Knowledge, perception and practice of atraumatic restorative treatment among dentists in Nairobi
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Abstract

Aim: To determine the knowledge, perception and practice of atraumatic restorative treatment (ART) approach among dentists in Nairobi.

Design: The study was a descriptive cross-sectional study involving registered and practicing dentists in Nairobi.

Materials and Method: A total of 120 registered dental practitioners based in Nairobi, and who had practiced for more than a year after internship were identified to participate in the study, but only 86 actually did. Information on the knowledge, perception and practice of Atraumatic Restorative Treatment was collected using semi-structured questionnaires. The data gathered was analyzed using SPSS.

Results: Majority of the respondents knew about ART approach (82.6%), considered ART a practical procedure (76.8%), and did not think ART can be an alternative to conventional restorative methods (63.5%). 48.2% thought it can be used for permanent restorations. A total of 72.9% of the dentists had never placed any ART restorations. 60.9% of those who had practiced ART had placed less than five restorations. However, 82.6% thought the procedures were successful. Among those who had not placed any restorations, 66.7% had never had an opportunity to try and 55% would perform ART on their patients if given the chance. 86.5% of all the dentists were interested in learning more about ART.

Conclusions: It was established that majority of the dentists in Nairobi are knowledgeable about ART, but they have a poor perception of the technique. The study also established that few dentists applied the ART approach in their practices.

Recommendations: There is need to improve the knowledge and perception of ART among the dentists through continuing dental education seminars and workshops, in order to encourage them to use the technique especially in the underprivileged communities without proper dental facilities.

Introduction

Dental caries is an irreversible demineralization process of dental hard tissue by bacterial acids. Dental caries remains a worldwide problem because of availability of sucrose and other forms of sugar in the diet. It is estimated that the entire world’s population has suffered, is suffering or will suffer a carious experience at one time in their life.1,2 Studies have shown that there is an upward trend in prevalence of dental caries in developing countries in contrast to a downward trend in industrialized countries. Downer et al (1990) showed prevalence of less than 50% in industrialized countries, while Akpabio et al (1989) showed a prevalence of dental caries of more than 80% in developing countries.3,4 Dental caries is left virtually untreated in majority of people living in non-industrialized, developing countries of the world. This group of people with no access to proper oral health care constitutes at least two-thirds of the world’s population. In most of these cases, extraction is the commonest form of treatment offered.1

Atraumatic restorative treatment (ART) is a method of caries management using only hand instruments and an adhesive filling material - Glass ionomer cement (GIC).1 ART was pioneered in rural Tanzania in the mid 1980s by Dr Jo Frencken following a recommendation by WHO to improve oral health status in developing countries using an affordable and practical method.1,5 ART is strongly supported by modern scientific approach to controlling caries, whose key features are maximal prevention, minimal invasiveness and minimal cavity preparation. It has also shown appreciable success and has been accepted
as an appropriate technique in several countries.\textsuperscript{1,5} Recent improvements in restorative materials, specifically GIC have given ART a solid practical basis. These improvements include rapid setting reaction, less moisture sensitivity, enhanced wear resistance and a better handling profile. These, together with the original salient properties of the filling material, namely, chemical bonding to the tooth and fluoride release to the tooth induce remineralization of the restored tooth.\textsuperscript{6,7} Furthermore, conventional considerations in cavity preparation are not necessary, and as a result, there is enhanced conservation of tooth structure because the cavity is not enlarged or 'cut' with rotary instruments. The procedure is also more comfortable for the patient because there is less pain.\textsuperscript{8,9,10}

ART was originally introduced for economically less developed countries in the world. However it has applications in the industrialized, more affluent parts of the world, for example, introducing oral health care to very young children not previously exposed to dentistry, patients with extreme fear or anxiety, mentally or physically handicapped patients, home bound elderly and those living in nursing homes, and patients with high caries index who cannot have all the restorative treatment completed immediately, as an intermediate treatment to stabilize conditions. In the past ART has been used for temporary restorations, till the patient could access a dental clinic for the permanent restoration.\textsuperscript{11-13}

Despite the proven advantages of ART as a method of caries management that is also more comfortable and cheaper for the patient, it still has limited use in developing countries. This is probably due to inadequate facilities to implement the program, and lack of well trained personnel that can properly deliver the service. In East Africa, very few studies have been carried out to assess the application of ART. One such study by Kemoli et al (2009) involved an analysis of how the cavity size affected the survival rate of proximal ART restorations in primary molars.\textsuperscript{14} It was conducted in Matungulo and Kangundo divisions in Kenya. Another study was conducted by Kikwilu et al (2009) in Tanzania on barriers to restorative care as perceived by patients attending government hospitals, and ART approach was strongly recommended as a form of treatment.\textsuperscript{15}

There appears to be very limited data on ART because it is not being practiced to a large extent in the country. This is probably because of low level of knowledge on ART, a poor attitude or wrong perception among the dentists in Nairobi, and in Kenya as a whole. The aim of this study was to determine the knowledge, perception and practice of ART among dentists in Nairobi. The information will be used for ART development programs, continuous education programs and as a reference for future studies conducted on ART.

Materials and Methods

The study was a descriptive cross-sectional study involving registered and practicing dentists in Nairobi, the administrative and economic capital of Kenya. The study included all the dentists in Nairobi who have finished a year or more since internship, regardless of whether they are based in private practice, public hospitals or teaching institutions, and who consented to participate. Out of 120, only 86 of the dentists filled and returned the questionnaires. Ethical approval was obtained from the Kenyatta National Hospital and University of Nairobi’s Ethics, Standards and Research Committee. Information on the knowledge, perception and practice of Atraumatic Restorative Treatment was collected using semi-structured questionnaires that were designed by the investigator. The questionnaire was distributed by hand to the dentists, who were given two days to fill it before it was collected by the investigator. Data analysis was carried out with SPSS Version 12.0 for Windows.

Results

Knowledge of ART

Where they learnt about ART

Twenty-one (24.7\%) of the dentists learnt about ART from conferences, twelve (14.1\%) from journals, fifteen (17.6\%) from the internet, thirteen (15.3\%) from their colleagues, and the remaining twenty-four (28.2\%) from lectures given while in school.

What ART involves

Seventy-one (82.6\%) of the dentists knew that ART involves management of caries using hand instruments only. Eight (9.3\%) thought ART involves management of caries with both hand and rotary instruments, two (2.3\%), rotary instruments only, while another four (4.7\%) did not know.

Where ART was pioneered

Forty-one (48.2\%) of the dentists knew ART was pioneered in East Africa, five (5.9\%) in South Africa, three (3.5\%) in West Africa, eight (9.4\%) in Asia, nine
(10.6%) in Europe, three (3.5%) in America, while sixteen (18.8%) did not know.

The restorative material used in ART
Seventy-one (82.6%) of the dentists knew that the restorative material used in ART is Glass ionomer cement (GIC). Seven (8.1%) thought it is composite material, one (1.2%) thought it is amalgam, while seven (8.1%) did not know.

Potential clients for ART
Thirty-three of the dentists thought the best clients for ART are first time pediatric patients (39.8%), followed by anxious or fearful patients (32.5%), elderly patients (13.3%), difficult patients (6%) and talkative patients (2.4%). Five (6%) did not know.

Perception of ART

Whether they consider ART a practical procedure
Sixty-three of the dentists (76.8%) consider ART a practical procedure. Nineteen (23.2%) did not consider ART practical.

Whether ART could be used for permanent restorations
Forty (48.2%) of the dentists thought ART can be used for permanent restorations while forty-three (51.8%) did not.

The future of ART in Kenya
Fifty-three (62.3%) of the dentists thought ART has a bright future, eight (9.4%) very dim, while twenty-three (27.1%) were not sure.

Main advantages of ART
The dentists' perceived advantages were as follows: no need for anaesthesia (32.9%), reduced pain (11.8%), better healing (4.7%), reduced risk of infection through instruments (11.8%), no need for patient follow-up (3.5%), does not require electricity and pressurized water (20%), reduced risk of secondary caries (1.2%), a very affordable procedure (11.8%).

Disadvantages of ART
The dentists' perceived disadvantages of ART were: risk of infection if cavity toilet is not properly done (31%), limited access in some cavities (16.7%), difficult to conserve tooth substance without rotary instruments (4.8%), risk of residual caries (26.2%), very low longevity (9.5%), not totally atraumatic (10.7%).

Practice of ART

Whether they have ever placed ART restorations or not
Sixty-two of the dentists who participated in the study had never placed any ART restorations (72.9%), while only twenty-three of them had ever done so (27.1%).

Those who had ever placed ART restorations were interviewed further on their practices
Indication for ART as the restorative procedure of choice
Seventeen of the placed ART restorations were minimal to moderately large class I accessible to hand instruments in primary dentition and secondary dentition (73.9%). The remaining six were placed on a large class II, large class I or all cavity sizes and classes (25%).

How many such procedures they have ever done
Fourteen (60.9%) of the dentists had placed less than 5 restorations, six (26.1%) had placed up to 10 restorations, and three (13%) had placed more than 20 restorations.

Whether they considered the procedures successful
Nineteen of the dentists (82.6%) thought the procedures were successful, six did not think they were successful, or were still following the patients (12.9%).

Criteria for successful treatment
Sixteen of the dentists (69.5%) considered absence of post treatment pain and a restoration that lasted more than 5 years to be the main criteria of a successful treatment.

Failed treatment
Nineteen of the dentists (79%) considered failed treatment to be patient complaining of intolerable pain and sensitivity post operatively, and a fractured restoration.

Whether they are interested in learning more about ART
Twenty-one of the dentists (95.5%) were interested in learning more about ART, while only two were not (4.5%).
Those who had not performed any ART were asked the following questions

**Why they have not performed any ART restorations**
Forty-two of the dentists (66.7%) had never had an opportunity to try, thirteen had inadequate knowledge about it (22.2%), while seven did not think it is practical and would never try it on a patient (11.1%).

**If they would perform ART on their patients if given opportunity to try**
Thirty-three of the dentists (55%) said they would perform ART on their patients if given the chance, while twenty-seven said they would not (45%).

**Whether they have ever observed a demonstration on ART**
Ten of the dentists (16.4%) had observed a demonstration on ART. Fifty-one had not (83.6%).

**Whether they are interested in learning more about ART**
Forty-seven of the dentists (75.8%) were interested in learning more about ART. Fifteen were not (24.2%).

**Discussion**

From this study, it was established that dentists in Nairobi are fairly knowledgeable about ART. Most of them (28.2%) learnt about it from lectures they were given while in school. Most of the dentists (82.6%) are correctly aware that ART involves management of dental caries with hand instruments only, and an adhesive filling material, Glass ionomer cement, as defined by Dr. Jo Frencken. 48.2% of the dentists know that ART was pioneered in East Africa, and that the potential clients include first-time paediatric patients, anxious or fearful patients, and the elderly who cannot easily access dental services.25 The dentists are also aware of the main advantages of ART as reduced need for local anaesthetic, reduced pain, reduced risk of infection through instruments, no need for electricity and piped water, reduced risk of secondary caries and a very affordable procedure. These are consistent with those results obtained from studies such as that carried out by Carvalho et al (2003) in sixteen 5 - 7 year olds following ART treatment which showed significant reduction of mutans streptococci levels in saliva one week (95.95%), four weeks (93.27%), and one year (95.56%), after ART as compared to saliva before treatment.6 A study conducted among Finnish elderly persons, mean age 74.5 years showed a promising advantage of patient satisfaction because the patients did not have to go out to visit the dentist, but rather had one come to their homes and this was enabled by the fact that the dentist did not need pressurized water nor electricity in order to treat the patients.11

The disadvantages quoted by the dentists included risk of infection if cavity toilet is not properly done (31%), limited access in some cavities (16.7%), risk of residual caries (26.2%), low chance of survival of the restoration (9.5%), and that the procedure is not totally atraumatic (10.7%). The response to these suggested disadvantages was as variable among the dentists as it is among different researchers. Amerongen et al (1999) considers the choice of term ART defensible because the patients experience less discomfort with ART procedure without anaesthesia, and preparations thus made are smaller than those prepared with rotary instruments, while Anusavice et al (2003) reports that access to the cavity using hatchets to widen entrance or fracture overhanging enamel may cause fragmentation of sound or undermined enamel, and that excavation of carious dentin with hand instruments although less painful than with rotary instruments, is traumatic.9

Another issue that has come up is that regarding residual caries. According to Weerheijm et al (1999), three important measures if considered carefully during the cavity preparation and filling, contribute to caries arrest. However, all three need to be combined in order to be effective. These three measures are: isolating the caries process from the oral environment, excavating the carious dentin and using a cariostatic filling material.16 Regarding these three measures: In general, isolation leads to a reduction in the number of microorganisms but the sealant or restoration must be very secure and last for a long time; although microorganisms are not always removed during excavation, it remains an important step in arresting the caries process; cariostatic properties are attributed to some filling materials, for example, GIC, dentin conditioner like 37% phosphoric acid, supposedly ensuring reduction of the remaining microorganisms.6,9 How about a place in preservative dentistry? According to Anusavice (1999), retention rates for ART restorations are not impressive, especially for primary teeth. ART technique offers some benefits in restoring function and reducing rate of caries progression but, it is unlikely that current materials will be able to arrest caries progression completely in high risk persons.7 In a typical situation where ART is considered, the option of remineralisation has been lost already and there is a cavitated lesion: preservative dentistry represents an ultra conservative philosophy of delaying placement
of first restoration or replacement of restorations till there is evidence of cavitations or definite failure is observed or is highly likely.7

However, the present study established that the dentists in Nairobi have a poor perception of ART. Although 76.8% of them consider ART a practical procedure, 51.8% of these do not think ART can be used for permanent restorations. Furthermore, 63.5% do not think ART can be an alternative to conventional cavity preparation with rotary instruments. This is probably because of the dentists’ bias against or misinformation concerning the ART approach. These perceptions contrast results of studies done to compare ART with conventional restorations. Monsen-Schneider et al assessed whether amalgam restorations would retain successfully in ART repaired cavities and reported a high survival rate (95.1%) of large occlusal restorations.9,16,17 A one year evaluation of ART and MIT in primary dentition of 6 to 9 year old school children using Fuji IX (GIC) and Dyract (compoer) materials exhibited an overall 86% success.18 62.1% of the dentists think ART in Kenya has a bright future. This is at par with worldwide studies which have recognized that there is great potential and room to improve ART.17,19

Findings from this study established that there is limited practice of ART among dentists in Nairobi. 72.9% of the participants have never placed ART restorations, and only 10% of these have ever observed a demonstration on ART. This may be due to the fact that they have inadequate knowledge about it, and because most dentists practice in hospital set-ups, with provisions for modern dentistry like piped water and electrically driven dental units, having no need, and therefore no opportunity to place ART restorations. Among the few who have, most of them have placed less than 5 restorations, and the majority considered the restorations successful. Most of these restorations were placed in the field during community outreach programs. All among those who have placed ART restorations, and 75.8% of those who have not were interested in learning more about ART. This may be because they realize the importance of such a convenient and affordable method of caries management in a third world country like Kenya, in which majority of the population has no access to proper and modern dental care.

Conclusion

Dentists in Nairobi were found to be knowledgeable about ART. They are aware that ART involves management of dental caries with hand instruments only, and an adhesive filling material, usually Glass ionomer cement. The dentists also know that the potential clients for ART include first time paediatric patients, fearful or anxious patients, and elderly patients. They consider the main advantages to be reduced need for anaesthesia, no need for electricity and piped water, and that it is a very affordable procedure, and the main disadvantages to be risk of residual caries, very low chance of survival of the restorations, and the fact that it is not totally atraumatic. Dentists in Nairobi have a poor perception of ART. Although most of them consider ART a practical procedure, they do not think it can be used for permanent restorations, nor could it be an alternative to conventional cavity preparation with rotary instruments. However, majority of them think ART in Kenya has a bright future.

Very few dentists in Nairobi practice ART approach in their practice. However, most of them are interested in learning more about ART.

Recommendations

1. The knowledge of ART among dentists in Nairobi should be improved through continuing dental education seminars and workshops.
2. Perception of ART should be improved through education as it appears to have a direct bearing on the practice.
3. Practice of ART should be encouraged among the dentists because in a third world country like Kenya, the population with no access to proper dental care would benefit greatly from the facilities.

References


