ORIGINAL RESEARCH

Knowledge and Awareness about Chair-Side Diagnostic Techniques for the Screening of Suspicious Oral Lesions among General Dental Practitioners - A Cross-Sectional Survey

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Abstract

Introduction: General dental practitioners (GDPs) play an important role in screening and early detection of oral potentially malignant disorders (OPMD) and oral cancer.

Aim: This survey aims to assess the knowledge and awareness of general dental practitioners about chairside diagnostic techniques for screening of inflammatory oral lesions, potentially malignant lesions and oral cancer.

Materials and Methods: GDPs (n=125) were surveyed about their knowledge about chairside diagnostic techniques for early detection and screening of suspicious oral lesions. The interview was based on a pre-structured questionnaire containing 14 closed ended questions. Chi square test was used for evaluating the association of survey parameters.

Result: 95.2% of dentists do diagnosis and management of suspicious oral lesions along with chief complaints. There is a strong association between the educational status of GDPs and their method for management of suspicious oral lesions (p=0.002). 84.5% of the postgraduate GDPs are aware of chemiluminescence methods than graduate level GDPs (p =0.0009). Majority of the graduate GDPs are unaware of VELScope(p=0.0009). Usage of all non-invasive techniques was found to be less among graduate GDPs (p=0.002).

Conclusion: The overall awareness of the dentists involved in the study were good and postgraduate GDPs are more aware and practically ahead about the non-invasive diagnostic techniques than graduate GDPs.

Keywords: Knowledge; awareness; chairside diagnostic techniques; screening; suspicious oral lesions.

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Introduction

Oral lesions are a broad term and includes, inflammatory lesions, lesions of infectious origin, oral potentially malignant lesions and oral cancer. Among these, lesions of inflammatory and infectious origin should be treated accordingly and oral potentially malignant lesions and early oral cancer are quiet worrisome. According to Globocan 2020, the most common cancer type among males in India is lip and oral cavity cancer and its incidence among males and females are 104,661 and 31,268 respectively.[1] More than 90% of the reported oral cancer cases are coming under the category of Oral Squamous Cell Carcinoma with prevalence of 300,000 cases annually and it is one of the major problems in South East Asia and Indian subcontinent.[2,3] Oral cancer can also develop in apparently normal mucosa and can also be preceded by clinically obvious potentially malignant lesions.[3] Progression of epithelial dysplasia will decide the conversion of an oral potentially malignant disorder into oral cancer.[4] A systematic review by Warnakulasuriya and Ariyawardana stated that the overall malignant transformation rate of leukoplakia is 1.5 %- 34% and 3% in homogenous lesions and 14.5 % in inhomogeneous lesions.[5] The rate of malignant transformation in oral submucous fibrosis was estimated to be between 2 % – 8 %.[6]

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The screening and early detection of potentially malignant oral disorders (PMODs) and oral cancer are the only means for controlling the disease progression. General dental practitioners can play an important role in this crucial area.[7] Awareness about the lesions, their early screening, diagnosis, and prevention is critically important and is the best way to prevent the aggressive outcomes.

Several studies have suggested out the lack of adequacy in early detection and screening of suspicious oral lesions and its progression to oral cancer by physicians and general practicing dentists.[8-11] Various techniques have been adopted to improve dentist's practice methodology in the detection and management of potentially malignant lesions. There have been several studies in literature which upheld the need to upgrade the knowledge of general dental practitioners and dental hygienists in detection of suspicious oral lesions.[12-14]

Conventional gold standard method for confirming OPMD is biopsy along with proper history taking and clinical examination. Other methods such as cytological smears and vital staining have been used as adjunct to biopsy to screen these suspicious lesions.[15] The usage of non-invasive chairside diagnostic techniques for suspicious oral lesions such as vital staining, chemiluminescence, autofluorescence and brush biopsy have been noted among general dental practitioners.[16] However, besides the development of these newer methods, several studies have suggested that there exists a knowledge gap among dental practitioners about the techniques for diagnosing suspicious oral lesions.[17] Therefore, the awareness and proper practice of newer diagnostic techniques among dentists can affect early diagnosis of OPMDs and prevent its progression to OSCC.[18] Hence this survey aims to assess the knowledge and awareness of general dental practitioners about chairside diagnostic techniques for the early detection and screening of suspicious oral lesions.

Materials and Methods

The present pilot study was conducted with approval from the Institutional Standard review board. This online based cross sectional-questionnaire study was conducted between January and March 2021. A pre-structured questionnaire consisting of 14 closed ended questions were prepared using google forms and circulated among the practicing dentists. Demographic details along with the educational status and Years of experience (Table 1) were also recorded. Dental practitioners with minimum qualification of BDS, postgraduates and practitioners who completed post-graduation were included in the present study. Undergraduate students and students doing internship were excluded. The responses were tabulated in MS Excel and transported to SPSS software for statistical analysis. The collected data were analysed using IBM SPSS Statistics 23 software. Descriptive statistics was used to analyse the data and Pearson's Chi square test was used to evaluate the influence of educational status and Years of experience with the knowledge and awareness about the chairside diagnostic procedures. P value less than 0.05 was considered statistically significant.

Results

A total of 125 respondents participated in the study. Among participants, 72% were females and 28% were males. 53.6% were completed BDS and practicing, 46.4% were completed MDS and practicing and 35.2% having less than 2 years and 64.8% having more than 2 years of experience. In this survey, 92% of the general dental practitioners (GDPs) agreed on the progression of suspicious oral lesions towards malignancy and 95.2% do diagnosis and management of suspicious oral lesions along with chief complaints. Even though most of the dentists were aware about the use of non- invasive techniques in screening of suspicious oral lesions in general, only 79.2% knew about vital staining using toluidine blue. 91.38% of the dentists completed MDS and practicing were aware about vital staining, which was high when compared to dentists practicing after BDS (P=0.002) (Figure 5).

Nearly 69% of the dental practitioners were aware of the chemiluminescence method for screening oral lesions. However, 44.8% of dentists practicing after BDS were unaware. A statistical significance (P=0.0009) was obtained between educational status GDPs and their awareness on chemiluminescence technique (Figure 4). Surprisingly, 52.8% of the GDPs were not sure of the colour of abnormal mucosa in the chemiluminescence method using VIZILITE.

58.4% of the GDPs were not aware of VELScope and the colour of normal mucosa during screening of oral lesions using VELScope. 73.1% of GDPs who completed BDS were unaware of VELScope, when compared to dentists with post-graduation (P=0.0009) (Figure 3). 75.2% of the practitioners were aware that during photodynamic therapy, the highly dysplastic tissue will emit fluorescence.

Majority of dental practitioners knew that brush biopsy is a non- invasive procedure. Nearly 29% of the dental practitioners were of the opinion that auto fluorescence using VELScope (28.8%) is the best non- invasive technique for diagnosing suspicious oral lesions followed by vital Staining (24%) and brush biopsy (20%). Surprisingly, 64% of the dental practitioners have not used any non-invasive techniques for screening of suspicious oral lesions in day to day practice. 50% of MDS practitioners and 76.12% of BDS practitioners haven't used any of these techniques. A statistical significance (P=0.002) was obtained between the educational status of GDPs and their usage of non-invasive techniques (Figure 2).

Majority of the practitioners felt that newer non-invasive techniques were not superior to conventional biopsy. Majority of the MDS practitioners knew that non-invasive techniques are not superior, but Surprisingly, 50.8% of the BDS practitioners believed these techniques were superior over biopsy (P=0.042) (Figure 1). Even though majority of the practitioners opined

Table 1: The gender distribution, educational status and years of experience of participants included in the survey

Gender	• Male • Female	• 72% • 28%
Educational status	• Completed BDS and practicing • Completed MDS and practicing	• 53.60% • 46.40%
Years of experience	• Less than or equal to 2 years Greater than 2 years	• 35.20% • 64.80%

that conventional biopsy is superior, 92.59% of the practitioners with more than 2 years of experience believed that newer non-invasive techniques were easier to be used in diagnosing suspicious oral lesions, but only 79.55% with less than 2 years of experience believed so (P=0.032) (Figure 6). However, the majority of practitioners are of the opinion that newer non-invasive techniques alone are not sufficient for final diagnosis of the doubtful oral lesions.

Discussion

General dental practitioners should be capable of differentiating normal oral mucosal variations from suspicious oral lesions and its progression to malignancy since general dental practitioners play an important role in oral screening.[19] Since oral cancer is the second most common cancer in Indian subcontinent, early detection, timely referral of potentially malignant disorders and its effective management can prevent ag-

Table 2: Showing the survey questions and their responses

Sl no	Questions	Choices	No of responses (Percentage %)
1	Do you know that some suspicious oral lesions can progress towards malignancy?	• Yes • No • May be	• 92% • 0.80% • 7.20%
2	What would be your approach on identifying a suspicious oral lesion during your day to day practice	• Only treat the chief complaints of patient • Diagnosis and management of suspicious oral lesions along with treatment of chief complaints	• 4.80% • 95.20%
3	Are you aware that non-invasive techniques can be used for screening of suspicious oral lesions?	• Yes • No	• 96% • 4%
4	Do you know that a simple chair side staining technique using toluidine blue can be used for detection of abnormal tissue in the oral cavity?	• Yes • No	• 79.20% • 20.80%
5	Have you heard of the chemiluminescence method for screening oral lesions?	• Yes • No	• 68.80% • 31.20%
6	In the chemiluminescence method using VIZILITE, what is the color of abnormal mucosa?	• Whitish • Bluish • Don't know	• 27.20% • 20% • 52.80%
7	Do you know about VELScope?	• Yes • No	• 41.60% • 58.40%
8	During screening of oral lesions using VELScope, the normal mucosa appears as?	• Light green • White • Don't know	•28.80% • 3.20% • 68%
9	During photodynamic therapy using photosensitizer aminolevulinic acid and light source, the highly dysplastic tissue will emit	• Fluorescence • Non fluorescent	• 75.20% • 24.80%
10	According to you, is a brush biopsy an invasive or non- invasive procedure?	• Invasive • Non invasive	• 17.60% • 82.40%
11	Which one of these is an easier technique for diagnosing suspicious oral lesions ?	• Vital Staining using toluidine blue • Chemiluminescence • Autofluorescence using VELScope • Photodynamic therapy • Brush biopsy • Conventional biopsy	• 24% • 10.40% • 28.80% • 4.80% • 20% • 12%
12	Have you ever used any of these noninvasive techniques for screening of suspicious oral lesions in day to day practice	•Yes • No	36% • 64%
13	Do you think that the newer noninvasive techniques are superior over conventional biopsy in screening of doubtful oral lesions?	• Yes • No	• 42.40% • 57.60%
14	Do you think newer noninvasive techniques alone are sufficient for final diagnosis of the doubtful oral lesions?	• Yes • No	• 12.80% • 87.20%

gressive outcomes and further lead to better prognosis.[20] This is possible only when the general dental practitioners are well aware of the clinicopathology of the lesions and techniques for screening of suspicious oral lesions.[21] There are few studies, which reported the lack of accuracy of diagnosis in suspicious lesions when the diagnosis is only based on clinical features.[22,23]

However, in the past few decades, dentists have developed noninvasive techniques like vital staining, chemiluminescence, autofluorescence and brush biopsy apart from clinical evaluation.[24] Vital staining is the simplest, inexpensive and sensitive tool for identifying oral epithelial dysplasia and early squamous cell carcinoma. During vital blue staining, toluidine blue dye is applied in the area of lesion and later washed. The dysplastic areas will retain the blue colour of the dye. Brush biopsy is a rapid chair side procedure causes minimal bleeding and results in a collection of a complete transepithelial tissue sample. This stained tissue sample will further help in detailed microscopic examination for dysplastic cells. VELscope is a device based on autofluorescence. It uses narrow-emission tissue fluorescence for distinguishing dysplastic and non-dysplastic lesions. Normal mucosa emits a pale green autofluorescence while the dysplastic tissue cannot. In chemiluminescence us-

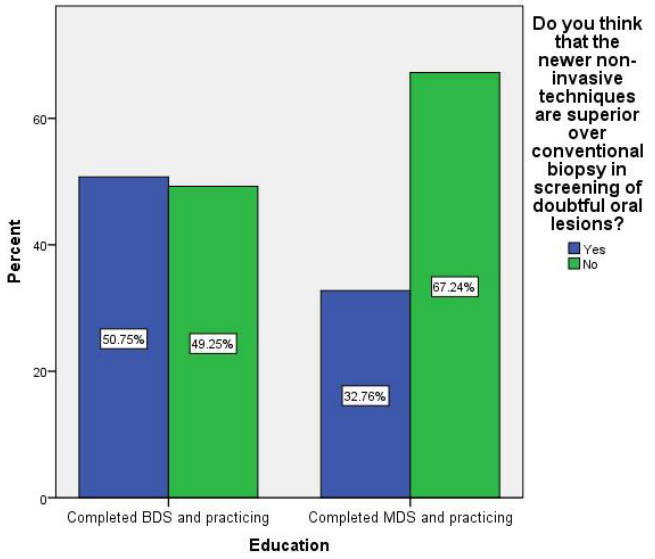

Fig. 1: Association between educational status of general dental practitioners (GDPs) and their response to the query. Chi-square test- p value = 0.002. Majority of the GDPs completed MDS and practicing are aware of Vital staining techniques.

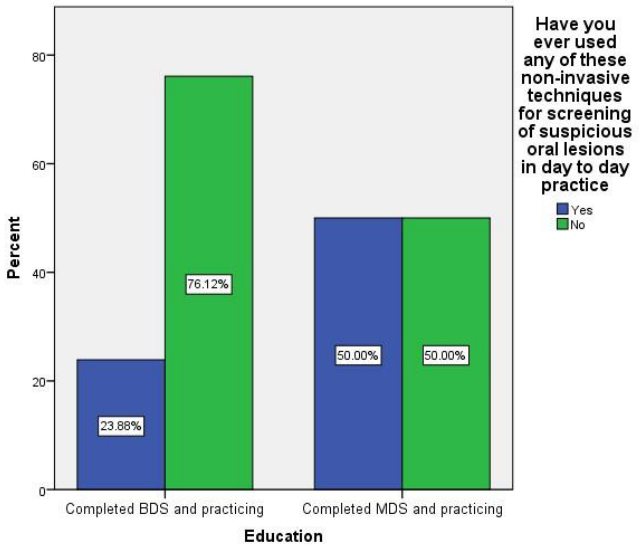

Fig. 2: Association between educational status of general dental practitioners (GDPs) and their response to the query. Chi-square test- p value = 0.0009. 84.5% of the GDPs completed MDS and practicing are aware of chemiluminescence methods.

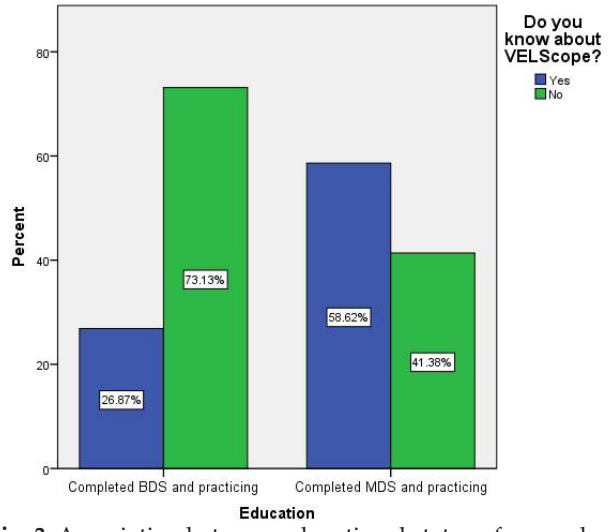

Fig. 3: Association between educational status of general dental practitioners (GDPs) and their response to the query. Chi-square test- p value = 0.0009. More GDPs who completed BDS are unaware of VELScope when compared to dentists with post graduation.

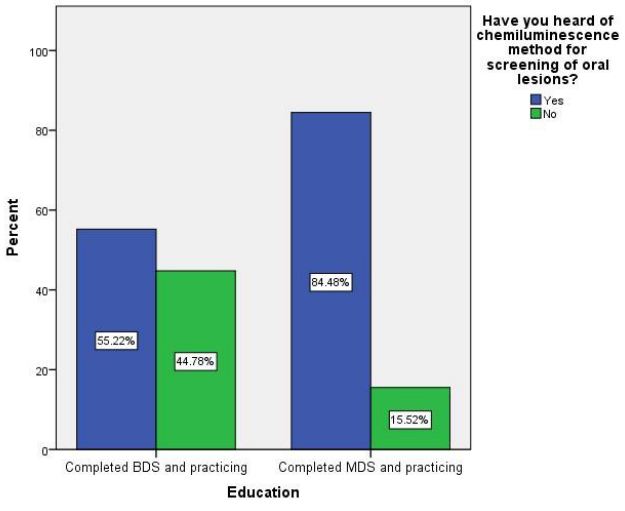

Fig. 4: Association between educational status of general dental practitioners (GDPs) and their response to the query. Chi-square test- p value = 0.002. The usage of non-invasive techniques during practice is less among GDPs who hold BDS degree.

ing Vizilite, the normal mucosa absorbs the light and appears as blue, whereas the dysplastic mucosa appears acetowhite. There should be proper awareness among the general dental practitioners about the various techniques and their day to day practice for early detection and screening of oral lesions.

The present survey analysed that about 92% of GDPs were aware about the possibility of malignant transformation of suspicious oral lesions, however the remaining 8% were unaware of this fact. This was not in accordance with the study by Shaila M et al in 2013, according to them only 52% of the practicing population were aware about the possibility of malignant transformation of suspicious oral lesions.[7] This variation could be due to time of conduction of the survey, geographical variations and difference in sampling. Nowadays, dental practitioners are attending workshops and conferences regularly compared to the previous decade, this could be another reason behind the improved awareness about the prognosis of oral mucosal lesions. Less than 5% of the GDPs were not willing to make any attempt to treat oral mucosal lesions apart from patients' chief complaints. Similar results were obtained for Shaila M et al in 2013. Even though this seems to be very less, this has to be further reduced to 0% through more knowledge awareness programs and conferences, because it's dentist's duty to completely examine the oral cavity.

Most of the dentists were aware about the use of non- invasive techniques but only 79.2% knew about vital staining using toluidine blue and MDS practitioners had better idea about toluidine blue staining compared to BDS practitioners. Similar results were also obtained by Swathi et al in 2018. This could be due to MDS curriculum being extensive compared to BDS and incorporates in depth understanding of screening and diagnostic techniques. However, more emphasis on the non-invasive screening techniques for mucosal lesions should be given in the BDS curriculum because most of the practicing dentists in the community are BDS practitioners.

Even though the majority of the GDPs were aware of the chemiluminescence method, autofluorescence using VELScope and photodynamic therapy, a significant proportion of them were not sure of the colour of abnormal mucosa and normal mucosa in each one of these techniques. This points to the lack of in-depth practical knowledge about the procedure. The knowledge and practical awareness were limited among BDS dental practitioners compared to MDS practitioners irrespective of the specialty. Apart from this most of the dental practitioners had knowledge about brush biopsy. This was also not in accordance with previous study by Shaila M et al, in which the majority of the study population were not aware of brush biopsy.[7] This difference could be due to the time gap between two studies and variations in sampling.

Among MDS practitioners, 50% of the practitioners preferred using non-invasive techniques. The non-invasive technique usage was found to be comparatively less among BDS practitioners which accounted for only 23.88%. This is due to the extensive MDS curriculum allowing the student to get familiarised with all the equipment so that they can use it in their day today practice.

The non-invasive techniques were superior to conventional biopsy; this misconception was deeper rooted among BDS practitioners. Occasionally these non-invasive techniques can lead to false positive and false negative results and this has to be double checked with conventional biopsy otherwise it will affect the prognosis of the lesion. Hence the applications and limitations of these non-invasive techniques also have to be highlighted among general dental practitioners. Though various non-invasive techniques for screening of oral lesions are available, conventional biopsy is considered to be the gold standard among the majority of the dental practitioners. Several studies add value to this point.[25-28] The ease of application of non-invasive techniques was better accepted by dentists with more than 2 years of experience. This suggests that dentists

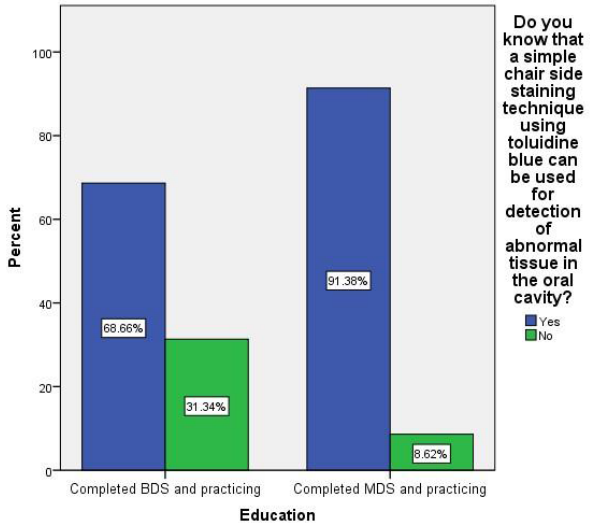

Fig. 5: Association between educational status of general dental practitioners (GDPs) and their response to the query. Chi-square test- p value = 0.042. Majority of dentists with postgraduate degree know that noninvasive techniques are not superior to biopsy.

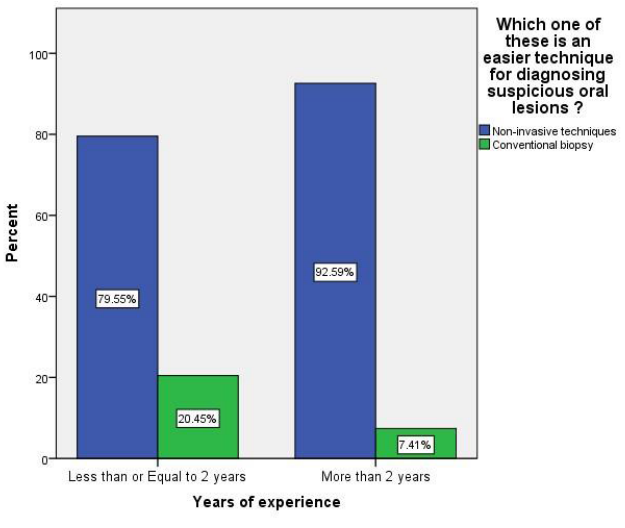

Fig. 6: Association between experience of general dental practitioners (GDPs) and their response to the query. Chi-square test- p value = 0.032. Dentists with more than 2 years of experience agreed to the fact that noninvasive techniques are easier compared to conventional biopsy.

with more years of experience are more into practicing noninvasive techniques when compared to dentists with less years of experience. The usefulness of non-invasive techniques like cost effectiveness, easiness of use in emergency and compromised cases has to be highlighted among newly passed out dentists.

Less sample size, geographical restriction of samples are the major drawbacks of the current study. More futuristic studies are needed in all India levels on this serious subject and it may have an impact on screening of oral cancer at early stage and aid in better prognosis.

Conclusion

The present study results suggest that MDS students and graduates have more awareness on the practical aspect of screening of oral lesions when compared to BDS graduates. This gap in knowledge can be brought down by expanding BDS curriculum by incorporating hands on training on newer methods for screening of oral lesions. Conferences and seminars should be conducted at institutional level regarding the newer techniques for screening of doubtful oral lesions for enforcing its importance without denying the usefulness of conventional biopsy. Compulsory hands on experience workshops and conferences and should also be conducted at a state level by the respective state dental council for practicing general dentists.

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