

Assessment of knowledge, attitude, and implementation of green dentistry among dental practitioners in Chennai

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Abstract

Introduction: Global warming is one of the serious issues that people face around the globe (WHO 2011). It is important for us that the earth is around for our kids for a long time to come. Hence, as a dentist, it is our responsibility to extend our contribution toward environmental protection using an eco-friendly approach in clinical practice.

Aim of Study: This study aims to assess the knowledge, attitude, and awareness of green dentistry among graduate and postgraduate dental practitioners in Anna Nagar, Chennai, Tamil Nadu.

Materials and Methods: A cross-sectional survey was conducted using a self-administered close-ended questionnaire comprising of 15 questions among 250 dental practitioners to evaluate the awareness of green dentistry and procedures involved in implementing them. The questions were prepared to assess the knowledge, attitude, and implementation of green dentistry.

Results: The overall knowledge regarding green dentistry was similar among the participants, but those with postgraduate degree reported a slightly higher percentage of awareness (73.6%) and preferred digital radiography (62.3%) than undergraduate practitioners.

Conclusion: The current study suggests that the implementation of green dentistry practices among the graduate and postgraduate dental practitioners is not adequate.

Keywords: Dental practitioners, eco-friendly dentistry, green dentistry

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INTRODUCTION

Environmental pollution is one of the serious issues causing global warming. Each and every individual either directly or indirectly responsible for this situation, and dentistry is not an exception to this.^[1] Thus, everyone should make an effort and contribute in keeping the planet green and make it a better place to live for future generations. Dental professionals, too, can contribute by making few changes in their practice and adopting the principles of green dentistry.^[2]

Dentistry has gradually developed in terms of materials and techniques. It is the duty of the dental professionals to safeguard the natural resources and to decrease the influence of lethal waste generated from their practices.

Although each individual dentist generates only a minor portion of unfriendly waste, the amount of waste produced by the entire profession globally has a significant impact on the environment.^[3,4] To prevent the ill-effects, recently, the term “Eco-Dentistry or Green Dentistry” has been

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pioneered to encourage the dentists to implement new strategies to try and reduce the energy being consumed and the large amount of wastes being produced by them.^[5]

Green dentistry is relatively a new term and emerging concept in the field of dentistry. Green dentistry is defined as “A high tech approach that reduces the environmental impact of dental practices and encompasses a service model for dentistry that supports and maintains wellness.”^[6] Green dentistry is not only friendly for the environment but also for the dentist and the patient. It helps to reduce the waste production thereby benefitting the environment, saves money and energy for the dentist, and incorporates high tech innovations and promotes well-being of the patients.

Dentists throughout the world are doing their best to reduce the environmental impact of dental practice. Certainly, collective efforts are necessary to ensure that dentists, at least, will not be responsible for destroying it. This concept should be made accessible to all dental health-care professionals.^[5] However, this concept and its awareness among professionals remain a query to be analyzed.

Thus, the purpose of this study is to determine the knowledge, application, and awareness of eco-friendly dental strategies among dental practitioners in Anna Nagar, Chennai, in preparation for the implementation of future eco-friendly dental practices.

MATERIALS AND METHODS

A cross-sectional survey was conducted to determine the awareness of green dentistry among dental practitioners in Anna Nagar, Chennai, Tamil Nadu. A pilot survey was done among 20 volunteer dentists to pretest the collection of data and to train the researcher. The study was approved by the institutional review board, and the ethical clearance was obtained prior to the commencement of the study. The study was conducted in December 2018, and a designated research assistant distributed the questionnaires designed by the researcher to the dental clinicians. Dentists were personally visited, and the questionnaires were distributed to 250 graduate (BDS) and postgraduate (MDS) dental practitioners, out of which only 174 (70%) responded. After the questionnaires were filled, they were collected and returned by the questionnaire administrator in a sealed envelope to blind the principal investigator. As the questionnaire was self-designed, the content validity was established by the panel of Health science faculty at Dr. MGR University, Maduravoyal, Chennai, Tamil Nadu.

The questionnaire consisted of 15 sets of questions regarding awareness of green dentistry and the procedures involved in implementing them.

Inclusion criteria included dentists who were practitioners and academicians in various fields of dentistry with diverse years of experience. Exclusion criteria included practitioners who were not willing to participate in the study, incompletely filled questionnaires. The questionnaire consisted of three sections which included demographic details (name, qualification, years of experience as an academician and clinician), the knowledge of dentist regarding green dentistry (this section consisted of 8 close-ended questions), implementation of eco-friendly strategies in their clinical practice (this section consisted of questions with different options and the dentists were asked to select one option which they used in their clinics for the management of amalgam, paper, energy, digital radiograph). The questionnaire data thus obtained was tabulated and analyzed using Statistical Package for Social Sciences version 23.0, Raleigh, North Carolina, USA. Significance level was fixed as 5% ($\alpha = 0.05$).

RESULTS

The results revealed that 174 respondents, 68 were undergraduates and 106 were postgraduate clinicians [Table 1]. The results of gender predilection and other queries obtained from the questionnaire are mentioned in Tables 1 and 2 respectively. The awareness about green dentistry was higher among postgraduates 73.6% when compared to graduates 50% ($P = 0.02$), though awareness was higher, significant percentage of dentists (60.9%) do not follow eco-friendly methods in their clinics. However, a high percentage of postgraduate qualified practitioners (45.3%) used eco-friendly methods in comparison to graduate (29.4%, $P = 0.036$). About 83.9% of practitioners used light-emitting diode (LED lights) in their clinics, and only 37.9% of practitioners used plants in their clinics to increase oxygenation. Most of the practitioners preferred computer documentation over paper ($n = 92$, 52.9%) disposable drapes over reusable one ($n = 120$, 69%) plastic suction tips over metal ($n = 158$, 90.8%). However, most of the practitioners preferred biodegradable cups over plastic cups and reusable ($n = 104$,

Table 1: Depicts distribution of dental practitioners based on gender and qualification

Qualification	Gender		Total (%)
	Male (%)	Female (%)	
BDS	58 (85.2)	10 (14.7)	68 (39.0)
MDS	62 (58.4)	44 (41.5)	106 (60.9)
Total	120 (68.9)	54 (31)	174

Table 2: Depicts response of practitioners to questionnaire

	Qualification			P
	BDS, n (%)	MDS, n (%)	Total, n (%)	
Are u aware of green dentistry?				
Yes	34 (50.0)	78 (73.6)	112 (64.4)	0.002
No	34 (50.0)	28 (26.4)	62 (35.6)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Eco-friendly method followed in clinic				
Yes	20 (29.4)	48 (45.3)	68 (39.1)	0.036
No	48 (70.6)	58 (54.7)	106 (60.9)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Type of light used in clinic				
LED	56 (82.4)	90 (84.9)	146 (83.9)	0.655
Incandescent	12 (17.6)	16 (15.1)	28 (16.1)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Use of water faucets sensors in clinic				
Yes	16 (23.5)	22 (20.8)	38 (21.8)	0.666
No	52 (76.5)	84 (79.2)	136 (78.2)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Use plants in clinics to increase oxygenation				
Yes	20 (29.4)	46 (43.4)	66 (37.9)	0.064
No	48 (70.6)	60 (56.6)	108 (62.1)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
How do you document patient details?				
Computer	30 (44.1)	62 (58.5)	92 (52.9)	0.064
Paper	38 (55.9)	44 (41.5)	82 (47.1)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Type of drape used in clinic				
Disposable	46 (67.6)	74 (69.8)	120 (69.0)	0.763
Reusable	22 (32.4)	32 (30.2)	54 (31.0)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Types of suction tips used				
Plastic	60 (88.2)	98 (92.5)	158 (90.8)	0.348
Metal	8 (11.8)	8 (7.5)	16 (9.2)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Types of cups used for patients				
Plastic	26 (38.2)	40 (37.7)	66 (37.9)	0.267
Bio-degradable	42 (61.8)	62 (58.5)	104 (59.8)	
Reusable	0 (0.0)	4 (3.8)	4 (2.3)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Which type of radiograph do you use in clinic?				
Conventional	44 (64.7)	40 (37.7)	84 (48.3)	0.001
Digital	24 (35.3)	66 (62.3)	90 (51.7)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Aware digital radiograph reduces radiation exposure to patients				
Yes	68 (100.0)	100 (94.3)	168 (96.6)	0.046
No	0 (0.0)	6 (5.7)	6 (3.4)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Common restorations done in clinic				
GIC	34 (50.0)	42 (39.6)	76 (43.7)	0.178
Composite	34 (50.0)	64 (60.4)	98 (56.3)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
How often are amalgam restorations done in clinic				
Very often	4 (5.9)	2 (1.9)	6 (3.4)	0.340
Rarely	14 (20.6)	20 (18.9)	34 (19.5)	
Nil	50 (73.5)	84 (79.2)	134 (77.0)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Aware of mercury toxicity to patients, operator, and environment				
Yes	64 (94.1)	100 (94.3)	164 (94.3)	0.951
No	4 (5.9)	6 (5.7)	10 (5.7)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	
Do you follow proper waste disposal method in clinic?				
Yes	44 (64.7)	76 (71.7)	120 (69.0)	0.331
No	24 (35.3)	30 (28.3)	54 (31.0)	
Total	68 (100.0)	106 (100.0)	174 (100.0)	

LED: Light emitting diode, GIC: Glass ionomer cement

59.8%). 62.3% of postgraduate practitioners preferred digital radiography over conventional, whereas only 35.5% of graduates preferred digital radiography, which was significant ($P = 0.01$). Although postgraduates preferred digital radiography, the awareness that the usage of digital radiography reduces radiation exposure to the patient was higher in graduates ($n = 68$, 100%) when compared to postgraduates ($n = 100$, 94.3%) which was significant ($P = 0.046$). Both the groups preferred composite restoration when compared to glass ionomer cement ($n = 98$, 56.3%) and discontinued the usage of amalgam ($n = 134$, 77%) and the awareness of mercury toxicity was found to be much higher ($n = 164$, 94.3%) and followed proper waste disposal methods ($n = 120$, 69.0%).

DISCUSSION

In India, green dentistry is still in progressing state, while in several countries, it has been developed long ago.^[7] In the present study, 120 (68.9%) males and 54 (39%) female dentists had participated which was similar to study Al-Qarni *et al.*, in 2016,^[8] where there is a higher proportion of males (78.5%) and less number of female dentists (21.25%).

In this study, the awareness about term green dentistry was higher among postgraduates 73.6% when compared to graduates 50% ($P = 0.02$), which is contrary to the study conducted by Agrasuta and Nelson 2013^[9] where 83.5% of respondents never heard the term “green dentistry,” only 16.5% had idea of what it is. Although in this study, the awareness was found to be higher in postgraduates, the implementation of the eco-friendly methods in their clinics was found to be only 39.1%, which shows that there is a need to change from current practice to green practice.

About 83.9% practitioners preferred LED light bulbs as they are highly energy-efficient, tough and durable, and work in low voltages when compared to incandescent lights which is in accordance to studies of Chopra and Raju, in 2017,^[10] where dentists employed the use of LED light bulbs (91%), but there is another study conducted by Kallakuri *et al.* 2019^[11] where only 45% practitioners used LED lights bulbs.

On the other hand, water faucet sensors save water usage, prevents water overflow with automatic turn off, hands-free and easy to operate, help to stop the spread of germs and bacteria. In the present study, the usage of water faucet sensors was found to be around 21.8% which was found to be slightly higher than study conducted by Kallakuri *et al.* in 2019^[11] where only 11.7% used the water faucet sensors

which shows that there is a need for implementation of water conservation in clinics.

Studies^[10,12,13] showed that 78.7%, 62%, 49% used computer-based record systems which is in congruent with the present study, where 52.9% used the same. In this around 58.5% were postgraduates, and 44.1% were graduate practitioners. Results of this study also revealed, low use of reusable cups (2.3%), drapes (31%), and suction tips (9.2%) which was seen similar to the study carried by Al Shatrat *et al.*, in 2013.^[12]

The present study results illustrated that 51.7% dentists used digital radiography which is in accordance to the study conducted by Sen *et al.*, in 2017,^[13] where 40.3% are using digital radiography. 62.3% of postgraduate practitioners preferred digital over conventional which were found to be significant.

This study results revealed (19.5%) preferred amalgam restorations whereas the majority of practitioners switched to other restorative materials such as Glass Ionomer and Composite to prevent mercury toxicity which is similar to the study conducted by Chopra and Raju, in 2017^[10] where 98% of practitioners are implementing alternative to amalgam restoration practices. This is not in accordance with the study of Sawair *et al.*^[14] who found that about 76% of Jordanian general dental practitioners use amalgam.

Green dentistry is an innovative approach which is slowly gaining popularity in developing countries. With limited availability of resources and literature comparative analysis of results with other countries on the current topic becomes difficult. The sample size used in the present study is very small confined to one area in a city. These results cannot be considered as true value as the awareness may be different in urban and rural areas in different parts of the country. Furthermore, studies are necessary involving a larger population which will help in better understanding and obtain a more reliable data to generalize the results.

CONCLUSION

The current study suggests that awareness of green dentistry is high in dental practitioners, but they lag in implementing the same. Furthermore, proper education through CDE programs, workshops, and seminars can bring a change and create a positive attitude among dentists to change from conventional dentistry to green dentistry.

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Conflicts of interest

There are no conflicts of interest.

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