



Knowledge and practice of indirect vision during dental procedure among dental students ‘Across-sectional study’

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ABSTRACT

Maintaining good oral hygiene is crucial for an individual's overall health and well-being. Proper oral care plays a significant role in enhancing the quality of life. In clinical practice, certain areas of the oral cavity are difficult to visualize directly during treatment. This study aimed to assess the Knowledge and practice of indirect vision during dental procedures among dental students. An online questionnaire-based study was conducted using a Survey Planet link to evaluate the knowledge and practice of indirect vision among dental students during clinical procedures. A total of 100 participants, comprising of final-year dental students and CRIs were included in the study. The responses collected were systematically analyzed and tabulated. Descriptive statistics were used for data interpretation. The majority of the participants were not aware of antifog mouth mirrors, sprays or wipes (79.1%) and lacked awareness of learning curve associated with indirect vision such as writing and drawing under mirror guidance (84.1%).

I. INTRODUCTION

Disease burden and health problems are rapidly increasing in India including those related to oral and dental health. Tooth decay also known as dental caries is a multifactorial disease influenced by diet, oral hygiene and socio- demographic factors. In India, epidemiological studies show that dental caries affects a large proportion of the population, with an

estimated overall prevalence of around 50-60% across age groups[1].

Effective prevention and management of dental caries depend on a thorough understanding of disease etiology, precise diagnosis, minimally invasive treatment strategies, and prompt therapeutic intervention.[2]

An indispensable tool in dentistry, the mouth mirror facilitates both direct and indirect observation of the treatment area, allowing clinicians to visualize surfaces that would otherwise be obscured. In clinical practice, certain parts of the mouth are difficult or impossible to view directly, necessitating the use of indirect vision to avoid awkward posture that can lead to musculoskeletal strain and impaired ergonomics. Although indirect vision is a fundamental skill, dental students often find it challenging in their early clinical experience, leading to frustration and a tendency to avoid using a mouth mirror, particularly when attempting to view teeth in the maxillary arch.[3,4,5]

The development of manual dexterity, a critical clinical skill used on a regular basis, is emphasized in preclinical education for Operative Dentistry (OD), as it underpins many restorative procedures that require fine motor control and precision. This motor skill involves gaining the tactile and hand-eye coordination necessary to perform tasks such as precise cavity preparation in tissues with varying physical resistance, a competence that preclinical training has been shown to significantly improve.[6,7,8]



The two stages of the most popular teaching methodology in Operative Dentistry are (1) a theoretical introduction that includes schematic representations of the procedures and (2) practical experience with human models that simulate actual clinical situations. Reducing the distance between working in a real clinical context and practicing in a synthetic preclinical environment is the aim of simulation training. [6]

Temperature differences between the oral cavity and the mirror surface cause condensation and fog deposition on mouth mirrors, which impedes vision and disrupts clinical procedures. This fogging phenomenon is especially problematic in areas that are difficult to visualize, such as the lingual surfaces or posterior teeth, where reduced visibility can lead to treatment delays and errors during indirect vision tasks.[9]

II. MATERIALS AND METHOD

A cross-sectional online survey was conducted to evaluate the knowledge and practice of indirect vision among dental students during clinical procedures. A total of 100 participants, consisting of final-year dental students and CRIs, voluntarily completed the questionnaire via a Survey Planet link. The survey included 13 questions about their understanding and use of indirect vision techniques.

Chi-square tests and descriptive statistics were used to analyze the data from the responses. The findings revealed that the participants' proficiency levels varied, with some reporting issues with hand-eye coordination, maintaining spatial orientation, and controlling lip mirror fogging. On the other hand, students who frequently used indirect vision techniques reported increased confidence and accuracy in clinical settings.

The results emphasize that in order to improve students' practical skills, indirect vision training needs to be improved, especially using simulation-based approaches. Clinical results in dentistry practice could become more accurate and efficient if this area of dental education is strengthened.

III. RESULTS

The present study population included 60 final BDS students and 60 CRIs. Majority of the participants were not aware of antifog mouth mirror/spray/wipes (79.1%) as well as learning curve of indirect vision such as writing and drawing under Mirror (84.1%). Around 70.8% replied that indirect vision is commonly used in examination and tooth preparation of upper teeth as well as to examine the tooth preparation in distal aspect. Most of the study participants were very comfortable (54.17%) with using indirect vision technique for dental procedure while others felt somewhat comfortable (39.17%) and not comfortable (6.67%). Many participants have never used antifog spray/wipes/mouth mirror (87.5%), while 2.5% use it very often and others use rarely (10%). More than 50% correctly answered all the advantages of using the indirect vision in clinical practice like better access to hard-to-reach areas, better visualization of posterior teeth, improved ergonomics (reduces strain on the neck/back) and increased accuracy of treatment.

The common difficulties faced while using indirect vision are fear of deep penetration (15.8%), fog settlement (13.3%), hand eye coordination (8.3%), over cutting (4.2%) and all the above (58.3%). The study participants overcame difficulties while using indirect vision by adjusting position (73.3%), get help from instructor/guide (10.3%) and using different tools/technique (7.5%). The study participants felt that they can improve their skills with indirect vision with additional hands on practice/workshop (69.2%), better equipment (10%) and proper guidance (12.5%). Almost all the study participants felt that indirect vision in preclinical will help to improve in clinical sides (98.33%). Many are aware of using indirect vision in routine life such as seeing the face in the mirror, using side mirror of two-wheeler (81.6%). The table 1 describes the proportion of study participants based on their responses. The graphs 1-12 depicts the responses given by the study participants.

Table 1:

Questions	Responses	Frequency (n)	Percentage (%)
Year of study	CRI	60	50
	Final year	60	50
What are all the advantages of using indirect vision in clinical practice?	All the above	62	51.67
	Better access to hard-to-reach areas	28	23.33
	Better visualization of posterior teeth	1	0.83



	Improved ergonomics (reduces strain on the neck/back)	27	22.5
	Increased accuracy of treatment	2	1.67
In what way do you find difficulties while using indirect vision	All the above	70	58.33
	Fear of Deep penetration	19	15.83
	Fog settlement	16	13.33
	Hand eye coordination	10	8.33
	Over cutting	5	4.17
How do you overcome difficulties while using indirect vision?	Adjusting position	88	73.33
	Help from instructor/ guide	13	10.83
	Others	10	8.33
	Using different tools/ technique	9	7.5
What kind of support do you feel would help you to improve your skills with indirect vision?	Additional hands on practice /workshop	83	69.17
	Better equipment's	12	10
	Others	10	8.33
	Proper guidance	15	12.5
In which procedures indirect vision commonly used?	All of the above	85	70.83
	Examination and tooth preparation of upper teeth	30	25
	To examine the tooth preparation in distal aspect	5	4.17
Are you comfortable with using indirect vision technique for dental procedure?	Somewhat comfortable	47	39.17
	Uncomfortable	8	6.67
	Very comfortable	65	54.17
How often do you use antifog spray/ wipes/ mouth mirror	Never	105	87.5
	Rare	12	10
	Very often	3	2.5
Are you aware of learning curve of indirect vision such as writing and drawing under Mirror?	No	101	84.1
	Yes	19	15.8
Are you aware of antifog mouth mirror/ spray/wipes?	No	95	79.1
	Yes	25	20.8
Do you think using of indirect vision in preclinical helps to improve in clinical sides	No	2	1.67
	Yes	118	98.33
Are you aware in routine life we using indirect vision such as seeing the face in the mirror, using side mirror of two-wheeler, etc.?	No	22	18.3
	Yes	98	81.6



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IV. Discussion

Effective visualization of difficult-to-reach portions of the oral cavity is made possible by indirect vision, a crucial ability in dentistry education and practice. However, the study highlights the need for improvements in preclinical education by identifying

notable gaps in dental students' awareness, training, and comfort levels with indirect vision tasks.[10,11]

Awareness of Antifogging Tools

According to the study, 79.1% of participants had never heard of antifogging products like wipes, sprays, or antifog mirrors. Additionally, only 2.5% of



respondents reported utilizing these tools frequently, 10% reported using them infrequently, and 87.5% acknowledged never using them. This lack of exposure points to a need to incorporate curriculum-based learning on these tools. By enhancing clarity throughout processes, antifogging solutions lessen disruptions brought on by fog accumulation, which 13.3% of participants said was a frequent problem.

Proficiency and Challenges in Indirect Vision

About 70.8% of participants admitted to frequently using indirect vision, especially for distal and upper tooth inspections and tooth preparations. However, only 54.17% reported feeling extremely comfortable using indirect vision, compared to 39.17% who reported feeling moderately comfortable and 6.67% who reported not feeling comfortable. This range of comfort levels suggests that indirect vision skills, like writing and sketching in front of a mirror, have a learning curve that 84.1% of participants were not aware of.

Common hurdles are also identified by the survey, such as over-cutting (4.2%), fog settling (13.3%), hand-eye coordination problems (8.3%), fear of deep penetration (15.8%), and all of the above (58.3%). Targeted training techniques are needed to address these issues and improve pupils' confidence, accuracy, and synchronization.

Benefits of Indirect Vision

Over half of the participants accurately listed the benefits of indirect vision in clinical practice, such as improved visualization, easier access to posterior teeth, improved ergonomics (less strain on the neck and back), and more accurate treatment. These advantages highlight how crucial it is to become proficient in this ability for sustained therapeutic success.

Methods to Overcome Challenges

Participants in the study reported adopting different tools or approaches (7.5%), asking instructors for assistance (10.3%), and changing their position (73.3%) to overcome indirect vision issues. This highlights the value of mentorship, posture training, and investigating various ways to problem-solving.

Strategies for Skill Improvement

The majority of participants (69.2%) believed that more practical experience or workshops would enhance their ability to see indirectly. Others

recommended appropriate supervision (12.5%) and better equipment (10%) as means of improving proficiency. Together with controlled feedback, hands-on training sessions that mimic actual clinical situations could successfully meet these objectives.

Relevance to Clinical Practice

Nearly all of them (98.33%) thought that using indirect vision in preclinical training would help them in their clinical work. The importance of stressing indirect vision at an early stage of dental education is further supported by this study. A large percentage of students (81.6%) also acknowledged the use of indirect vision in everyday situations, such as looking at faces in mirrors or utilizing side mirrors on cars, indicating that they were aware with the idea outside of dentistry.

V. Conclusion

This study emphasizes the importance of incorporating comprehensive instruction in indirect vision into the dental curriculum. Addressing existing gaps in knowledge and skill through mentorship, structured practical training, and the use of antifogging techniques can lead to improved clinical outcomes. Evidence from previous research, including studies published in BMC Medical Education, supports the effectiveness of structured training in enhancing mirror-hand-eye coordination and promoting ergonomic clinical practices. Ultimately, such educational interventions benefit both dental students and the patients they will serve in future clinical practice.

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