

A survey on Green Orthodontics in North Gujarat

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Abstract

Introduction: Global warming is one of the serious issues that people face around the globe (WHO 2020). 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. Dental practice which has a huge impact on the environment due to the large amount of metallic waste generated by various dental procedures along with excessive use of water and electricity, which specifically emphasis the thrust to move towards 'Green dentistry'. Furthermore, because climatic emergencies and pollutants disproportionately impact vulnerable groups, the dentistry professionals has a chance to close the ever-widening gap in public health by reducing environmental **impact through better dental waste management**.

Aim: The aim of this study was to assess the knowledge, attitude, awareness and implementation of green dentistry among Orthodontist in North Gujarat.

Objective: The objective was to identify the method of practicing by orthodontist.

Methods: A total of 100 orthodontists were randomly selected, and a questionnaire consisting of 15 multiple-choice questions sent to them by mail. Upon receiving of the completed questionnaires, the data were statistically analyzed.

Results: A cross-sectional survey was conducted using a self-administered close-ended questionnaire comprising of 15 questions among 100 orthodontist 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. A total of 95 respondents sent completed questionnaires within 2 months after the initial mailing. Most of the orthodontist aware of green dentistry (62.1%) (**chart 1**), Eco-friendly method followed in clinic (54.8%) (**chart 2**), An 88.4% orthodontists used LED lights in clinic(**chart3**), An 66.7% orthodontists not used water faucets sensors in clinic(**chart 4**), An 63.2% orthodontists use plants in clinics to increase oxygenation(**chart 5**), About 71.6% orthodontists document their patients detail in computer or digitally(**chart 6**), A 57.9% orthodontist used reusable drape in clinic(**chart 7**), An 95.8% orthodontists used plastic suction tip in clinic. (**chart 8**), About 49.5%used bio-degradable cups for patient (**chart 9**), An 74.7% orthodontists use digital radiograph in clinic. (**chart 10**), About 88.4% orthodontist know digital Orthodontics. (**chart 11**), About 83.2% orthodontists took impression in conventional manner. (**chart 12**), An 57.9% orthodontist use digital cephalometric analysis(**chart 13**), and 62.4% use digital model analysis. (**chart 14**), An 88.4% orthodontist aware of 3D printing in orthodontics(**chart 15**).

Conclusions: This study suggested that awareness of green dentistry among orthodontists are high but the implementation of green dentistry practices among the orthodontists is not adequate.

Key word: Green orthodontics, Green dentistry, Global warming, Green practice

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I. Introduction

'Green dentistry' described as ecofriendly dentistry, has been described by Dr Ali Farhani as an: 'approach to dentistry that implements sustainable practices by keeping resource consumption in line with nature's economy, by safeguarding the external environment by virtue of eliminating or reducing outgoing wastes and by promoting the well-being of all those in the clinical environment by conscious reduction of the chemicals in the breathable air.' The term 'eco-friendly dentistry' was patented and trademarked by Dr Goran Kralj, Dr Steven Koos, and Mladen Kralj, the founders of ORA Dental Studio, a green group dental practice. They describe that 'eco-friendly dentistry, through green design and operations, protects the immediate health of patients and

team members, protects the health of the surrounding community, and protects the health of the global community and natural resources.' These concepts are based on the principle of sustainable development which is defined as development that 'meets the needs of the present without compromising the ability of future generations to meet their own needs.

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.

Dental professionals, too, can contribute by making few changes in their practice and adopting the principles of green dentistry¹¹.

New products and technologies for cleaner, greener dental practices are emerging, allowing practitioners to mediate, or completely eliminate, much of this waste. But still there are a lot of things to be done³.

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. To prevent the ill-effects, recently,

the term "Eco- Dentistry or Green Dentistry" has been 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 them⁴.

One significant waste within dental clinics is paper. Dentists could be more environmentally friendly by changing from a paper-based records system to a computer-based records system⁸.

Although the contribution of dentistry to environmental mercury contamination is negligible compared to other sources, the adverse effects of mercury spurred a lively debate about the so-called "amalgam toxicity"¹³. Moreover, recycling is another green practice.

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

II. Materials And Methods

A cross- sectional survey was conducted to determine the awareness of green dentistry among dental practitioners in Visnagar, Gujarat .This study was conducted via a questionnaire consisting of 15 multiple-choice questions modified from Chandrasekhar Pallavi et al.¹ A designated research distributed the questionnaires to the orthodontist clinician. The questionnaire consisted of 15 sets of questions regarding awareness of green dentistry and the procedures involved in implementing them. This questionnaire was first distributed to 10 randomly selected orthodontists for surface validation before conducting the final survey.

Full lists of the names and addresses of orthodontists were obtained from the Gujarat Association of Orthodontists website.

Inclusion criteria included orthodontist who were practitioners and academicians in field 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 two sections which included demographic details (name, email id), the knowledge of dentist regarding green dentistry, 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 light, plant, paper, energy, digital radiograph). Therefore, to obtain a sample of n =95 responses with 95 confidence and accounting for a response rate, 100 samples were required for this survey. A simple random sampling method was used by drawing the name lots of the registered members. A total of 95 registered orthodontists were included in this study. The study participants were ortho- dontists registered with the Gujarat Association of Orthodontists who are currently practicing in this state.

The questionnaire was sent to the orthodontists by mail. The survey was concluded 2 months after the initial mailing, whereby any response after that period was not included. Confidentiality of the information provided was assured and participation was voluntary.

All statistical analyses were performed using google form. The items were all described in percentages.

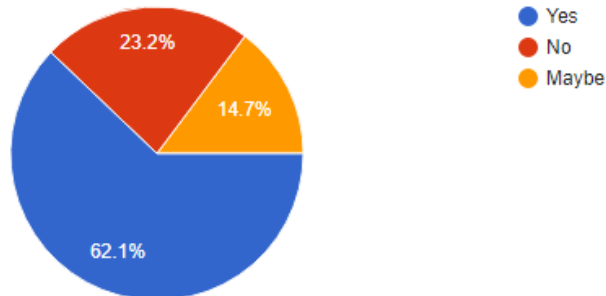
III. Result

A total of 95 respondents sent completed questionnaires within 2 months after the initial mailing. Most of the orthodontist aware of green dentistry (62.1%) (**chart 1**), Eco-friendly method followed in clinic (54.8%) (**chart 2**), An 88.4% orthodontists used LED lights in clinic(**chart3**), An 66.7% orthodontists not used water faucets sensors in clinic(**chart 4**), An 63.2% orthodontists use plants in clinics to increase oxygenation(**chart 5**), About 71.6% orthodontists document their patients detail in computer or digitally(**chart 6**), A 57.9% ortho-

dentist used reusable drape in clinic(**chart 7**), An 95.8% orthodontists used plastic suction tip in clinic. (**chart 8**), About 49.5%used bio-degradable cups for patient (**chart 9**), An 74.7% orthodontists use digital radiograph in clinic. (**chart 10**), About 88.4% orthodontist know digital Orthodontics. (**chart 11**), About 83.2% orthodontists took impression in conventional manner. (**chart 12**), An 57.9% orthodontist use digital cephalometric analysis(**chart 13**), and 62.4% use digital model analysis. (**chart 14**), An 88.4% orthodontist aware of 3D printing in orthodontics(**chart 15**).

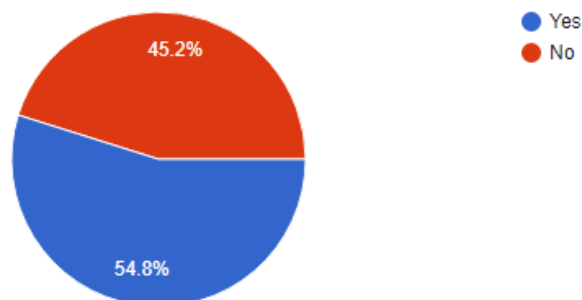
1. Are you aware of green dentistry?

95 responses



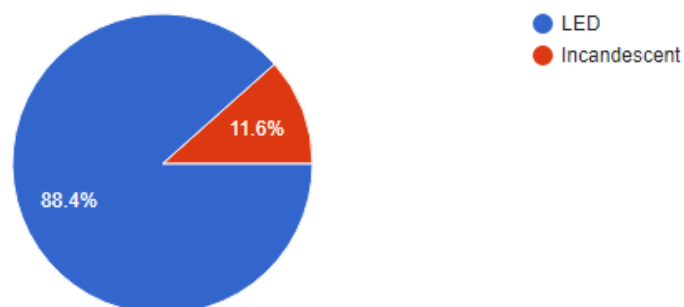
2. Eco-friendly method followed in clinic

93 responses



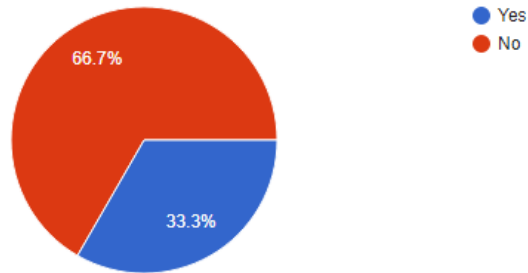
3. Type of light used in clinic

95 responses



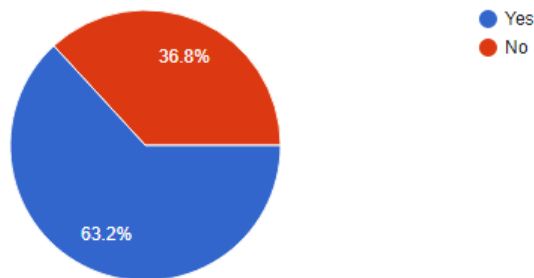
4. Do you use of water faucets sensors in clinic?

93 responses



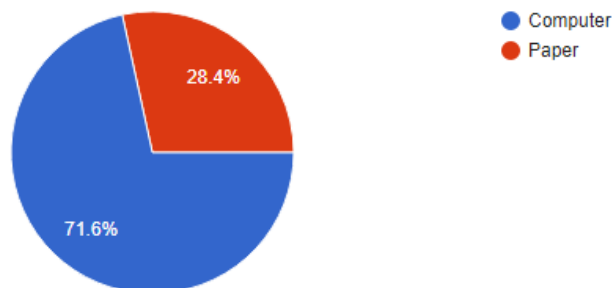
5. Do you use plants in clinics to increase oxygenation?

95 responses



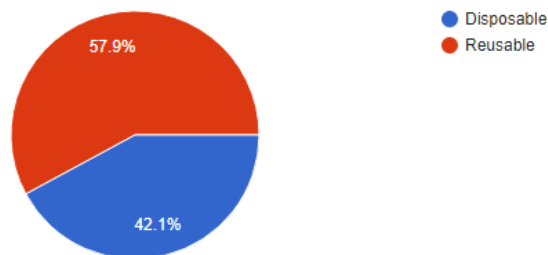
6. How do you document patient details?

95 responses



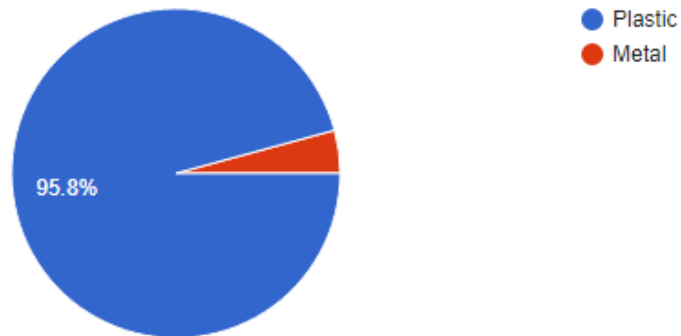
7. Which type of drape used in clinic?

95 responses



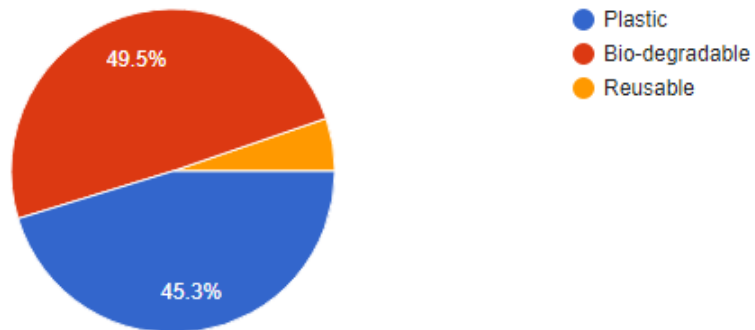
8. Types of suction tips used

95 responses



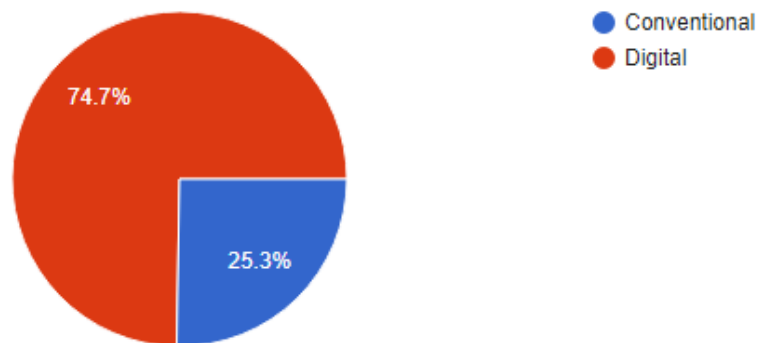
9. Types of cups used for patients

95 responses



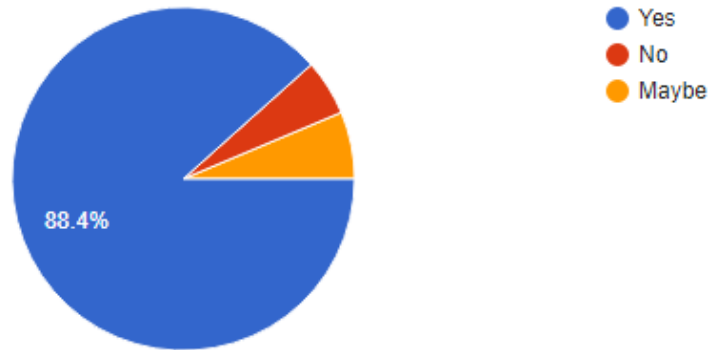
10. Which type of radiograph do you use in clinic?

95 responses



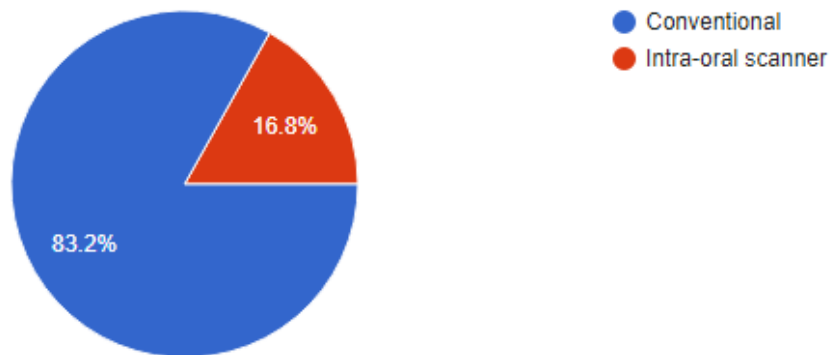
11. Do you know about digital Orthodontics?

95 responses



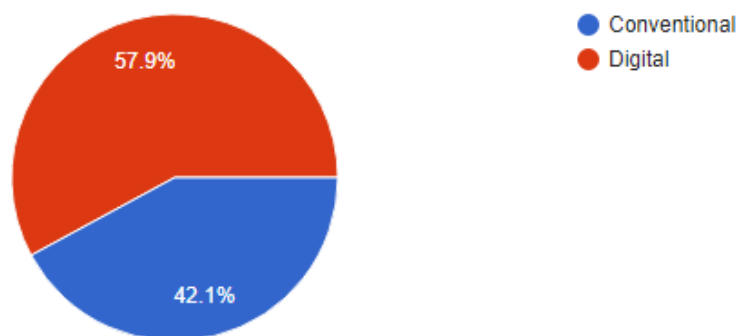
12. Method of impression taking in clinic

95 responses



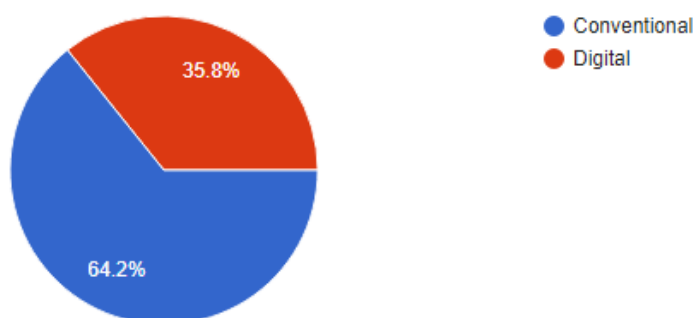
13. Type of cephalometric analysis followed

95 responses



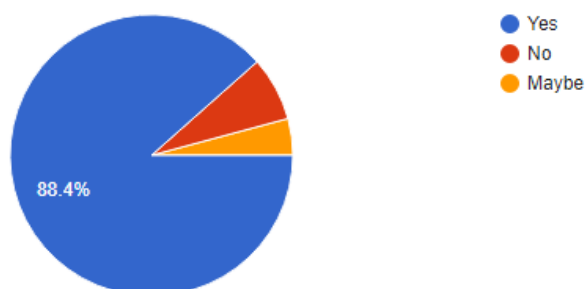
14. Type of Model analysis followed

95 responses



15. Are you aware of 3D printing in orthodontics?

95 responses



IV. Discussion

About 95% of the randomly selected orthodontists responded to the questionnaire. The response rate in this study was similar to the study by Pallavi C, Moses J, Joybell CC, Sekhar KP in 2020. In this study, the awareness about term green dentistry was higher among Orthodontists are 62.1% where 23.2% of respondents never heard the term “green dentistry,” Although in this study, the implementation of the eco- friendly methods in their clinics was found to be 54.8%, which shows that there is a need to change from current practice to green practice.

The Eco-Dentistry Association reports that the dental industry generates tons of plastic and other waste: 680 million patient barriers and 1.7 billion sterilization pouches a year, along with 4.8 million lead foils, 3.7 tons of mercury waste and 28 million liters of X-ray fixer annually. In one year, India generated 56,000 tonnes of bio-medical waste. According to a report filed by the Central Pollution Control Board (CPCB) in the National Green Tribunal India generates about 101 Metric Tonnes per day (MT/day) of COVID-19 related bio-medical waste. In Gujarat, day’s total Covid waste generated in the state was 32.4 Tonnes. Dental practice which has a huge impact on the environment due to the large amount of metallic waste generated by various dental procedures along with excessive use of water and electricity, which specifically emphasis the thrust to move towards ‘Green dentistry’.

Waste management policies are often not sophisticated enough to identify and compel stakeholders to establish effective pathways for segregation of waste that enable effective recovery for recycling¹⁰.

One of the easiest ways to start a going green initiative is to develop a waste reduction plan. Whenever possible, waste reduction plans should include the four R's: ¹⁴

- a. Recycle
- b. Reduce
- c. Reuse
- d. Rethink

There are innumerable ways to introduce eco-friendly dental practices: 1) Introduce digital X-rays that will help in reduction of radiation and use of chemicals; 2) Low energy bulbs and motion sensors can be introduced to reduce electricity usage; 3) Reduce water wastage; 4) Using amalgam separators on chairs and sinks can reduce amalgam pollution; 5) Reduce paper usage and recycle wherever possible⁷.

The government might encourage dentists to implement eco-friendly strategies in their offices by providing tax incentives, no duties on purchases, and use of equipment or materials that have minimum effect on the environment⁹.

Awareness through education is key at all levels and this should be the bedrock of future strategies¹². Green dentistry is an innovative approach which is slowly gaining popularity in developing countries.

V. Conclusion

The current study suggests that awareness of green dentistry is high in orthodontist practitioners, but they lag in implementing the same. However, there is a possibility of rise in implementation with most followed eco-friendly dental practices including alternatives to amalgam filling, use of LED bulbs, unplugging electronic devices when not in use, paper waste management, use of steam sterilization with cloth instrument wraps, using reusable lab coats, and using digital radiography. 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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