışması. (A questionnaire on the relation between patients and physicians and patient rights). In: Pelin SS, Arda B, Özcelikay G, et al. *Proceedings of the Third Medical Ethics Symposium*; 1998:7, Oct 23-25; Ankara, Turkey
 11. Rebecca, Taiwo. "Knowledge and Attitude of Patients Towards the Privacy and Confidentiality of Their Health Information Attending the Medical Outpatient (MOP)" ; 12 Jul. 2019
 12. J Braunack-Mayer AC, Mulligan E. Sharing patient information between professionals: confidentiality and ethics. *MJA* 2003; 178: 277-279.
 13. Özer N, Özlü ZK, Sarıtaş S. Do the surgical clinic inpatients know their rights? *J Anatolia Nurs Health Sci*. 2009; 12(4):19-28.
 14. Ersoy N, Gündoğmuş ÜN. A study of the ethical sensitivity of physicians in Turkey. *Nurs Ethics*. 2003; 10(5):472-84.
 15. Nilüfer Demirsoy, RN;, Hülya Öztürk, RN; Nurdan Ergün Acar, A Cross-Sectional Study: Patient Privacy According to Doctors and Nurses. *Nursing Science Quarterly* 2021; , Vol. 34(2) 114-122.
 16. Akca SO, Akpınar YY, Habbani T. Knowledge and attitudes of nurses regarding patient rights: a Corum/Turkey sample. *Rev Assoc Med Bras* 2015; 61(5):452-457
 17. Adeleke IT, Adekanye AO, Adefemi SA, Onawola KA, Okuku AG, Sheshi EU, James-Adeniran JA, Francis M, Elegbe TRO, Ayeni AM, Tume AA. Knowledge, attitude and practice of confidentiality of patients' health records among health care professionals at Federal Medical Centre, Bida. *Nigerian Journal of Medicine*, Vol. 20, No. 2, 2011. P. 228- 235
 18. Utkualp N, Yildiz H. awareness and attitudes of nurses working in a university hospital on patients' rights. *International Journal of caring sciences*, 2016, Vol. 9, Issue 1. P. 185- 197
 19. Öztürk H, Torun Kılıç Ç, Kahriman İ, Meral B, Çolak B. Assessment of nurses' respect for patient privacy by patients and nurses: A comparative study. *J Clin Nurs*. 2021;30:1079-1090.
<https://doi.org/10.1111/jocn.15653>
 20. Mapatunage T.K. and Seneviratne S.M.K.S. Knowledge and Attitudes Towards Patients' Rights Among Nurses in Two Selected Teaching Hospitals in Colombo, Sri Lanka. *Journal of Health Sciences and Innovative Research* 2022;3(1):1-10
 21. Yousef WAS, Abed FA. Nurses' versus patient's awareness about patient rights and nurses' compliance to these rights. *Egyptian Nursing Journal* 2021, 18:107-119
 22. Tegegne MD, Melaku MS, Shimie AW, Hunegnaw DD, Legese MG, Ejigu TA, Mengestie ND, Zemene W, Zeleke T, Chanie AF. Health professionals' knowledge and attitude towards patient confidentiality and associated factors in a resource-limited setting: a cross-sectional study. *BMC Medical Ethics*, 2022. 23:26
 23. Alhawsawi AM, Alsohimi KM, Awadie MS, Alshehri BA. Nurses' Attitude towards Patient's Rights at Erada Mental Health Complex in Jeddah City, Saudi Arabia. *Emerging Medical Science* ; Vol. 01, Issue 02, October 2022
 24. Kim Y-S, Yoo M-S, Park JH. Korean Nurses' Awareness of Patients' Rights in Hospitals. *Korean J Med Ethics Educ* 11(2) : 191-200, Dec 2008
 25. Ceylan SS, Cetinkaya B. Attitudes towards gossip and patient privacy among paediatric nurses. *Nursing Ethics* 2020, Vol. 27(1) 289-300

26. Nejad EM, Begjani J, Abotalebi G, Salari A, Ehsani SR. Nurses awareness of patients rights in a teaching hospital. Journal of Medical Ethics and History of Medicine 2011, 4:2
27. Alotaibi AA, Aletaby NS, Alotaibi MS, Almqati YA, Alshehri SA, Almogati FS, Alqurashi MA,

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Original Article

Denture Hygiene Knowledge, Attitudes, and Practices Toward Patient Education in Denture Care among Dental Clinicians in Benghazi City, Libya

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ABSTRACT:

Background: Denture cleaning is essential to prevent malodor, poor aesthetics and the accumulation of plaque/calculus with its deleterious effects on the mucosa. Moreover, denture and mucosal tissues of the edentulous mouth's hygiene, especially in the elderly are essential for overall health. Therefore, the present study was conducted to assess the denture hygiene knowledge and attitudes toward patient education in denture care among dentists in Benghazi, Libya.

Materials & Methods: The present questionnaire survey was conducted on 180 dentists. A self-administrated questionnaire was designed to gather the socio-demographic characteristics, assess the denture hygiene knowledge, attitudes and practices among dental clinicians. The data was entered and analyzed using the Statistical Package for Social Science (SPSS Version 20 for Windows, SPSS Inc. Chicago, IL).

Results: A total of 155 questionnaires had been returned to the researcher giving a response rate 86 %. The sample comprised of 74.8% of females and 25.2% of males. About 57.4% of participants were general dental practitioner. While 17.4% and 25.2% of them specialist (prosthodontics and non -prosthodontics). About 87.6% of dental general practitioner had aware about accumulation of oral biofilm on denture, but almost of them did not know that the oral biofilm associated with denture stomatitis. While high rates of specialists (prosthodontics 74.1% and non-prosthodontics 64.1%) had positive attitude in compared with general practitioner 48.3% (The difference was significant) about explaining denture hygiene instructions to old patients. All of prosthodontics gave patient's instruction regarding the denture cleansing methods at the time of denture delivery 64% of them used verbal medium for instruction delivery.

Conclusion: Dental general practitioner had limited knowledge and attitudes toward patient education in denture care whereas specialists had sufficient denture hygiene knowledge, attitudes and practices toward patient education in denture care.

Keywords: *Denture hygiene, denture stomatitis, knowledge, attitude and practice.*

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INTRODUCTION

Over the past few decades, the life expectancy in both developed and developing countries has increased.^{1,2} Aligned with this increase, the status of oral health of the old population also became of prime importance, as tooth loss in the elderly increases with age as does the contributing factors

leading to it over time. As a result, the rates of complete loss of teeth are customarily the highest in the oldest age groups. Despite efforts made by dentists aimed at the conservation of teeth, patients still lose their teeth owing to tumors of the jaw, trauma, dental caries, and periodontal diseases.³ Correspondingly, the number of elderly requiring dentures has also increased. Complete dentures constitute the most common treatment option for total teeth loss in the edentulous patient. Similarly, a removable partial denture is considered one of the most common replacements of teeth for partial tooth loss.^{2,4-6}

Dentures and mucosal tissues of the edentulous mouth's hygiene, especially in the elderly, are essential for overall health.⁷ As well as, general

health of elderly gives insight into their quality of life.⁸ Moreover, denture care minimizes poor denture aesthetics and staining, malodor, and plaque/calculus accumulation with deleterious effects on the mucosa.⁷ Unfortunately, studies show that many patients prefer to use unclean dentures instead of keeping their dentures clean. This may be a result of the negligence of clinicians in reinforcing the methods of denture hygiene and recalling their denture patients. For patients who wear dentures cleaning is recognized as an important part of oral hygiene as they predispose denture wearers to denture stomatitis. In other words, unclean dentures lead to unwanted effects both on the oral mucosal and on the denture itself.⁹

Ideally, products for denture care should be fungicidal and bactericidal, inexpensive, nontoxic to the patient, and effective for the removal of organic/inorganic stains and deposits. Several studies have reported different methods employed by patients to clean dentures.^{10, 11} These methods range from the simplest method such as brushing with toothpaste and water to the complex method including the use of tablets and chemical solutions. Given that the most common way for complete dentures cleansing is brushing, for a better outcome, the utilization of specific cleansers and brushes is of paramount importance.¹⁰

Denture wearers and dentists should realize that plaque accumulation on dentures hurts the oral mucosa and general health. Hence, it is the patient's responsibility to maintain oral hygiene. However, denture patients in comparison to dentists, pay less attention to the importance of plaque control. The dentist must instruct and motivate the patient and provide the methods and means for plaque control.¹² This study aimed to assess denture hygiene knowledge, attitudes, and practice toward patient education in denture care among dental practitioners and dental specialists in Benghazi, Libya.

METHODOLOGY:

A descriptive, cross-sectional study was conducted on dentists who work in public and private clinics in Benghazi, Libya. In the current study, a self-administration questionnaire was adapted from questionnaires used in previous published studies.^{7,11,12} A pilot study was conducted by administering the questionnaire to a random sample

of 20 participants. Modifications were subsequently made based on their feedback to ensure the questionnaire's validity. The finalized questionnaire consisted of nineteen questions covered four major areas including socio-demographic data, the knowledge, attitude and practices of dentists toward patient education in denture care.

The socio-demographic part consisted of five questions: age group, gender, work experience, and place of work, and five knowledge-related questions (plaque on denture bases, denture cleansing aids, etc.). Each of these questions had three options to choose from Yes, No, and Do not know, as well as Five attitude-related questions, such as explaining denture hygiene instructions and a recall program for denture patients. The response options included a Likert scale of (strongly agree, agree, do not know, disagree, and strongly disagree). Finally, four practice advice questions (patient instruction and medium used for instruction, etc.). Before beginning the study, ethical approval was obtained from the ethical committee in the dental college with approval number 151. One hundred – fifty five dentists agree to participate in this study after sending an e-mail and explaining the purpose of the research

Data collection extended over a period of three months during 2023. Finally, uncompleted questionnaires were excluded from this study and then data was entered into spreadsheets and analyzed using the Statistical Package for Social Science (SPSS Version 20 for Windows, SPSS Inc. Chicago, IL). Data analysis included descriptive statistics based on the percentage of answered questions. P value test was used for comparing data as appropriate. The level of significance was set at P value equal to or less than 0.5.

RESULTS:

We distributed 180 questionnaires among the dentists. A total of 155 questionnaires had been returned back to the researcher giving a response rate 86 %. The participants comprised of 74.8% of females and 25.2% of males. 66% of them were 1-5 and over 10 years of experience in work. High percentage of this sample were general dental practitioner (57.4%). Whereas 17.4% and 25.2% were specialist prosthodontics and non-prosthodontics respectively. (Table 1, figure 1 and 2).

Table 1: Socio-demographic characteristics

Variables	Frequency		
Age Group	21 - 30	62	40.0
	31 - 40	63	40.6
	41 - 50	23	14.8
	over 50	7	4.5
gender	male	39	25.2
	female	116	74.8
Years of work experience	1 - 5	66	42.6
	6 - 10	23	14.8
	over 10	66	42.6
Qualifications	General Dental Practitioner	89	57.4
	Specialist (prosthodontics)	27	17.4
	Specialist (not prosthodontics)	39	25.2
Work Institution	Governmental	77	49.7
	Private	78	50.3

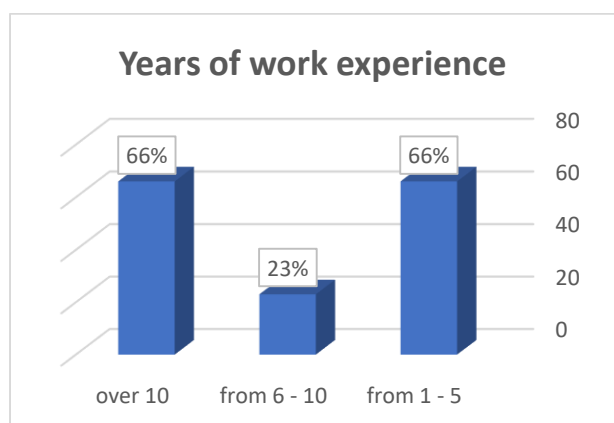


Figure 1:

Distribution of years of work experience

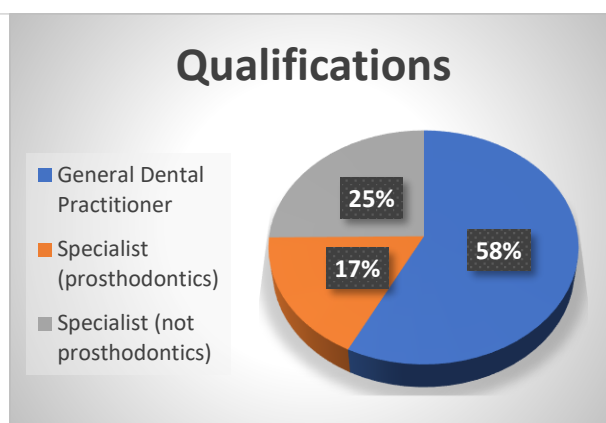


Figure 2:

Distribution of subjects according to qualification

About 87.6% of general practitioner had aware about accumulation of oral biofilm on denture, but majority of them did not know associated with denture stomatitis. While 74.1% of specialists (Prosthodontics) gave correct answer regarding this question. The group of specialists in the

prosthodontics had higher awareness (85%) about the placement of denture in hypochlorite cleansing solution for a longer period damage the dentures ,while 59% and 74.2% were non prosthodontics and general practitioner (The difference was significant P value < .005). (Table 2).

Table 2: Dentists knowledge towards denture hygiene instructions

Variables		General Practitioner (%)	Specialist (prosthodontics) (%)	Specialist (not prosthodontics) (%)	P Value
dentures accumulate plaque/biofilms	incorrect	11 (12.4)	1 (3.7)	1 (2.6)	0.115
	Correct	78 (87.6)	26 (96.3)	38 (97.4)	
Association between oral biofilm and denture stomatitis	incorrect	75 (84.3)	7 (25.9)	5 (12.8)	0.345
	Correct	14 (15.7)	20 (74.1)	34 (87.2)	
advisable for regular toothpaste in denture cleansing	incorrect	52 (58.4)	10 (37.0)	24 (61.5)	0.100
	Correct	37 (41.6)	17 (63.0)	15 (38.5)	
The cleaning of tissue bearing side on the denture effects on it's retention in the mouth	incorrect	48 (53.9)	10 (37.0)	14 (35.9)	0.095
	Correct	41 (46.1)	17 (63.0)	25 (64.1)	
The placement of denture in hypochlorite cleansing solution for a longer period damages the dentures	incorrect	23 (25.8)	4 (14.8)	16 (41.0)	0.0054**
	Correct	66 (74.2)	23 (85.2)	23 (59.0)	

High rates of specialists (prosthodontics 74.1% and non-prosthodontics 64.1%) had positive attitude in compared with general practitioner 48.3% about explaining denture hygiene instructions to old patients (The difference was significant). A well as, the questions regarding the recall program for

complete denture patients, the specialists had the significance highest percentages. 59.3% of general practitioners and 56.3% of specialists were positive attitude with the fact that denture adhesives (if used) need not be cleaned completely and reapplied again daily. (**Table 3**).

Table 3: Dentists attitude towards denture hygiene instructions

Variables		General Practitioner (%)	Specialist (prosthodontics) (%)	Specialist (not prosthodontics) (%)	P Value
Explaining denture hygiene instructions to old patients	Negative	46 (51.7)	7 (25.9)	14 (35.9)	0.034**
	Positive	43 (48.3)	20 (74.1)	25 (64.1)	
If not provide denture hygiene instructions, as the patient decline to follow	Negative	44 (49.4)	6 (22.2)	15 (38.5)	0.038**
	Positive	45 (50.6)	21 (77.8)	24 (61.5)	
A recall program for complete denture patients is not importance	Negative	36 (40.4)	4 (14.8)	6 (15.4)	0.003**
	Positive	53 (59.6)	23 (85.2)	33 (84.6)	
Patient education regarding the impact of denture hygiene on systemic health is not important	Negative	23 (25.8)	1 (3.7)	3 (7.7)	0.005**
	Positive	66 (74.2)	26 (96.3)	36 (92.3)	
If used denture adhesives do not need to clean completely and reapplied again daily	Negative	39 (43.8)	11 (40.7)	18 (46.2)	
	Positive	50 (56.2)	16 (59.3)	21 (53.8)	

All of prosthodontics gave patient's instruction regarding the denture cleansing methods at the time of denture delivery. While 64% of this group used verbal medium and just 3.7% of them used practical demonstration for instructions delivery. All of

specialists educated patients about the relationship between denture hygiene and systemic health. While, 37 % of advice patient used brushing with water only to clean their denture. (**Table 4**).

Table 4: Dentist practices towards denture hygiene instructions

		General Practitioner (%)	Specialist (prosthodontics) (%)	Specialist (not prosthodontics) (%)	P - Value
Give patient's instruction regarding the denture cleansing methods at the time of denture delivery	No	5 (5.6)	0 (0.0)	1 (2.6)	0.369
	Yes	84 (94.4)	27 (100.0)	38 (97.4)	
kind of medium used for instructions delivery	Verbal	44 (49.4)	18 (66.7)	22 (56.4)	0.003**
	Written	9 (10.1)	8 (29.6)	6 (15.4)	
	Practical demo	36 (40.4)	1 (3.7)	11 (28.2)	
Patient's education about the relationship between denture hygiene and systemic health	No	12 (13.5)	0 (0.0)	7 (17.9)	0.079
	Yes	77 (86.5)	27 (100.0)	32 (82.1)	
The denture cleansing methods is recommended	Immersion in alkaline per oxide	8 (9.0)	1 (3.7)	2 (5.1)	0.009*
	Immersion in sodium hypochlorite	20 (22.5)	3 (11.1)	5 (12.8)	
	Immersion in mouthwash solution	24 (27.0)	4 (14.8)	10 (25.6)	
	Brushing with toothpaste	11 (12.4)	6 (22.2)	9 (23.1)	
	Brushing with soap water &	6 (6.7)	10 (37.0)	9 (23.1)	
	Brushing with water only	20 (22.5)	3 (11.1)	4 (10.3)	

DISCUSSION

Cleansing of dentures are essential for the maintenance of oral soft tissue health and successful use of removable dentures. Elderly patients, particularly those who are in a compromised state, are not able to maintain good denture hygiene due to some physical and/or mental handicap.¹³ However, the maintenance of denture hygiene is neglected in not just compromised geriatric patients

but also with normal healthy denture wearers.¹⁴ This can be attributed to a definite lack of motivation, basic knowledge or simply carelessness and neglect. As well as, Poor denture hygiene is a seemingly common problem encountered by dentists' with their numerous complete denture patients. Therefore, it is very important for dentists' to educate their patients regarding daily denture cleansing regimen to prevent undesirable problems.^{11,15}

On 155 of dentist completed a comprehensive questionnaire. Majority of the subjects with a bachelor degree (general dental practitioner) did not aware the association between oral biofilms on complete denture with conditions like denture stomatitis and other serious systemic diseases. While, the results of Indian' research¹¹ found that 25 (18%) replied "no" and 22 (15%) replied "don't know. This may be due to lack of their information about dentures problems. Therefore, it is necessary to ensure that the dentists' awareness and essential that they apply this knowledge to train and instruct their patients about the importance of denture hygiene maintenance and also to recall them at regular intervals to ensure that the hygiene is maintained.

Denture cleanliness is essential to prevent malodor, poor aesthetics and the accumulation of plaque/calculus with its deleterious effects on the mucosa.¹³ Therefore, education and motivation of the denture wearers on proper denture hygiene is responsibility of dental clinicians. In this study, less than half of general practitioner and almost of specialists agreement that explaining denture hygiene instructions to old patients. This rate is in the same line with dental practitioner in study of Sharma A et al.,¹⁶ But the percentages of specialists is higher in our research in a comparable with another study conducted in Sao Paulo, Brazil¹⁷ it was discovered that 51.89% of the practitioners did not give any instructions to their patients about denture cleansing after delivery of dentures. In addition, many of researches reported that the majority of denture wearers do not pay necessary attention toward the cleanliness and their hygiene of their dentures. This may be due to the denture wearers negligence as well as dentists' who give insufficient instructions to their patients about denture cleansing methods.

Patient should be learned new practices by doing to understand it. As the famous Chinese proverb goes – I hear and I forget, I see and I remember, I do and I understand' It, is absolutely essential to ensure that the patients are trained to an acceptable level of competency to maintenance of denture hygiene.¹¹ In this research, when asked about the medium of instructions used to provide denture cleansing information; less than half of the subjects provided a practical demonstration. On other hands, only 14% of the subjects in Indian¹¹ provided a practical demonstration.

The combination of brushing and soaking method is recommended as the effective way for cleaning dentures.^{13,18,19} In the present survey, almost of dentist instruct their patients regarding the denture cleansing methods at the time of denture delivery. About third of specialists advised their patients to

brush their dentures using water only. In same line, other studies²⁰⁻²¹ the most preferred cleansing regimen by the patients was brushing only. However, research of Suresan V et al.,¹¹ reported that 37% of the dentists' advised their patients to brush their dentures using soap water. Therefore, the results of the present study revealed that dental professionals must update their knowledge of denture cleansing strategies continuously in order to maximize the services offered to their denture patients and must not avoid spending time for instructing them.

CONCLUSION AND RECOMMENDATION:

In the present study, it is concluded that almost most of general dental practitioner had limited awareness and attitudes toward patient education in denture care whereas specialist had sufficient denture hygiene knowledge, attitudes toward patient education in denture care among dentists. Strongly recommended that the knowledge about post denture delivery instructions in the undergraduate curriculum should be stressed and improvement.

REFERENCES

1. Deogade SC, Vinay S, Naidu S. Dental prosthetic status and prosthetic needs of institutionalised elderly population in old age homes of Jabalpur city, Madhya Pradesh, India. *J Indian Prosthodont Soc* 2013 Dec;13(4):587-592. SUBJECTS AND
2. Salma A. Elnaili, David G. Patrick. Evaluation of the surface roughness of four different types of acrylic resin denture base materials: heat cure (HC), high impact heat cure (HIHC), heat cure clear (HCC), and clear chemical cure (CC). Part (1. *Libyan J Sci & Tech*. 2020;11:2 94-97.
3. Thatapudi Shankar, Snigdha Gowd, Vinay Suresan, Sneha Mantri, Sudhanshu Saxena Prateek Mishra, Pragya Panday. Denture Hygiene Knowledge and Practices among Complete Denture Wearers attending a Postgraduate Dental Institute. *The Journal of Contemporary Dental Practice*, August 2017;18(8):714-721
4. Mersel A, Babayof I, Rosin A. Oral health needs of elderly short-term patients in a geriatric department of general hospital. *Spec Care Dentist* 2000 Mar-Apr;20(2):72-4.
5. Petersen PE, Yamamoto T. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme.

- Community Dent Oral Epidemiol 2005 Apr;33(2):81-92.
6. Nalcaci R, Erdemir EO, Baran I. Evaluation of the oral health status of the people aged 65 years and over living in near rural district of Middle Anatolia, Turkey. Arch Gerontol Geriatr 2007 Jul-Aug;45(1):55-64
7. Jagger DC, Harrison A. Denture cleansing – The best approach. Br Dent J 1995;178:413-7.
8. Abdelsalam I, Roba EL and Rasha A Kablan . Oral health related Quality of life among Completely Edentulous Patients. Libyan Journal Of Dentistry 2018; 2(2) 80-83
9. Cakan U, Yuzbasioglu E, Kurt H, Kara HB, Turunç R, Akbulut A, Aydin KC. Assessment of hygiene habits and attitudes among removable partial denture wearers in a university hospital. Niger J Clin Pract 2015 Jul-Aug;18(4):511-515
10. Femandes RA, Lovato-Silva CH, Paranhos Hde F, Ito IY. Efficacy of three denture brushes on biofilm removal from complete dentures. J Appl Oral Sci 2007;15:39-43.
11. Suresan V, Mantri S, Deogade S, Sumathi K, Panday p, Galav A, Mishra K. Denture hygiene knowledge, attitudes, and practices toward patient education in denture care among dental practitioners of Jabalpur city, India . J Indian Prosthodontic Society 2016 ;751-024
12. Tarbet WJ, Axelrod S, Minkoff S, Fratacangelo PA. Denture cleansing: A comparison of two methods. J Prosthet Dent 1984;51:322-5
13. Schou L, Wight C, Cumming C. Oral hygiene habits, denture plaque, presence of yeasts and stomatitis in institutionalised elderly in Lothian, Scotland. Community Dent Oral Epidemiol. 1987; 15:85-9.
14. Sheen SR, Harrison A. Assessment of plaque prevention on dentures using an experimental cleanser. J Prosthet Dent 2000;84:594-601.
15. Gornitsky M, Paradisi I, Landaverde G, Malo AM, Velly AM. A clinical and microbiological evaluation of denture cleansers for geriatric patients in long- term care institutions. J Can Dent Assoc. 2002; 68:39-45.
16. Sharma A, Partap V, Singh A and Beneetu Atri .Knowledge and attitudes toward patient education regarding denture care in dentists: A questionnaire survey . International J Dental Sciences 2017;228-230.
17. Peracini A, Andrade IM, Paranhos Hde F, Silva CH, de Souza RF. Behaviors and hygiene habits of complete denture wearers. Braz Dent J 2010;21:247-52
18. Jeganathan S, Payne JA, Thean HP. Denture stomatitis in an elderly edentulous Asian population. J Oral Rehabil 1997;24:468-72.
19. Dills SS, Olshan AM, Goldner S, Brogdon C. Comparison of the antimicrobial capability of an abrasive paste and chemical-soak denture cleaners. J Prosthet Dent 1988;60:467-70.
20. Jagger DC, Harrison A. Denture cleansing – The best approach. Br Dent J 1995;178:413-7
21. Dikbas I, Koksall T, Calikkocaoglu S. Investigation of the cleanliness of dentures in a university hospital. Int J Prosthodont 2006;19:294-8.



Original article

Oral Cancer Knowledge, Practices, and Attitudes: A Survey of Libyan Dentists

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ABSTRACT:

Dentists play an important role in early detection of oral cancerous lesions. Several studies indicate that dentists lack knowledge in oral cancer etiology and diagnosis. Role in the control studies assessing dentists' oral cancer awareness in Libya are lacking.

Objectives: This study examined the oral cancer awareness and practice among dentists in Libya.

Materials and methods: Administered questionnaires were distributed on dentists working in private and public clinics in the city of Benghazi. Participants' responses to the questionnaire were analyzed using descriptive and analytical statistics.

Results: Three hundred dentists returned completed questionnaires; 237 (79%) females and 63 (21%) males and most of them were under 40 years old 227 (75.7%). Although most dentists were knowledgeable about the most common site, type, and screening method of oral cancer, only about half of the dentists were aware of tobacco as the main risk factor and biopsy as the most proper diagnostic technique for oral cancer. Despite that 86% of the dentists reported that they perform mucosal examination as part of their routine dental examination, about half of the dentists reported lack of confidence in detecting oral cancer and most dentists expressed need for further education and training in this area.

Conclusion: Overall, this study highlighted the importance of introducing continuous education and training programs to dentists which could increase oral cancer prevention and survival rates among oral cancer patients.

Keywords: Oral cancer, Libya, awareness, knowledge, attitude, practice.

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INTRODUCTION:

Oral cancer is a significant global public health problem. It is the most common malignancy of the head and neck with more than 450,000 new cases of oral cancer each year worldwide, and only about half of these patients would survive 5 years since diagnosis. Recently, there has been a marked increase in the incidence of oral cancer.¹ Oral cancer is an aggressive

cancer with poor prognosis and is considered a major cause of morbidity and mortality worldwide.²

Globally, oral cancers were the seventh most commonly occurring cancer and the ninth deadliest cancer site in the world as stated by World Cancer Report 2014.² It is more common in developing than developed countries and has particularly higher incidence in males.³ In Libya, oral and pharyngeal cancer ranked the eleventh with 1.7% of all cancer deaths.⁴ Oral cancer is often preceded by a premalignant lesion that can be detected clinically via visual inspection, therefore, there are chances for earlier detection which could improve prognosis and the quality of life for these patients. In fact, evidence shows that early detection is the single most critical intervention influencing survival of oral

cancer patients. There are multiple etiological factors for oral cancer. The most significant risk factors are tobacco use, excessive alcohol consumption, betel quid chewing, in addition to sun exposure in the case of lip cancer. Other risk factors include human papilloma virus infection, immunodeficiencies, nutritional and socio-economic status.^{5,6}

Oral lesions are often first seen by dental practitioner who has a unique position to detect the oral cancer at an early stage.⁷ However, lack of knowledge and lack of training among dental professionals contribute to the delayed diagnosis. Although the oral cavity is a relatively accessible site of the human body for both self and professional examinations, in addition to the fact that such knowledge is included as part of the dental degree undergraduate curriculum, survival rates of oral cancer patients remain poor with late diagnosis playing a major role in this delay.⁸

In Libya, there are fifteen dental schools. The dental education system is structurally similar among these schools where all dental programs start with a one-year pre-dental education program followed by four years of pre-clinical and clinical dental education, followed by completion a one-year internship by all students. Several studies across the world have assessed dentists' knowledge, opinions and practices regarding oral cancer. These studies showed the demand to improve the knowledge on preventive and detection methods for oral cancer.^{9, 10} In Benghazi, dentists receive formal education and training on oral cancer prevention and detection during their undergraduate studies, however, there are no continuous education courses in this area currently available for the dentists working in various sectors. To date, there has been no published studies assessing dentists' oral cancer knowledge, opinions and practices in Libya.

MATERIALS AND METHODS

This is a cross sectional study that enrolled a total of 350 dentists working in private and public dental clinics in Benghazi by convenient sampling where dentists were approached personally at Benghazi Dental College and the Salmani Dental Clinic and at the 4th scientific day, which was organized by the Faculty of Dentistry, University of Benghazi, in March 2019. Participation in the survey was a voluntary basis, instructions were given for completing the questionnaire and all respondents were clearly

informed that participation was anonymous, and confidentiality was guaranteed. Inclusion criteria were dentists with or without post-graduate studies, graduated from dental college, University of Benghazi. Exclusion criteria were dentists working in oral pathology, oral medicine and oral diagnosis departments. The study was conducted between March and May 2019. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (University of Benghazi, Libya) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all subjects involved in the study. A self-administered pretested questionnaire based on previously validated items^{10, 11} was given to the dentists. The questionnaire was used to record demographic data such as age, gender, years of experience, qualification and practice nature. The knowledge of oral cancer risk factors, clinical characteristics, diagnosis procedures were assessed using 8 questions with multiple-choice responses. Furthermore, dentist's practices and attitude toward oral cancer were assessed using 8 questions with "yes" and "no" responses. The face and content validity of the questionnaire was evaluated by pilot testing the questionnaire on a small sample of dentists and no major corrections were needed.

Statistical analysis:

Results were expressed as numbers and percentages of respondents for each question and dichotomy of multiple-choice questions with right and wrong categories was made. Statistical analysis was performed using the statistical software SPSS version 20.0 (SPSS Inc., Chicago, IL, USA). Chi-square test was used to determine the association between different demographic and descriptive variables and the dentists' answers to the questions. P value < 0.05 was considered significant.

RESULTS

Questionnaire Data:

Demographic and Descriptive Data

From a total of 350 questionnaires distributed, 300 dentists returned completed questionnaires (14 dentists returned incomplete questionnaires, and 36 refused to participate) resulting in a response rate of

85.7%. The sample showed predominance of females 237 (79%), most dentists were under 40 years old 227 (75.7%) and majority were general dentists 223

(74.3%) who have five-year experience or less 108 (36%). Demographic characteristics of the participants are presented in table 1.

Oral Cancer Knowledge and Practices:

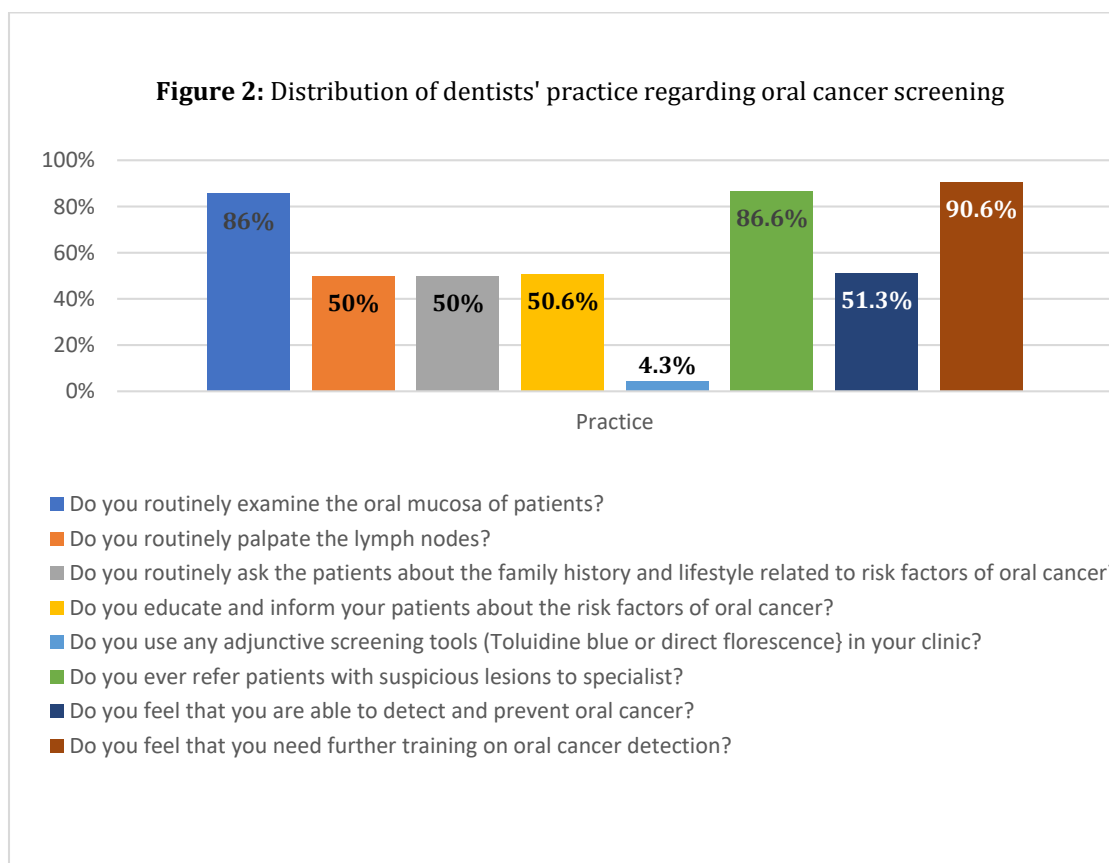
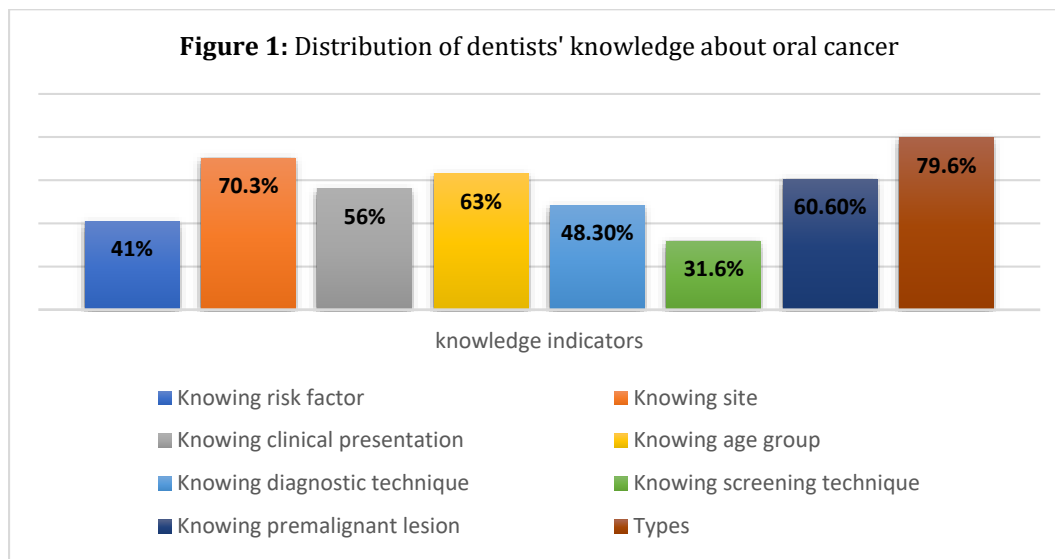
The distribution of dentists according to their level of knowledge about oral cancer from different perspectives is displayed in figure 1. The statistical analyses showed that most dentists have a suitable knowledge about the commonest type 239 (79.6%) and site 211 (70.3%) of oral malignancy. On the other hand, three items of the knowledge questions were incorrectly answered by more than half of our participants: only 95 (31.6%) knew that the most effective screening technique to identify oral cancer is visual inspection. 123 (41%) identified the use of tobacco as the main risk factor for oral cancer and 145 (48.3%) of the dentists recognized the most proper diagnostic technique for identifying suspected cancer lesions.

With respect to oral cancer practice procedures, 86% of the dentists reported that they perform mucosal

examination as part of their routine dental examination and the same percentage reported a referral of suspected cancer patient to a specialist. Referral was commonly performed by specialists compared to general dentists (p -value=0.04), and by participants with experience of 6 years or more (p -value<0.001). However, about half of participants stated that they neither palpate lymph nodes during routine examination, ask patients about family history of cancer, nor educate people about risk factors of oral cancer. Dentists practicing in public clinics more commonly reported to perform lymph node palpation during routine exam compared to those practicing in private clinics (p -value=0.04). About 90% of dentists declared that their knowledge about oral cancer needs to be updated with more training and 51.3% do not feel confident that they could detect malignant lesions. The distribution of dentists' practice regarding oral cancer screening is shown in figure 2.

Table 1: Demographics and practice

Factor	Frequency	Percent %
<i>Gender</i>		
male	63	21.0
female	237	79.0
<i>Age</i>		
< 40 years	227	75.7
> 40 years	73	24.3
<i>Experience</i>		
1-5 years	108	36.0
6-10 years	70	23.3
11-15 years	58	19.3
more than 15	64	21.4
<i>Qualifications</i>		
general dentist	223	74.3
specialist	77	25.7
<i>Practice</i>		
private	29	9.7
Public	158	52.7



DISCUSSION

The findings of the present study identified insufficient knowledge of dentists working in Benghazi regarding the screening and diagnostic techniques as well as identifying risk factor commonly associated with oral cancer.

Exposure to tobacco carcinogens is considered one of the main risk factors for oral cancer.¹² A retrospective study conducted on 122 oral squamous cell carcinoma Libyan patients proved that nearly 80% of them were tobacco smokers.¹³ Despite this fact, only 41% of the dentists in this study correctly mentioned tobacco as the most common risk factor. This percentage indicates a poor level of knowledge among dentists in Benghazi which was less than those reported in previous studies conducted in Kuwait,¹⁴ Italy,¹⁵ USA¹¹ and Ireland,¹⁶ and higher than a study from Iran, with 83.8% of the respondents having a low level of knowledge about risk factors.¹⁷

The most common clinical sign of oral cancer is ulceration where most cancers appear as a painless mouth ulcer that does not heal normally.⁸ A little more than half (56%) of our participants were able to specify that the persistent ulcer is the main clinical presentation of oral cancer. This question was more commonly answered correctly by dentists working in private practice compared to those working in public practices (p -value=0.04).

The majority of oral cancer cases occur in patients 45 years or older, with most patients at the time of diagnosis being at their sixties, though there is an increased incidence in patients under 45 years of age;⁵ to our surprise, about two thirds (63%) of dentists indicated that oral cancer is frequently diagnosed from 40 to 60 years of age, a percentage lower than that reported in similar studies elsewhere.^{14, 16}

Scalpel biopsy is considered the gold standard in definitive diagnosis of oral cancer,¹⁸ unfortunately less than half of respondents (48.30%) identify it as a diagnostic technique. Similar finding has been reported by Hashim and Ismail in United Arab Emirates who found that less than half (40%) of the respondents were aware of this fact.¹⁹ A cluster-randomized control trial conducted by Sankaranarayanan et al. (2013)²⁰ reported a sensitivity of 67.4% for the visual examination in detecting oral cancer. However, a study assessed the knowledge of dentists in USA, suggests that screening for oral cancer has not been adequately understood⁵. Similarly, only a small percentage of the present study sample (31.60%) recognized visual inspection as the most effective screening method. This is in contrast to the report by Kujan et al. (2006)²¹ who reported that 89.9% of dental practitioners strongly believed that visual screening is effective in the early detection and prevention of oral cancer, as well as, in a study in Sri Lanka, which is a developing country, the respondents had better knowledge of early detection of oral cancer,

with 65% having adequate knowledge of screening for this disease.²²

Leukoplakia and erythroplakia are the best known oral potentially malignancy disorders with malignant transformation rate which could be at least 50%²³. This fact was identified by 60.60% of respondents which is better than those seen in other studies.^{24, 25} In addition to that, a large proportion of dentists (79.60%) correctly identified Squamous cell carcinoma (SCC) as the most common type of oral cancers. The literature shows similar results, in which a higher number of dentists described Squamous cell carcinoma as the most common type of oral cancer,²⁶ yet others show even worse results.²⁷

The answers of dentists on the current practices revealed that most of them (86%) reported that they examine the oral cavity regularly. This is similar to results seen among dentists surveyed in Brazil (81.95%),²⁷ UK (84%)²⁸ and Spain (72.4%).²⁹ Furthermore, thorough head and neck examination is necessary for detecting enlarged lymph nodes that may indicate cancer metastasis, non-tender and fixed nodes are very suspicious for malignancy. About 30% of patients clinically present a palpable metastatic lymph node, and an additional 25% will develop cervical metastases in at least two years.¹² Thus, it is essential that practitioners are aware of the importance of palpation and know how to recognize the pattern of neoplastic lymphadenopathy. In our study only half of dentists (50%) reported routine palpation of lymph nodes. This was in accordance with the results of an Indian study where 14% of dental practitioners performed extra oral examination on new patient cases,³⁰ as well as, only 44.36% of Brazilian dental students considered the firm and painless lymph nodes as the main form of metastasis of these tumors.²⁷ However, in contrast with this study, Alaizari and Al-Maweri et al found that 68.3% of Yemenis dentists was comfortable to routinely palpate lymph nodes in the neck.⁶

Around 50% of our dentists routinely asked about risk factors and 50.30% educate patients about their lifestyle habits related to oral cancer. These results are proportional with the findings of a number of previous studies from Europe,²⁴ Ireland,¹⁶ and UK²¹ where a large percentage of the dentists found providing tobacco and alcohol cessation advice to their patients challenging and further perceived themselves inadequately trained to incorporate these interventions within their practices.¹⁶ Even in Arab countries, for example, in Kuwait, only 65% of the dentists routinely asked patients about their tobacco habits and 42.7% regularly advise patients about risk factors¹⁴ Whereas studies conducted in Malaysia³¹ and Spain²⁹ reported that the majority of dentists agreed that they were competent to educate patients on tobacco cessation.

Despite that British Dental Association³² encourages the use of toluidine blue as an adjunctive method for

screening potentially malignant lesions, very few respondents (4.30%) were using toluidine blue or direct fluorescence as an adjunctive screening tools at their dental clinics and most of practitioners (86.60%) would prefer to refer patients to specialists. This low percentage may reflect issues such as reliability, cost and a lack of significant evidence for its effectiveness or is perhaps a direct response by dentists to the reported high number of false positive results from toluidine blue application.³³

It is well established that dentists' knowledge and practices are positively influenced by continuous education courses.²⁹ Our study demonstrated that 48.7% of the dentists felt unconfident and unable to diagnose suspected oral cancer lesions and the vast majority of them (90.60%) were interested in obtaining further information and training about oral cancer early detection. Our results agree with the study by Fotedar et al. who found that 60.7% of the subjects believe that their knowledge regarding the prevention and detection of oral cancer was not up to date and 99% agreed that they need an additional training/information regarding oral cancer.³⁴

Our study had a few limitations, although the response rate was good, the study was conducted on dental practitioners in Benghazi city and may not be generalized to other regions due to the variation of clinical teaching and university settings across Libya. In addition, the data presented here were self-reported and subjective and the dentists have the tendency to provide socially acceptable answers that do not reflect their actual practicing habits, and this might bias the outcome. However, the anonymous nature of the questionnaire should have minimized this information error. Nevertheless, despite these limitations the study provides some important information about dentists' knowledge, opinion and practices regarding oral cancer. As highlighted by other researchers.^{5, 24} In this survey most dentists expressed their need to attend continuing education training on oral cancer which might be considered as an excellent indicator for improving the current situation, and this study provided clues on the areas that require focus more during the continuing education courses; such courses will go a long way to enhance the prevention and early detection of oral cancer.

CONCLUSION

Overall, this study showed poor level of awareness regarding oral cancer detection and prevention among the dentists in Benghazi. Extensive continuous education programs are necessary to increase the level of awareness about oral cancer. Future directions include improvement of current undergraduate and graduate training about examination, risk factors of oral cancer through both in-person and online educational programs.

REFERENCES

1. Ren ZH, Hu CY, He HR, Li YJ, Lyu J. Global and regional burdens of oral cancer from 1990 to 2017: Results from the global burden of disease study. *Cancer Commun (Lond)*. 2020;40(2-3):81-92.
2. IARC. World cancer report 2014. Stewart B, Wild C, editors. Lyon, France: World Health Organization; 2014.
3. WHO Global Oral Health Programme, Global data on incidence of oral cancer. Switzerland: World Health Organization; 2005.
4. Singh R, Al Sudani O. Cancer mortality in Benghazi, Libyan Arab Jamahiriya, 1991-96. *EMHJ-Eastern Mediterranean Health Journal*, 7 (1-2), 255-273, 2001. 2001.
5. Yellowitz JA, Horowitz AM, DRURY TF, GOODMAN HS. SURVEY OF US DENTISTS' KNOWLEDGE AND OPINIONS ABOUT ORAL PHARYNGEAL CANCER. *The Journal of the American Dental Association*. 2000;131(5):653-61.
6. Alaizari NA, Al-Maweri SA. Oral cancer: knowledge, practices and opinions of dentists in Yemen. *Asian Pac J Cancer Prev*. 2014;15(14):5627-31.
7. Baykul T, Yilmaz H, Aydin Ü, Aydin M, Aksoy M, Yildirim D. Early diagnosis of oral cancer. *J Int Med Res*. 2010;38(3):737-49.
8. Ogden GR, Mahboobi N. Oral cancer awareness among undergraduate dental students in Iran. *J Cancer Educ*. 2011;26(2):380-5.
9. Macpherson L, McCann M, Gibson J, Binnie V, Stephen K. The role of primary healthcare professionals in oral cancer prevention and detection. *Br Dent J*. 2003;195(5):277-81.
10. Carter L, Ogden G. Oral cancer awareness of general medical and general dental practitioners. *Br Dent J*. 2007;203(5):E10-E.
11. Gajendra S, Cruz GD, Kumar JV. Oral cancer prevention and early detection: knowledge, practices, and opinions of oral health care providers in New York State. *J Cancer Educ*. 2006;21(3):157-62.
12. Scully C. Oral cancer aetiopathogenesis; past, present and future aspects. *Med Oral Patol Oral Cir Bucal*. 2011;16(3):e306-11.
13. Jaber MA, Abu Fanas SH. The Pattern of Occurrence of Oral Squamous Cell Carcinoma in Libya. *Ibnosina Journal of Medicine & Biomedical Sciences*. 2010;2(3).
14. Joseph BK, Sundaram DB, Sharma P. Oral cancer awareness among dentists in Kuwait. *Med Princ Pract*. 2012;21(2):164-70.
15. Colella G, Gaeta GM, Moscariello A, Angelillo IF. Oral cancer and dentists: knowledge, attitudes, and practices in Italy. *Oral Oncol*. 2008;44(4):393-9.
16. Decuseara G, MacCarthy D, Menezes G. Oral cancer: knowledge, practices and opinions of dentists in Ireland. *J Ir Dent Assoc*. 2011;57(4).

17. Pakfetrat A, Falaki F, ESMAILI H, Shabestari S. Oral cancer knowledge among patients referred to Mashhad Dental School, Iran. 2010.
18. Mehrotra R, Gupta DK. Exciting new advances in oral cancer diagnosis: avenues to early detection. *Head Neck Oncol.* 2011;3(1):1-9.
19. Hashim R, Ismail S. Self-reported smoking cessation interventions among dental practitioners: A cross-sectional study. *European Journal of General Dentistry.* 2016;5(2):53.
20. Sankaranarayanan R, Ramadas K, Thara S, Muwonge R, Thomas G, Anju G, et al. Long term effect of visual screening on oral cancer incidence and mortality in a randomized trial in Kerala, India. *Oral Oncol.* 2013;49(4):314-21.
21. Kujan O, Duxbury A, Glenney A, Thakker N, Sloan P. Opinions and attitudes of the UK's GPs and specialists in oral surgery, oral medicine and surgical dentistry on oral cancer screening. *Oral Dis.* 2006;12(2):194-9.
22. Ariyawardana A, Ekanayake L. Screening for oral cancer/pre-cancer: knowledge and opinions of dentists employed in the public sector dental services of Sri Lanka. *Asian Pac J Cancer Prev.* 2008;9(4):615-8.
23. Bouquot J, Ephros H. Erythroplakia: the dangerous red mucosa. *Practical periodontics and aesthetic dentistry: PPAD.* 1995;7(6):59-67; quiz 8.
24. Applebaum E, Ruhlen TN, Kronenberg FR, Hayes C, Peters ES. Oral cancer knowledge, attitudes and practices: a survey of dentists and primary care physicians in Massachusetts. *The Journal of the American Dental Association.* 2009;140(4):461-7.
25. Hashim R, Abo-Fanas A, Al-Tak A, Al-Kadri A, Ebaid YA. Early detection of oral cancer-dentists' knowledge and practices in the United Arab Emirates. *Asian Pacific journal of cancer prevention: APJCP.* 2018;19(8):2351.
26. Scully C, Porter S. Swellings and red, white, and pigmented lesions. *BMJ.* 2000;321(7255):225-8.
27. Soares TRC, Carvalho MEdA, Pinto LSS, Falcão CA, Matos FTC, Santos TC. Oral cancer knowledge and awareness among dental students. *Brazilian Journal of Oral Sciences.* 2014;13(1):28-33.
28. Warnakulasuriya K, Johnson N. Dentists and oral cancer prevention in the UK: opinions, attitudes and practices to screening for mucosal lesions and to counselling patients on tobacco and alcohol use: baseline data from 1991. *Oral Dis.* 1999;5(1):10-4.
29. Seoane Lestón JM, Velo Noya J, Warnakulasuriya S, Varela Centelles PI, González Mosquera A, Villa Vigil MA, et al. Knowledge of oral cancer and preventive attitudes of Spanish dentists. Primary effects of a pilot educational intervention. 2010.
30. Khatri JM, Goyal S, Parekh M, Jyothi P, Hoshing C, Akifuddin S. Knowledge, attitude and awareness of oral carcinoma among dental practitioners—a survey. *Int J Oral Care Res.* 2015;3(4):32-6.
31. Saleh A, Kong YH, Vengu N, Badrudeen H, Zain RB, Cheong SC. Dentists' perception of the role they play in early detection of oral cancer. *Asian Pac J Cancer Prev.* 2014;15(1):229-37.
32. Association BD. Opportunistic oral cancer screening: a management strategy for dental practice. *BDA occasional paper.* 2000;6:1-36.
33. Martin I, Kerawala C, Reed M. The application of toluidine blue as a diagnostic adjunct in the detection of epithelial dysplasia. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology.* 1998;85(4):444-6.
34. Fotedar S, Bhardwaj V, Manchanda K, Fotedar V, De Sarkar A, Sood N. Knowledge, attitude and practices about oral cancers among dental students in HP Government Dental College, Shimla-Himachal Pradesh. *South Asian journal of cancer.* 2015;4(2):65.



Original article

Tooth Loss in Adults: A Survey of Reasons and Patterns in the Eastern Province of Aljabal Al-Akhder-Libya

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ABSTRACT:

Aim: This study aimed to investigate the reasons and patterns of tooth extraction among adults in the eastern province of Libya.

Methods: A cross-sectional study was carried out in three cities in Aljabal Al-Akhder in the east of Libya. A convenience sample was recruited from Libyan adult patients who underwent teeth extractions in dental practices in Albida, Goba and Derna from January 2022 to December 2022. The reasons and patterns for tooth extraction were collected using a form and it is categorized into: caries, periodontal diseases, orthodontic treatment, prosthetic treatment, impaction, trauma, and other reasons. Collected data were analyzed using SPSS software, the significance level was set at *P* value 0.05.

Results: The study included data from 1000 patients, of whom 55.7% were females, and the mean age was 28 years (SD = 13.8). The most commonly reported reason for tooth extraction was dental caries (59.2%), followed by severe periodontitis (14.1%), tooth impaction (8.2%), prosthodontics reason (4.8%), and failed RCT (4.6%). The most common tooth extracted was the first molar (27.1%), followed by the third molar (19.2%) and second molar (15.3%). The least extracted teeth, other than retained primary teeth, were canine (1.7%) and central incisors (2.5%).

Conclusion: Dental caries and periodontal diseases are the main causes of tooth loss among Libyan adults in Aljabal Al-Akhder. Molar teeth were the most commonly extracted teeth. Measures should be directed toward the prevention and early treatment of oral conditions to reduce teeth extractions and improve the oral health related quality of life.

Keywords: *Tooth extraction, tooth loss, reasons, Libya, adults.*

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INTRODUCTION:

Maintaining normal and functioning dentition is integral to oral and general health and related social well-being and quality of life.¹ Although many countries have improved figures in maintaining natural dentition, in many places around the globe (i.e in South Asia, Eastern Europe, Southern Latin America, Oceania, and Central Sub-Saharan Africa), there still be high rates of tooth loss with profound social inequality within countries.² There is growing interest in tooth loss as an epidemiological measure of dental status; it is regarded as an essential indicator of oral health, representing the

degree of dental care in a given community.³ Identifying the causes of tooth loss is a prerequisite to assessing the oral health needs in a community to inform local authorities.³ Many studies have been conducted in different parts of the world and reported the leading causes of tooth loss, including the sequelae of dental caries and periodontal disease, though trauma, orthodontic treatments, and pathologic reasons are also documented.⁴⁻¹³ Tooth loss has been associated with several sociodemographic, behavioural, or medical factors and is linked to nutritional changes, medical problems, and general well-being.¹⁴ Tooth loss

could also have an adverse impact on emotions and oral health-related quality of life, even after prosthetic replacement.¹⁵

Libya has three major provinces (West, East, and South). Most Libyans people live in the coastal cities. Aljabal Al-Akhder is located in the eastern province of Libya. It lies in the north east of the country. The capital is Bayda, the total population in the region was 157,747 with 150,353 Libyans. The inhabitants of this area include both urban and rural residents.¹⁶ Tooth loss is a complex outcome that reflects not only the dental disease but also the availability and accessibility of dental care services.² Understanding the current trends in tooth loss is important for planning dental services and updating the dental curriculum. Although three studies have been carried out among Libyan to investigate the reason and pattern of tooth extraction,¹⁷⁻¹⁹ none adequately represented Aljabal Al-Akhder. There is still a relative lack of information related to this area of research among Libyans in the eastern province. Therefore, this study aimed to investigate the reasons and patterns of tooth extraction among adults in the Green Mountain eastern province of Libya.

MATERIALS AND METHODS

Ethical consideration:

Permission was obtained from local authorities before commencing the study and informed verbal consent was obtained from all participants. The study was conducted in accordance with the Helsinki Declaration of research ethics.

Study design:

A Cross-sectional study was conducted over a period of 12 months (from January 2022 to December 2022). Three cities in Aljabal Al-Akhder were selected (Albida, Goba and Derna) based on their geographic location, population size and the accessibility of communication with dentists willing to participate in the study.

Sampling:

All dental patients aged 17 years and above who extracted their teeth in one of the selected dental clinics as study sites were included. A minimum study sample of 384 was required to estimate the number of Libyan adults who extracted their teeth for dental caries at a 95% confidence level and 0.05 margin of error.

Data collection procedure:

Each participating dentist was informed about the study's aims, the methods to collect data, and how to fill out the forms. Data were collected through clinical examination and interviews using specially designed forms based on similar studies.

The dental examination was done on the dental chair using the light, mouth mirror, and dental probe. No other diagnostic aids, such as dental X-rays, were used.

The form contains information on patient's demographic variables such as age; gender; education level; dental attendance pattern; occupation; place of birth; type of dental clinic; the tooth number, and reason for its extraction. The reasons for tooth extraction were categorized as follows: dental caries, periodontitis, trauma, impaction, orthodontic reasons, prosthodontics reasons, pathology such as a cystic lesion, failed RCT, and retained primary or supernumerary teeth.

Data analysis: Data were analyzed using SPSS software Version 25. Numbers and percentages were used to describe the demographics of the study sample and the reasons for tooth extraction.

RESULTS:

The total number of participants was 1000. The Demographic variables of the study sample are described in Table (1). It shows that more than half of the participants (557, 55.7%) were females., the age of participants ranged between 20 and 50 years with a mean of 28 years (SD = 13.8), and more than one-third (422, 42.2%) were from Albaida city. Nearly equal proportions of participants were recruited from public and private clinics (510, 51%, and 490,49%, respectively).

Table 1: Sociodemographic Characteristics

Variable	Mean (SD)	N	(%)
Age	28 (13.8)		
Age Group			
17-20		195	(19.5%)
21-30		221	(22.1%)
31-40		112	(11.2%)
41-50		332	(33.2%)
51-60		99	(9.9%)
≥61		41	(4.1%)
Gender			
Female		557	(55.7%)
Male		443	(44.3%)
Dental Clinic			
Public		510	(51.0%)
Private		490	(49.0%)
Cities			
Albaida		422	(42.2%)
Goba		247	(24.7%)
Derna		331	(33.1%)

The main reasons for tooth extraction among the study participants are depicted in Figure (1). It reveals that dental caries and its sequels is the most common

reason for tooth extraction (59.2%), followed by severe periodontitis (14.1%), tooth impaction (8.2%), prosthodontics reason (4.8%) and failed RCT (6.4%).

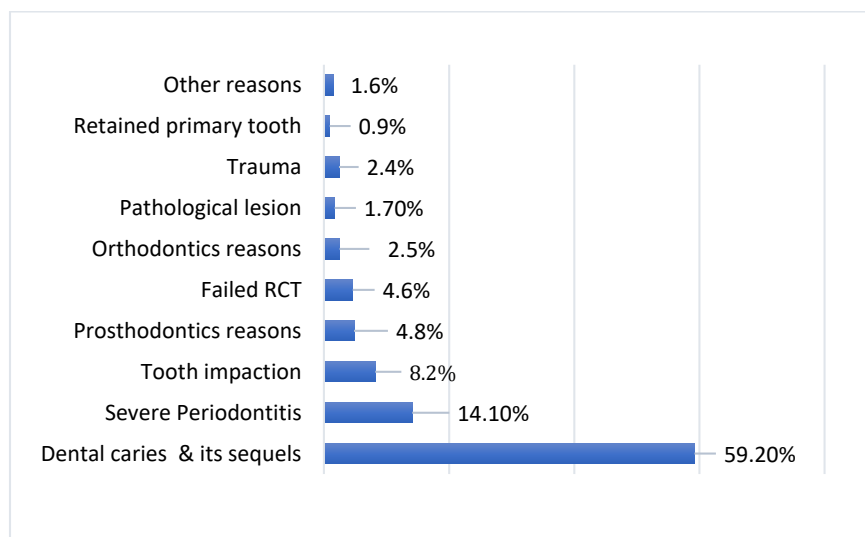


Figure 1: Distribution Based on the Reason for Tooth Extraction

Figure (2.) shows the percentage of extractions based on individual teeth. It reveals that the most common tooth extracted was the first molar (27.1%), followed

by the third molar (19.2%) and second molar (15.3%). The least extracted teeth other than retained primary teeth were canine (1.7%) and central incisors (2.5%).

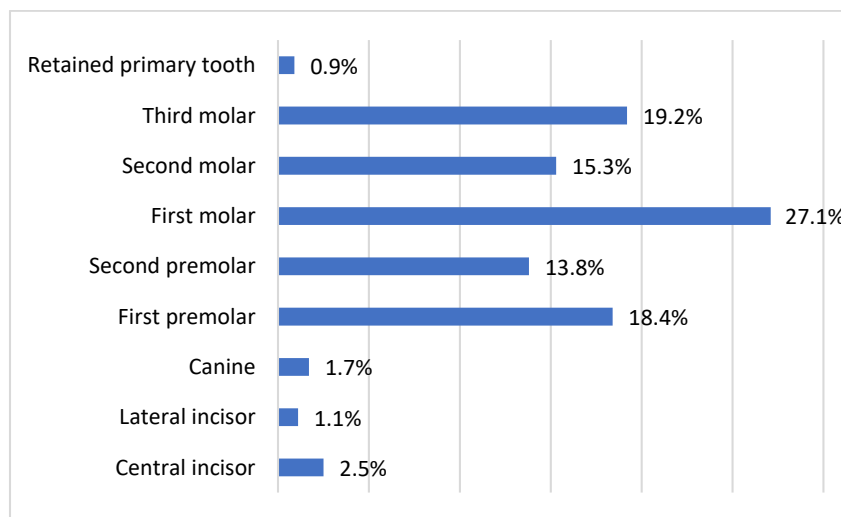


Figure 2: Distribution Based on Individual Tooth Extraction

DISCUSSION:

The study aimed to explore the reasons for tooth extraction among Libyan adults in the eastern province of Libya, namely Aljabal Al-Akhder. Our study demonstrated that dental caries, sequels, and severe periodontitis are the most common reasons for tooth extraction. These findings are consistent with other

studies conducted elsewhere in Libya¹⁷⁻¹⁹ and other countries.^{6,8,10,11,20} Moreover, caries continues to be a global public health problem and the most common oral disease with increased prevalence among the adult population.²¹

An alarming finding in the present study is the high extraction rate of first and second molars, which aligns with the results of the previous studies.^{7,22,23} That might be explained by the fact that posterior teeth are more susceptible to dental caries than anterior teeth, mainly due to their morphology.²⁴ These teeth are critical for occlusion and function. Although dentists may have no choice but to extract these teeth to solve patients' problems, efforts should be made to minimize the need for extracting permanent teeth in general and molars specifically. Raising awareness of the importance of maintaining natural teeth should be included in future health education and promotion programs. In addition, free dental care for geriatric patients can be another solution to reduce the cost and need for prosthodontic treatment. Around 1 per cent of the study sample extracted teeth for prosthodontic reasons, suggesting low utilization of this service. In addition, prosthodontic services are provided in the private sector only.

The present study has some limitations which need discussion. First, the study used a cross-sectional design which can only provide a snapshot of reasons for tooth extraction with limited analysis. Second, the study data were collected by different dentists; hence, the extraction decision depends on their attitudes and clinical experience. Finally, the data was limited to the main cities, which may ignore the important rural population in the study region. However, a relatively large sample size was recruited with clinically assessed data, and the study population represented different social and geographic classes in Aljabal Al-Akhder, which lends strength to the current study.

CONCLUSION:

This study shows that dental caries and periodontal diseases are still the major causes of tooth loss among study populations. Molar teeth were the most commonly extracted teeth. Measures should be directed toward the prevention and early treatment of oral conditions to reduce teeth extractions and improve the oral health-related quality of life.

It is of urgent need to give priority to the development and implementation of programs for oral health education and promotion.

REFERENCES:

1. Baiju RM, Peter E, Varghese NO, Sivaram R. Oral health and quality of life: current concepts. *J Clin Diagn Res.* 2017 Jun;11(6):ZE21-ZE26.
2. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe tooth loss: A systematic review and meta-analysis. *J Dent Res.* 2014 Jul;93(7 Suppl):20S-28S.
3. Haworth S, Shungin D, Kwak SY, Kim HY, West NX, Thomas SJ, Franks PW, Timpson NJ, Shin MJ, Johansson I. Tooth loss is a complex measure of oral disease: Determinants and methodological considerations. *Community Dent Oral Epidemiol.* 2018 Dec;46(6):555-62.
4. Aljafar A, Alibrahim H, Alahmed A, AbuAli A, Nazir M, Alakel A, Almas K. Reasons for permanent teeth extractions and related factors among adult patients in the Eastern Province of Saudi Arabia. *The Sci World J.* 2021 Feb; vol. 2021.
5. Khalifa N, Allen PF, Abu-bakr NH, Abdel-Rahman ME. Factors associated with tooth loss and prosthodontic status among Sudanese adults. *J Oral Sci.* 2012;54(4):303-12.
6. Jafarian M, Etebarian A. Reasons for extraction of permanent teeth in general dental practices in Tehran, Iran. *Medical Principles and Practice.* 2013 Dec 29;22(3):239-44.
7. Taiwo AO, Ibikunle AA, Braimah RO, Sulaiman OA, Gbotolorun OM. Tooth extraction: Pattern and etiology from extreme Northwestern Nigeria. *Eur j dent.* 2017 Jul;11(03):335-9.
8. Chrysanthakopoulos NA, Konstantinos Vlassi C. Reasons and risks of permanent teeth extraction. The general dental practice in greece. *Int J Med Dent.* 2013 Oct 1;17(4).
9. Montandon, Andréia Affonso Barretto, Elizangela Partata Zuza, and Benedicto Egbert Corrêa de Toledo. Prevalence and reasons for tooth loss in a sample from a dental clinic in Brazil. *Int J Med Dent.* 2012. doi: 10.1155/2012/719750. Epub 2012 Aug 29. PMID: 22973312; PMCID: PMC3437633.
10. Aida J, Ando Y, Akhter R, Aoyama H, Masui M, Morita M. Reasons for permanent tooth extractions in Japan. *J Epidemiol.* 2006 Sep;16(5):214-9.
11. Al-Shammari KF, Al-Ansari JM, Al-Melh MA, Al-Khabbaz AK. Reasons for tooth extraction in Kuwait. *Medical principles and practice.* 2006 Oct 13;15(6):417-22.
12. Trovik TA, Klock KS, Haugejorden O. Trends in reasons for tooth extractions in Norway from 1968 to 1998. *Acta Odontol Scand* 2000; 58: 89-96.
13. McCaul LK, Jenkins WM, Kay EJ. The reasons for extraction of permanent teeth in Scotland: a 15-year follow-up study. *Br Dent J* 2001; 190: 658-62.
14. Silva M.F., Jr., Batista M.J., de Sousa M.D.L.R. Risk factors for tooth loss in adults: A population-based prospective cohort study. *PLoS ONE.* 2019;14(7):e0219240.
15. Imam AY. Impact of tooth loss position on oral health-related quality of life in adults treated in the community. *J Pharm Bioallied Sci.* 2021 Nov;13(Suppl 2):S969-S974.

16. Jabal al Akhdar: in Wikipedia, the free encyclopedia. Available from: https://en.wikipedia.org/wiki/Jabal_al_Akhdar
17. Hassan AK. Reasons for tooth extraction among patients in Sebha, Libyan Arab Jamahiriya: a pilot study. *EMHJ-Eastern Mediterranean Health Journal*, 2000, 6 (1), 176-178,
18. Byahatti S, Ingafou M. Reasons for extraction in a group of Libyan patients. *Int J Dent.* (2011); 61(4):199-203.
19. Elzer A, Ensir H, Elsalhi A, Kablan R, Jedeh M, Elramli A, Eddaiki A. Reasons for Tooth Extraction among Libyan Adults: Multi-Center Cross-Sectional Study. *LJD.* 2021;5(1);109-119.
20. Richards W, Ameen J. Coll AM, Higgs G. Reasons for tooth extraction in four general dental practices in South Wales. *Br Dent J.* 2005; 198: 275-278.
21. Peres MA, Macpherson LMD, Weyant RJ, Daly B, Venturelli R, Mathur MR, Listl S, Celeste RK, Guarnizo-Herreño CC, Kearns C, Benzian H, Allison P, Watt RG. Oral diseases: a global public health challenge. *Lancet.* 2019 Jul 20;394(10194):249-260.
22. Alesia K, Khalil HS. Reasons for and patterns relating to the extraction of permanent teeth in a subset of the Saudi population. *Clin Cosmet Investig Dent.* 2013 Jul 30:51-6.
23. Lee CY, Chang YY, Shieh TY, Chang CS. Reasons for permanent tooth extractions in Taiwan. *Asia Pac J Public Health.* 2015 Mar;27(2):NP2350-7.
24. Agrawal SK, Bhagat T, Shrestha A. Dental caries in permanent first molar and its association with carious primary second molar among 6-11-Year-Old School Children in Sunsari, Nepal. *Int J Dent.* 2023.