



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2022; 8(1): 219-223
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www.oraljournal.com
Received: 27-10-2021
Accepted: 10-12-2021

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Survey on knowledge, attitude & skills of dental professionals of West Bengal on minimal invasive dentistry concepts: A wise move or a set back for dentistry after COVID-19?

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DOI: <https://doi.org/10.22271/oral.2022.v8.i1d.1431>

Abstract

Background: The emphasis on caries prevention & minimal spread of infection during this pandemic situation has led to a paradigm shift toward the concept of minimal intervention dentistry (MID). MID limits the destruction of tooth structure as well as aerosol generation, a deviation from G.V. Black's restorative principle. However, there seems to be either deficiency in knowledge or lack of initiations by the dentists to adopt these principles into clinical practice.

Objective: This study aimed to evaluate the knowledge, attitude, and practice of dental professionals of West Bengal regarding the awareness & acceptance of MID at the age of time (COVID-19).

Methods & Inferences: Data were collected through a month-long online survey questionnaire based on individual responses & statistically analyzed.

Results: It indicates that most of the respondents have satisfactory knowledge (3.21 ± 1.16), possess moderate skills in carrying out MID techniques in daily clinical practice (11.36 ± 2.72), but showed poor attitude towards MID (2.91 ± 1.07).

Conclusion: Hence, its implementation into their practices is not adequate. Supervised awareness campaigns have to be done for updating the practice and encouraging the clinical decisions of dental professionals in this critical situation (COVID-19).

Keywords: Attitude & skills, COVID-19, West Bengal

Introduction

Earlier the process of caries management was conceptualized on replacement dentistry where surgical approaches were performed by turning the cavity larger & making the tooth weaker but without eliminating the root cause of the disease [1]. Later on, with the evolution of scientific facts it has been proven that preserving tooth structure is the best treatment of choice as no restorative material is good enough to substitute the native enamel-dentin duo [2]. This recognition led to focus on more conservative & evidence-based approach for caries management which is more precise during application [3]. In this journey of explore the action, development of modern adhesive restorative technology has expedited the realistic implementation of Minimal intervention concept (MID) into dentistry [4]. This model was put forth by Mount and Humes in late twentieth century primarily focusing on non-invasive principles of operative dentistry and emphasizes in less destruction of tooth structure, a deviation of the century-old GV Black's restorative principles [5]. It primarily works on understanding the disease etiology scientifically, cease the caries from further progression and provide patient centred care [6]. So, it is quite evident that MID is not just simulation of the same contemporary cavity preparation in a smaller dimension, the clinical outlook behind this is disease elimination along with maximal preservation [7].

Now, irrespective of the evolution in technologies or material science, the global burden due to untreated cases of caries in both dentitions are increasing since the last few decades [8]. If the economics background behind the dental treatment needs is considered, it is found that

assigned expenditure provided for management of dental diseases is quite low in developing countries compared to developed countries [9]. Moreover, despite of these limited resources in public dental health care, inability to access for proper intervention facilities ultimately expand cost of the treatment [10]. Thus, inclusion of preventive measures and timely intervention will increase the efficacy of the treatment outcome for the population and improve cost-effectiveness for the health care service [9]. But even with growing popularity and its inclusion within study curriculum, the relative resistance is still seen regarding its effective application in therapeutic practice. Preference for conventional restorative dentistry as a mainstay of current practice, lingers the uncertainty manifold about attitude of practicing dentists towards adopting principles of MID, especially in the face of current health care scenario. Because, most of the invasive procedures endorses maximum exposure of aerosols causing high risk for spreading infection within a closed dental office [11]. And, we should have a therapeutic protocol that ensures safety of both health care providers & patients as well as should be convenient in terms of treatment costs [12]. Therefore, the present study is designed to evaluate the level of knowledge, attitude and practice among dental professionals of West Bengal regarding execution of MID philosophy into practice, especially during the post pandemic situation (COVID 19).

Material & method

Study design

It was an observational, survey-based study within a cross-sectional design conducted from July 2021- August 2021.

Study population

The study population encompassed both male & female dental practitioners (graduates/post-graduates), post graduate trainees and house-stuffs belonging to the government/private dental institutes situated in West Bengal.

Sample size

The number of dentists who have completed their graduation in the state of West Bengal was assessed to be 8000. The representative target sample size, thus required for this study was calculated with using a sample size calculator. To achieve the objectives of the study with sufficient statistical power, a minimum sample size of 367 participants was required with a margin of error of $\pm 5\%$ and a confidence level of 95%. A total number of 370 responses were received.

Data collection procedure

A self-designed questionnaire was prepared in English language & pre-tested by face validity. According to feedback it was revised. Finalized set consisted of 22 questions, which were compiled in an online mode link created using Google documents. The questions were framed in multiple-choice pattern, segregated into 4 sections. The first section (set of 7Q) assessed the demography of the respondents, second part (set of 5Q) were assigned to measure the level of knowledge (set of 5Q), third part to evaluate attitude (set of 5Q) & last part for monitoring practice habits (set of 5Q) of the professionals. The link was circulated among 500 dental professionals in West Bengal using the Email address, WhatsApp groups & other social media. Informed consents were taken from all the participants before sending the questionnaire. Response from only those dental practitioners who gave consent by answering the questionnaire within the

limited time frame of 1 month were included in the study. Timely reminders were sent as well. The participation was completely voluntary and all the participants had an option of opting out of the study by not filling the questionnaire. At the end of 1 month, 370 responses as collected in Google form were sent for statistical analysis.

Statistical analysis

The statistical analysis was carried out using IBM SPSS Statistics for Windows, Version 26.0. (Armonk, NY: IBM Corp). The data was expressed as means \pm standard deviation (SD) for continuous variables and as frequencies (percentages) for categorical variables. The knowledge score was measured using a dichotomous scale (1: correct response; 0: incorrect response). The attitudes and practices scales were measured using multiple-item Likert scales (i.e., 4-point Likert-type scale). One-way ANOVA test was employed to find the differences between the knowledge, attitude, skill scores according to various socio-demographic characteristics.

Results

A total of 370 dentists all over from West Bengal, responded to this survey among which 48.6% were male & 51.4% were female. The age range of the applicants majorly vary from 20 to 30 years. Among the participants 37.3% had completed their post-graduation, 35.7% had only done the graduation, whereas 27% were still pursuing their post-graduation course. About 40% of them had <2 years of experience, 30% had less than 5 years & another 30% had more than 5 years of experience in their professional career. A vast majority (68.1%) of the professionals were acquainted to the MID concepts through their BDS curriculum. Of the respondents, only 11.4% were confident in doing MID as they were thoroughly trained and mostly received MID training through hands-on programmes.

In relation to knowledge about the principle & materials needed for implementing MID in caries management, most of them were found to be well aware of the concepts. Of the participants, 70.8% considered MID as a possible treatment approach following COVID-19 restrictions for early lesions & 82.2% knew the reasons behind the demand of MID at this crisis period. But when they were asked about International Caries Detection and Assessment System (ICDAS) scoring, only 31.6% were found correct (illustrated in table no. 1). Based on scores (table no. 4) of one-way ANOVA test, knowledge was found significantly higher in dentists with 2-5 years of experience (3.43 ± 1.18) or who had completed their post-graduation (3.54 ± 1.1) & were in the age group of 20-30 years (3.31 ± 1.18).

Regardless of the depth of knowledge, 28.4% were still not convinced to adopt G.V Black's approach of "extension for prevention" for treating initial carious lesion during practice (illustrated in table no. 2). But most of them (>90%) found it helpful to perform Caries risk assessment for every child patient before proceeding into treatment. More than 95% professionals showed positive attitude in encouraging child patients for home application of topical fluorides and 80% of them considered sealants application as routine procedure for high-risk patients during this pandemic situation. Although, 62.4% practitioners pointed out higher cost of modern diagnostic aids as a barrier for pursuing MID techniques on timely manner. In general, based on professional qualification (4.15 ± 0.86) post-graduates exhibited more accepting attitude for MID application than others (<0.05) (Fig.1)

Regarding performance/skills (Table no. 3) only 7.3% dentists were comfortable doing slot & tunnel preparation in child's teeth and 4.9% professionals applied topical fluoride / remineralizing agents (CPP-ACP) on a regular basis as a preventive measure during post-pandemic crisis period. Although, most of them realized that minimally invasive approaches were more convenient while performing on small children than drilling & filling. More than half of the participants (52.8%) relied only on conventional radiography rather than using detecting dyes/ FOTI for diagnosing initial demineralizing lesions in children. Again, it was reinforced by the fact that dentists of more than 40 years were found to be more skillful in doing minimally invasive techniques at practice than others (table no. 4).

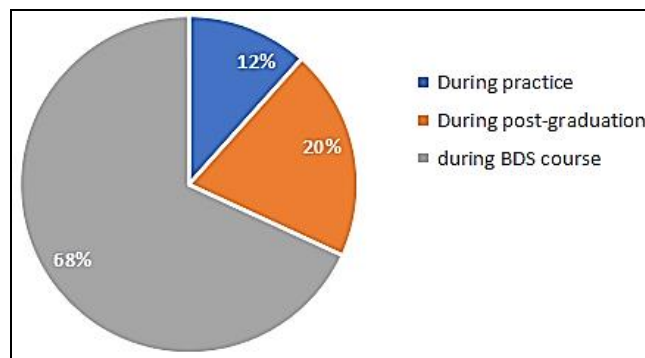


Fig 1: Distribution of response to when did you get the chance to be familiar with newer preventive restoration concepts

Table 1: Responses to the questionnaire on MID knowledge

Questions assessing Knowledge		Incorrect	Correct	
1	Which of the following is not a principle of MID?	Frequency	168	202
		%	45.4	54.6
2	Which of the following materials least follows the goals of MID?	Frequency	67	303
		%	18.1	81.9
3	Up to which International Caries Detection and Assessment System (ICDAS) score, visible enamel deformity can be seen in bare eyes in a child patient?	Frequency	253	117
		%	68.4	31.6
4	Possible treatment approach following COVID-19 restrictions for incipient lesion could be-	Frequency	108	262
		%	29.2	70.8
5	Why MID has gained popularity & become savior in this crisis time of covid-19?	Frequency	66	304
		%	17.8	82.2

Table 2: Responses to the attitudinal statements regarding MID

Questions assessing Attitude		Agree	Disagree	Don't Know	Strongly agree	
1	Do you think G V Black's concept of extension for prevention is no more relevant for treating initial caries in day-to-day practice?	Frequency	69	105	36	160
		%	18.6	28.4	9.7	43.2
2	Do you consider it helpful to perform CRA (Caries risk assessment) for every child patient?	Frequency	207	12	24	127
		%	55.9	3.2	6.5	34.3
3	Should sealants application be included in routine procedure for high-risk patients?	Frequency	160	24	45	141
		%	43.2	6.5	12.2	38.1
4	Do you think motivation & guidance to child patients for topical fluoride application at home is a beneficial measure on pandemic situations?	Frequency	205	3	15	147
		%	55.4	0.8	4.1	39.7
5	Do you find it difficult to implement MID technique due to highly expensive & less availability of modern diagnostic aids?	Frequency	177	78	61	54
		%	47.8	21.1	16.5	14.6

Table 3: Responses to the statements pertaining to skills regarding MID

Questions assessing Skills		Always	Never	Often	Sometimes	
1	Do you realize that managing a child patient is more convenient when his carious tooth is restored with minimal intervention than conventional approaches?	Frequency	166	6	114	84
		%	44.9	1.6	30.8	22.7
2	How frequently do you perform remineralization in teeth with CPP-ACP during/after pandemic?	Frequency	18	96	76	180
		%	4.9	25.9	20.5	48.6
3	Do you restore adjacent pits & fissures of amalgam/ composite restoration with a sealant?	Frequency	51	99	46	174
		%	13.8	26.8	12.4	47.0
4	Would you be comfortable doing slot & tunnel preparation in child's teeth with minimal intervention?	Frequency	27	117	52	174
		%	7.3	31.6	14.1	47.0
5	Other than conventional radiography would you use detecting dyes/ FOTI for accurately diagnosing initial demineralizing lesions in children?	Frequency	33	121	66	150
		%	8.9	32.7	17.8	40.5

Table 4: Comparison of social and demographic characteristics with mean Knowledge, attitude & skill scores

Predictor Variables	Knowledge Scores		Attitude Scores		Skill Scores	
	Mean±S.D.	P value*	Mean±S.D.	P value*	Mean±S.D.	P value*
Overall	3.21±1.16		2.91±1.07		11.36±2.72	
Age Groups						
20- 30 yrs	3.31±1.18	0.02	3.85±1.12	0.15	11.44±2.58	0.03
30-40 yrs	2.93±1.09		4.1±0.89		10.9±3.08	
>40 yrs	3±1.13		3.8±1.01		12.8±2.65	
Gender						
Male	3.12±1.2	0.13	3.9±1.08	0.85	11.6±2.88	0.11
Female	3.3±1.12		3.92±1.06		11.14±2.56	

Professional Qualification						
Graduation	2.98±1.27	<0.001	3.59±1.24	<0.001	11.45±2.46	0.79
Post-Graduate trainee	3.06±0.98		4±0.98		11.42±3.29	
Post-graduation	3.54±1.1		4.15±0.86		11.24±2.53	
Years of Experience						
0-2 yrs	3.29±1.15	<0.001	3.86±1.13	0.39	11.2±2.68	0.35
2-5 yrs	3.43±1.18		4.03±1.11		11.68±3.04	
>5 yrs	2.89±1.11		3.87±0.93		11.27±2.45	

Discussion

This research was carried out in concern with the present situation of COVID-19, as it has thrown multiple challenges to reform our delivery of health services especially in relation to dental treatment. Because of the higher risks of transmission (procedures generating aerosols), much of the dental services were restricted since late March, 2020 [13]. Within this limited access, dental care system needs to be more responsive toward preventive measures so that more invasive & aerosol producing works can be deferred [14]. Therefore, it is high time to acknowledge & adopt MID as it ensures minimal utilization of handpieces, offers maximum preservation of tooth structures as well as reduces the treatment expenditure [15]. MID philosophy endorses from timely diagnosis to patient education, prevention to remineralization of early lesions with minimal intervention [16]. This holistic approach has been much appreciated by global organizations like WHO, GCI etc. [17] But reports were still found showing inconsistency in its applications by dental professionals.

Most of the dentists surveyed in this study were well aware of current aspects of the COVID-19 situation and health care problems associated with invasive procedures. Majority of the participants (82.2%) accepted that MID application could not only minimize transmission risk but also reduces appointment frequency thereby adjust patients' inconveniences to visit clinic repeatedly in this situation. However, while went to find relevancy for "extension for prevention" principle in early cavitated lesions, 28.4% dentists were not convinced to lessen the importance of G V Black's concept during practice. Again 45.4% participants did not recollect of the exact principles of MID techniques. Similar findings were also observed in a study [8] done by Shah AH *et al.* International Caries Detection and Assessment System (ICDAS) is accepted as a good tool to detect early lesion & to take proper preventive measure based upon the visual depth of carious lesions [18]. Among the study samples 31.6% correctly recalled the criteria associated with ICDAS scoring while more than half the sample could not. These inadequacies reflected a deficit in basic knowledge among dentists which is worth exploring further.

Scientifically, to intervene before the teeth are irreversibly damaged, activity of the caries lesion should be evaluated through caries risk assessment. Now risk for each concerning individual can be determined by analysing disease indicators (assessment scoring systems), general health condition and considering protective factors [19]. Calculation of the level of caries risk, guides the dentists in determining appropriate preventive strategies for that patient. In the present study only 34.3% participants strongly agreed & 55.9 % agreed to consider to apply in each patient. These findings are in harmony with AAPD policies [20] & reflected a positive attitude towards patient-centred treatment. Out of the total participants, 38.1% strongly believed & 43.2% gave consent for sealants application as a routine procedure for patients detected as higher risk categories, which complies with the guidelines by ADA [21]. Regarding topical fluoride application

at home in pandemic situation majority of the dentists found it as a helpful measure in accordance with another study done by K Natarajan *et al.* [22] Researches have displayed full acceptance for remineralizing therapy using fluoridated tooth paste for caries prevention [23].

In the study very less agreement was displayed by the dentists (only 4.9% always perform) for practicing MID techniques including ART, pit fissure sealants, remineralizing with CPP-ACP in carious teeth of children. Although, studies had established that ART (atraumatic restorative treatment) is an effective option for caries lesions in both the dentition [24]. On the other side, it is well accepted that use of magnification/FOTI enhances the diagnostic ability of carious lesion [18]. In the present study more than half of the professionals (52.8%) still relied on contemporary caries detection methods in their practice. Nevertheless, higher price & unavailability of the modern diagnostic aids could be a factor, strongly agreed by 14.6% and agreed by 47.8% of participants, which is in accordance with the findings by Faden *et al.* [25]

Conclusion

These observations revealed wider discrepancy between knowledge & attitude towards practicing skills of respondents in caries management. It is noteworthy to mention that there is urgent need to implement standardize guidelines for diagnosis, case selection & treatment protocols for early caries management by the dental professionals during the age of covid period. Limitations of this study include the inability to include large number of samples nationwide which would have provided a broader outcome of the study and secondly, chances of inherent bias regarding truthfulness of the responses received from the dentists as there was no other source to doubly verify them. Further long-term study is needed to predict the practice trend of the dental professionals of West Bengal.

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