



ASSESSING EGYPTIAN DENTISTS' KNOWLEDGE AND PRACTICE IN UTILIZING FIBER REINFORCED COMPOSITE RESIN SPACE MAINTAINERS: A QUESTIONNAIRE-BASED STUDY

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Abstract

Introduction: Utilization of fiber-reinforced composite resin space maintainers (FRCRSM) in orthodontics and pediatric dentistry holds significant potential for effective space management. **Objectives:** This study aims to evaluate the knowledge, familiarity, frequency of usage, and perceived challenges related to FRCRSM among a sample of Egyptian orthodontists and pedodontists through a structured questionnaire survey. **Subjects and methods:** A questionnaire was designed and prepared, then evaluated for reliability and validity. A total sample of 200 participants, including Egyptian orthodontists and pedodontists, were asked to complete the questionnaire, and the final data were analyzed. **Results:** The survey responses from 200 participants unveiled varying levels of knowledge and utilization of FRCRSM among Egyptian orthodontists and pediatric dental

practitioners. While 20 % demonstrated a comprehensive understanding and routinely incorporated FRCSM in clinical settings, a substantial proportion of 80 % indicated limited exposure or knowledge gaps. **Conclusion:** The results of the current survey showed that a high percentage of orthodontic and pediatric dentistry practitioners didn't use the FRCSM as a space maintainer; this could be attributed to its technique sensitivity and reduced knowledge about this type of space maintainer.

Keywords: Interceptive orthodontics, Fiber-reinforced composite resin Space maintainer, Bonded space maintainer.

Introduction

Premature loss of primary molars due to caries or trauma has an impact on the primary dentition, permanent dentition, and or both. It may result in crowding, which could harm a child's self-esteem, quality of life, and changes in the dental arch, such as ectopic eruption of permanent teeth. (1-3)

Space maintenance is the most common preventive technique in orthodontics to decrease the incidence of malocclusion. (4-6)

There are many types of space maintainers used for space preservation, including band and loop, crown and loop, distal shoe, fiber-reinforced composite space maintainer (FRCSM), simple wire directly bonded, lower lingual arch, Nance appliance, transpalatal arch, and removable appliances. (2, 7, 8)

Space maintenance can frequently be done using a conventional banded space maintainer. Despite its effectiveness, all banded appliances have some drawbacks, including need for more than one visit, time-consuming laboratory procedures, cement disintegration, embedding in gingival tissues, rotation, metallic display, and fractured solder joints. (9)

Due to possible drawbacks associated with banded maintainers, fiber-reinforced composite resin technology was developed as a bonded space maintainer. (10) Various fiber types, including glass, polypropylene, polyethylene, and carbon fiber, are commonly used in dentistry. In pediatric dentistry, polyethylene fibers can be used as space maintainers to restore fractured teeth, splinting traumatized teeth, or in post-endodontic permanent retainers. (11)

Bonded space maintainers offer several advantages over the conventional banded space maintainers. It can be constructed intraorally at a single appointment, so there is no need for laboratory procedures. (4)

Additionally, it is more aesthetically appealing, less invasive, doesn't impinge soft tissue, is simple to remove, is more readily accepted by pediatric patients, and exhibits high durability. (7, 12, 13)

Hence, the FRCSM could be a suitable alternative to the conventional band and loop space maintainer; this study aimed to assess the knowledge and practice of FRCSM and its use among a group of Egyptian dentists who practiced orthodontics and pediatric dentistry.

Materials and Methods

This survey with a self-administered questionnaire was conducted in Egypt between March and May of 2022 to assess the knowledge, practice, and use of FRCSM. The questionnaire consisted of two sections. The first section contained the participants' personal information, which included their name, gender, age, and specialty. In the second section, participants were asked to answer seven questions, which were written in English. (Figure 1)

Initially, five experts evaluated the questions' validity using a five-point Likert scale. Following that, the Aiken index for each question was determined, and its relevance to the study was determined. Cronbach's alpha test was then used to assess the questionnaire's reliability and the results was 0.78 which considered reliable.

A total sample of 200 dentists participated in the study, including orthodontists, pedodontists, and master students of both specialties. Participants were instructed to answer the questions by marking the most appropriate answer they thought was most relevant.

Participants were instructed that if they need any clarification, they can communicate with the investigator, then the questionnaires were returned on the same day.

Assessment of knowledge and practice of fiber reinforced space maintainer

Name :
Gender:
Age :
Speciality:

• **Answer the questions by marking the most appropriate answer you thought it is most relevant.**

Q1- Have you ever used FRCSM for early primary tooth loss for children?
a) Yes
b) No

Q2- How frequently do you use FRCSM? (Out of 10 patients)
a) None
b) 1-2
c) 3-5
d) 6-8
e) All patients.

Q3- Which reinforced resin do you use?
a) Polyethylene fiber system.
b) Glass fiber system.
c) I don't use it.

Q4- What is the greatest advantage of using FRCSM?
a) Save time.
b) Better esthetic.
c) Low cost.
d) I don't know.

Q5- What is the greatest disadvantage of using FRCSM?
a) Sensitive technique.
b) High percentage of failure.
c) High cost.
d) I don't know.

Q6- Ease of application of FRCSM for the primary tooth is more in..
a) Maxillary arch.
b) Mandibular arch.
c) Same in both.
d) I don't know.

Q7- Do you promote the use of FRCSM in primary teeth loss?
a) Yes
b) No
c) Limited knowledge about its use.
d) I don't know.

Fig 1: Questionnaire used in this study.

Statistical analysis

Data management and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS) version 20. Categorical data were summarized using frequency and percentage.

Results

A total of 200 practitioners participated in the study, and the results were found to be as the following: Of the 200 participants, 110 were pedodontists, 30 were dentistry master students, and 60 were orthodontists (Fig 2). Regarding gender distribution, 110 were females, while 90 were males (Fig.3). Table 1 shows descriptive data regarding the age distribution of participants.

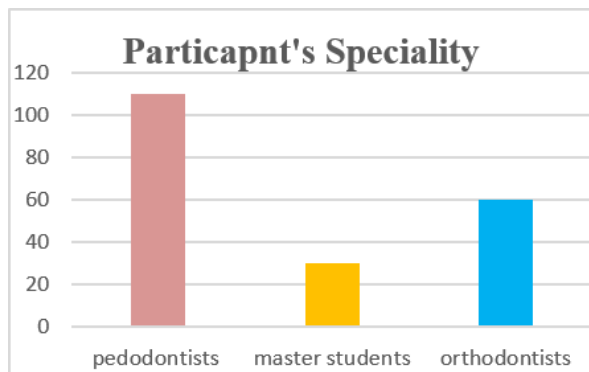


Fig 2: Chart showing the speciality of participants

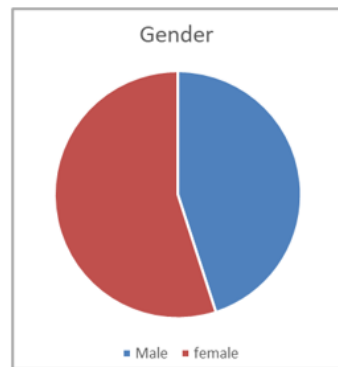


Fig 3: Regarding the gender distribution of the

Age	Frequency	Percent %
20 - 30	103	51.5
31- 40	88	44
Above 41	9	4.5
Total	200	100

Table 1: Age distribution of the participants.

The majority (80%) of the participants included in the study did not use this type of space maintainer, with the majority of those who use this type using the polyethylene fiber type (Fig.4). The frequency of use of FRCSM was assessed by question (2). The results showed that most of the participants did not use this type, while dentists who frequently use this type were for 1– 2 out of 10 patients (Table 2). with most of them using a Polyethylene fiber system (Fig.5).

Most participants believed that the main advantage of this type is its superior esthetic, while most of them see that the main drawback is its technique for construction is sensitive. And 40 % of the participants reported that the application of this type of space maintainer is easier in the maxillary arch.

Finally, more than 50 % of dentists in this study had limited knowledge when they were asked if they encouraged its use.

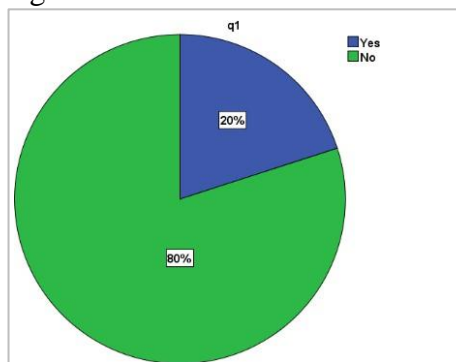


Fig. 4: Percent of who used FRCSM,

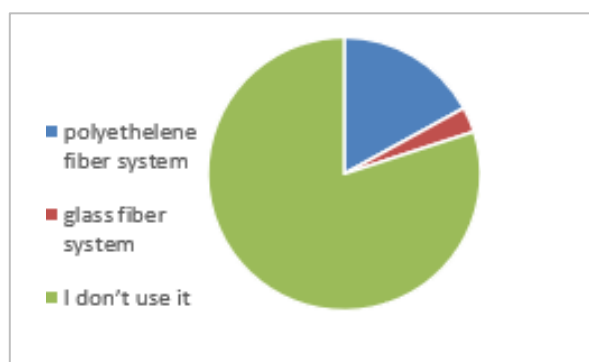


Fig. 5: Frequently used fiber system

Table (2): Descriptive statistics of response to different questions

Question	Response	Frequency	Percent%
Q1 Have you ever used FRCSM for early primary tooth loss for children	• Yes	40	20
	• No	160	80
Q2 How frequently do you use FRCSM? (Out of 10 patients)	• None	160	80
	• 1 - 2	30	15
	• 3 – 5	8	4
	• 6-8	2	1
	• All patients	Zero	Zero
Q3 Which reinforced resin do you use?	• Polyethylene fiber system	34	17
	• Glass fiber	6	3
	• I don't use	160	80
Q4 What is the greatest advantage of using FRCSM?	• Save time	20	10
	• Better aesthetic	110	55
	• Low cost	4	2
	• I don't know	66	33
Q5 What is the greatest disadvantage of using FRCSM?	• Sensitive technique	60	30
	• A high percentage of failure	40	20
	• High cost	30	15
	• I don't know	70	35
Q6 Ease of application of FRCSM for the primary tooth is more in	• Maxillary arch	28	14
	• Mandibular arch	8	4
	• Same in both	4	2
	• I don't know	160	80
Q7 Do you promote the use of FRCSM in primary teeth loss ?	• Yes	35	17.5
	• No	5	2.5
	• Limited knowledge about using FRCSM	100	50
	• I don't know	60	30

DISCUSSION

The development of fiber-reinforced composite technology has brought a new material into the field of dentistry with the advantage of metal-free, adhesive dental aesthetics,(10) Glass fiber (GlasSpan and Polydentia), ultrahigh molecular weight polyethylene fiber (Ribbond), and fibers impregnated with resin (Vivadent, StickTech, Pentron) are some of the commonly used reinforced fibers. (14) The participants in this study included orthodontists, pedodontists, and master students. In this study (80%) of participants don't use any type of fiber, which may be due to limited knowledge and practice of this type, as well as the high construction cost of this space maintainer compared to the conventional banded types. The sensitivity of its construction technique may reduce the survival rate of success if they don't use the proper isolation, as stated by some authors(15, 16).

Polyethylene fibers have advantages such as being easily shaped, having translucency, low density, and biocompatibility. (9) So, this may contribute to 17% of the participants in the group sample using the Polyethylene fiber system and 3% using the Glass fiber reinforced space maintainer. These findings agree with a previous study by Garg et al. (17), who used Ribbond polyethylene fibers (Ribbond) and placed them under the rubber dam.

In the current study, (55%) of participants found that the main advantage of FRCSM is its better aesthetics, which is in agreement with Kamal et al. (18), who found that patients treated with FRCSM showed a higher satisfaction than those treated with band and loop space maintainer concerning color and shape which is also in agreement with our results and with the results of Garg et al. (17) This could be due to good esthetic properties of FRCSM which meet patient's esthetic demands. (10, 19) Moreover, 10 % of participants believe that it saves time by eliminating the lab step, so this may lessen its cost, although it may need extra chair or clinical steps and time. (15, 16)

Regarding isolation and technique sensitivity, 30% of participants stated that FRCSM requires proper isolation, which should be considered when compared to conventional band and loop, which require less chair time with minimal need for isolation. This result is in accordance with other studies that stated that technique sensitivity is the main disadvantage of this type. (15, 16)

In the present study, the use of FRCSM in the maxillary arch was preferred by 28 participants, while 8 participants stated that it was preferred in the mandibular arch, and 4 participants responded, "same for both" and 160 didn't know, which may be contributed to the ease of isolation in the upper arch. Moreover, other studies^(11,12) found that the FRCSM placed in the maxillary arch have more extended survival periods than those placed in the mandible. (20, 21)

Regarding question no.7, only 35 participants promoted the use of FRCSM, while just 5 participants answered that they don't recommend its use; this could be due to increased chair time and sensitivity of its construction technique, which could affect its survival rate. Moreover, the popularity and ease of use of the conventional type of band and loop affect its application by many dentists. This low percentage of encouragement may be due to limited knowledge and practice of this type of space maintainer, which has been observed in our results.

Conclusions

The results of the current survey showed that a high percentage of orthodontic and pediatric dentistry practitioners didn't use the FRCSM as a space maintainer; this could be attributed to its technique sensitivity and reduced knowledge about this type of space maintainer.

Recommendation

Knowledge and clinical application of FRCSM should be incorporated into educational dental programs and workshops specifically for both orthodontic and pediatric dental practitioners.

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