Video modelling and dental anxiety in children. A randomised clinical trial

A. Alnamankany

Assistant Professor, Pediatric Dentistry Department
Taibah University, Madinah, Saudi Arabia

e-mail: a.alnamankany@yahoo.com

Abstract

Aim To evaluate the effect of video modelling on the reduction of dental anxiety (DA) in children receiving fissure sealants.

Materials and methods A parallel double-blind randomised clinical trial (RCT) was conducted between February and August 2017 in a hospital in Madinah (Saudi Arabia). A statistically calculated sample size (n=48) of children (6–10) years old was randomly assigned to either a modelling or a control video group. Before and after watching the relevant video, DA was assessed by means of the Abeer Children Dental Anxiety Scale (ACDAS).

Results There was a significant difference in dental anxiety scores between the modelling and the control groups after watching the videos, P<0.001. Children aged 7–8 years reported the highest dental anxiety scores. There was no significant difference between the results of DA that were reported by the child on ACDAS at the time of dental examination with a mirror, and expected behaviours of the children that were reported by their mothers before the start of the dental treatment, P=0.33.

Conclusion Video modelling seems to be an effective method to reduce dental anxiety in children receiving fissure sealants. The mother's expectation of her child's behaviour appears to be a good indicator of the child's actual behaviour at the dentist.

Introduction

Dental anxiety is a common global problem that affects children and adults; however, the exact aetiology is not entirely understood [Townend et al., 2000]. Anxiety may occur without a cause, or it may be based on a real situation that leads to a reaction that is out of proportion to what would normally be expected [Luoto et al., 2008]. On the other hand, severe anxiety can have a serious impact on quality of life and its different dimensions, such as speaking, eating, appearance, and social intercourse [Luoto et al., 2008]. Dental anxiety is cumulative over time and its development is influenced by multiple variables, where it is more likely to start in childhood [Tickle et al., 2009]. Children's fear is strongly associated with the subjective experience of pain and trauma than with the objective dental pathology [Townend et al., 2000]. Several studies have reported the strong relationship between dental anxiety and avoidance of dental care [Al-Namankany, 2017; Arnrup et al., 2003]. Furthermore, dental anxiety has been reported to decrease with the repeated exposure to dental treatment, which is possibly due to habit [Brown and Hammill, 1990]. In order to avoid any conflict between dentists and parents, it is important to inform the child's parents about the behaviour management techniques that the dentist is planning to perform; it was discovered that informed parents were significantly more compliant with behaviour management techniques than uninformed ones [Peretz et al., 2013]. Moreover, positive methods and behaviour management techniques that involve explanations and demonstrations appropriate to the child's level of understanding were preferred more by parents than using restraint and voice control [Peretz et al., 2013].

The social learning theory states that the behaviour is the outcome of an interaction between cognitive processes and environmental events [Do, 2004; Rosenthal and Zimmerman, 1978]. Modelling is a technique based on the social learning theory psychological principle that people learn about their environment by observing other's behaviour, either live or by video [LeBlanc et al., 2003; Nikopoulos and Keenan, 2007; Paterson and Arco, 2007]. Video modelling has the convenience and portability of demonstrating a wide

range of self-help strategies and positive behaviours across different settings; it can also enhance the learning of good behaviours by showing videos that highlight specific stimuli and behaviours, and thereby it can increase cost-effectiveness by saving on the use of live models [LeBlanc et al, 2003; Nikopoulos and Keenan, 2007; Paterson and Arco, 2007].

The first randomised clinical trial (RCT) to use video modelling in paediatric dentistry was completed in England, it showed that video modelling was successful in reducing dental anxiety in children having dental treatment under local anaesthesia, and inhalation sedation [Al-Namankany et al., 2014b;Al-Namankany et al., 2015]. Yet, there is no clinical study to investigate the effect of video modelling on the behaviour of anxious children receiving fissure sealants. Although fissure sealants are harmless and painless way of shielding children's teeth from caries, some children still refuse to have them because of their fear and confusion between needles and the metal tip of the (acid-etch/fissure sealants) as shown in Figure 1. Fissure sealant is a basic procedure in prevention and treatment of dental caries on its early stage. Therefore, the objective of this study is to evaluate the effect of video modelling on the reduction of dental anxiety in children receiving fissure sealants.

Materials and methods

The study design was a hospital-based, parallel double-blind RCT conducted between February and August 2017 in Madinah, Kingdom of Saudi Arabia. The fund was obtained from the Deanship of Research at Taibah University, and the ethical approval was obtained from the College of Dentistry, Research Ethics Committee (TUCD-REC). A statistically calculated sample size (n=46, 23 in each group) of a two group's Chi-square test of equal proportions, and a significance level of 0.05 with 80% power was used. The probability of a type-I error (alpha) was 0.05, and the probability of a type-II error (beta) was 0.2.

The inclusion criteria were the following: Girls and boys aged 6 to 10 years old; healthy children, in class I and II according to the classification of the American Society of Anaesthesiologists (ASA); children who were assessed to be dentally anxious based on the score of ≥26 on the Abeer Children Dental Anxiety Scale (ACDAS); and children with no previous dental fissure sealants experiences. The exclusion criteria were children who did not meet the inclusion criteria; children with learning disability, or children who needed emergency dental treatments.

A written consent was signed by the child's legal guardian after reading the information sheet, and verbal assents were also obtained from participating children. Two interventional videos were used for this study, the test-Modelling Video (MV), and the Control-oral hygiene instructions Video (CV). The external cover of both videos were similar in colour and design, but each one had a different content. The MV was a video of about four minutes showing a nine-year-old girl with her mother visiting the dentist for the first time, the girl was anxious about going to the dentist. The video showed all steps that would make the girl feel happy at the end of the dental visit, the first scene started from the waiting room then when she was entering to the clinic and sitting on the dental chair to have dental examination with mirror, followed by fissure sealant application. The child was scared to have the treatment as she thought that she was going to have an

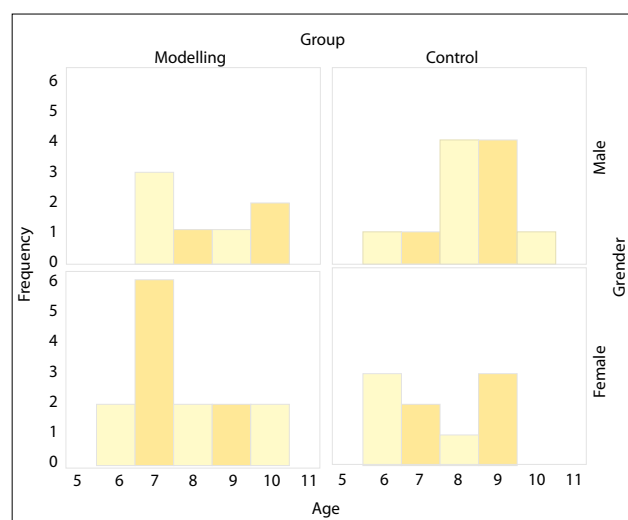FIG. 1 Fissure sealants and their tips.

FIG. 2 The distribution of age (years) by gender and group.

injection, the dentist showed her the process of etching and fissure sealant application on her hand, the child completed the treatment happily and was rewarded by a sticker.

The CV was also a video, about four-minute long, showing the same dentist and the same nine-year-old girl having oral hygiene instructions on how to brush her teeth properly. The dentist began by explaining and showing the technique on a plastic teeth model, and then asked the girl to brush her teeth in the same way in front of a mirror.

The first step of the study started in the waiting room where boys and girls, aged 6 to 10 years old, reported their dental anxiety on a valid and a reliable dental anxiety scale (ACDAS) (Al-Namankany et al., 2012a; Al-Namankany et al., 2014a) as baseline scores of their dental anxiety. Only anxious children who reported ≥26 on ACDAS were recruited. The dental nurse randomly assigned children to either the MV or the CV using random numbers that were generated and sealed inside small envelops by the dentist. All children reported their dental anxiety again on ACDAS after watching the relevant video at the end of the dental visit. The randomisation process was concealed by a sequence numbering all envelops and assigned to the relevant video group immediately after the randomisation. Both the dentist and the children were blinded, so children were asked to not talk about the video they had watched. All fissure sealants applications for the participating children were completed by one consultant in paediatric dentistry.

The null hypothesis suggested that there was no significant difference in dental anxiety between the modelling and the control groups, when video modelling was used to reduce anxiety for children receiving fissure sealants. Statistical
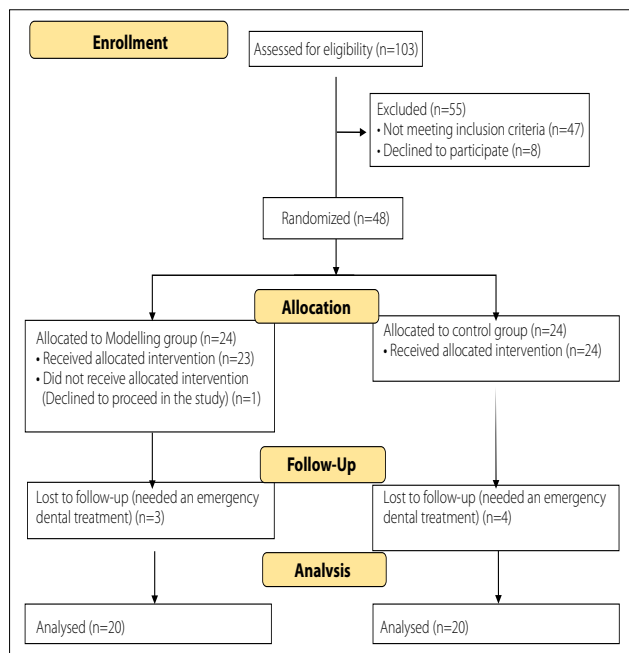
FIG. 3 CONSORT Flow Diagram.

analyses were completed by using IBM SPSS (24.0, SPSS Inc., Chicago Ill, USA) as follows.

A histogram was drawn to show the distribution of age by groups (modelling/control) and gender. The mean, and the standard deviation (SD) were calculated, the 95% Confidence Interval (CI) of the mean age was also calculated by performing one sample t-test because the age of the sample was normally distributed. The total scores for the dental part of the ACDAS range from 13 to 39 with the cut-off point of > 26, which was used to indicate anxiety. The baseline dental anxiety scores for all participants were >26 before watching the video.

A Chi-square test or Fisher's exact test (if one of the four expected frequencies were less than five) was used as follows.

1. Examine the presence of any difference in the proportion of dental anxiety (ACDAS > 26) after watching the videos in modelling and control groups.

2. Assess if there is a relationship between the proportion of dental anxiety on ACDAS and the age.

3. Assess if there is a relationship between the behaviour of the child when the dentist checked his/her teeth by a mirror and the expected behaviour of the child that had been reported by the mother.

The primary outcome of this study was the change in the proportion of dental anxiety on ACDAS before and after watching the video. The secondary outcomes were the relationship between the proportion of dental anxiety on ACDAS and age, and the relationship between the proportion of dental anxiety at the time of the dental examination by a mirror that were reported by the child on ACDAS and the expected behaviour of the child that were reported by the mother. The CONSORT 2010 checklist was used for reporting this RCT.

Results

Between February and August 2017, a sample of 103

children aged 6–10) years were approached in order to assess their eligibility for the study. Finty five children were excluded, 47 children did not meet the inclusion criteria, and 8 parents declined to consent. The age was normally distributed as shown in Fig. 2. The mean age was 7.98, SD=1.25, and the 95% CI of the mean was 7.5 to 8.3. The distribution of age by gender and group is shown in Figure 2. On the first stage of the study 48 children were randomised to either the MV (n=24) or the CV (n=24). On the second stage of the study eight children had dropped out, seven children needed emergency dental treatments, and one child declined to proceed. The flow diagram of the participants is shown in Figure 3.

There was no significant difference between the modelling and the control groups before watching the videos (P=1.00). However, the difference was significant after watching the videos (P<0.001). Children aged 7 to 8 years had the highest scores of dental anxiety, as shown in Figure 4. Although dental anxiety was higher in girls (73% anxious/ 27% not anxious) than in boys (47% anxious/53% not anxious), there was no significant difference between girls and boys (P=0.107). There was no significant difference between the proportion of dental anxiety at the time of dental examination with a mirror that was reported by the child on ACDAS at the end of the dental visit, and the expected behaviour of the child that was reported by the mother before dental examination (P=0.33). CONSORT 2010 checklist was used for reporting of this trial as shown in Table 1.

Discussion

In order to estimate the effect of the intervention, the CONSORT checklist should be adapted for the reporting of the RCT [Al-Namankany et al., 2009]. Therefore, reporting of this study was based on the CONSORT checklist [Anon, 2018]. Several previous studies reported that the highest level of dental anxiety was usually found in school children aged
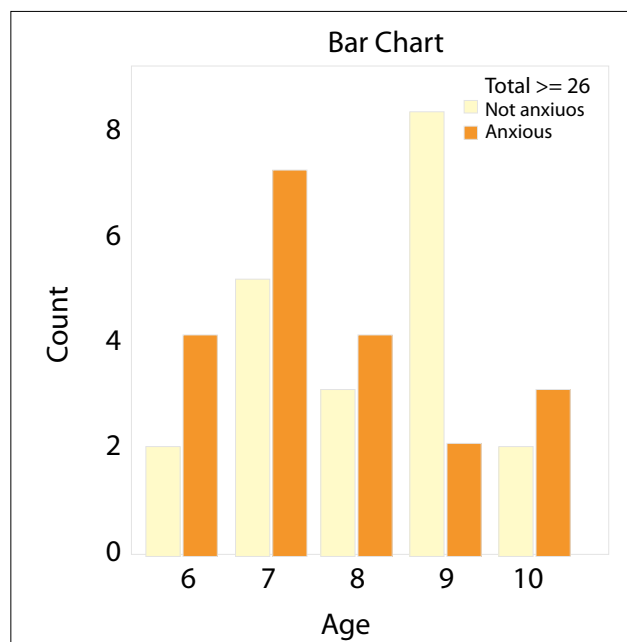

FIG. 4 Dental anxiety and age.

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	2
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	3
	2b	Specific objectives or hypotheses	4
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	4
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	5
Participants	4a	Eligibility criteria for participants	5
	4b	Settings and locations where the data were collected	4
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	5
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	6
	6b	Any changes to trial outcomes after the trial commenced, with reasons	N/A
Sample size	7a	How sample size was determined	4
	7b	When applicable, explanation of any interim analyses and stopping guidelines	N/A
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	5
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	5
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	5
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	5
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	5
	11b	If relevant, description of the similarity of interventions	5
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	6
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	N/A
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	7
	13b	For each group, losses and exclusions after randomisation, together with reasons	7 and 9
Recruitment	14a	Dates defining the periods of recruitment and follow-up	7
	14b	Why the trial ended or was stopped	N/A
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	7
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	9
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	7 and 10
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	N/A
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	N.A
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	N/A
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	12
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	11
Other information			
Registration	23	Registration number and name of trial registry	N/A
Protocol	24	Where the full trial protocol can be accessed, if available	Contact author
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	13

TABLE 1 CONSORT 2010 checklist for randomised trial reporting.

7 to 9 years [Al-Namankany at al., 2012a; Al-Namankany, 2017; Melamed, 1986; Raadal et al., 2002]; therefore, children aged 6 to 10 years were chosen for this study, which also reported that children aged 7 to 8 years had the highest scores of dental anxiety.

As children in both groups were anxious and had been included if they scored ≥26 on the ACDAS, there was no significant difference between the modelling and the control groups before watching videos (P=1.00). However, there was a significant difference between the modelling and the control groups after watching the videos (P<0.001). Generally, the behaviour and the acceptance of fissure sealants were noted to be superior in the modelling group than in the control one, the use of video modelling seemed to be effective in reducing dental anxiety in children receiving fissure sealants. The effectiveness of video modelling in reducing dental anxiety in children receiving dental treatment under local anaesthesia and inhalation sedation was reported in previous studies [Al-Namankany et al., 2014b; Al-Namankany et al., 2015].

Although dental anxiety was higher in girls (73% anxious/27% not anxious) than in boys (47% anxious/53% not anxious), there was no significant difference between girls and boys in dental anxiety scores (P=0.107). Moreover, there was no significant difference between the proportion of dental anxiety at the time of dental examination with a mirror that was reported by the child on ACDAS, and the expected behaviour of the child that was reported by the mother before dental examination (P=0.33); this might indicate that the mother's expectation of the behaviour of her child is usually a good predictor of the actual behaviour at the dentist, and similar findings were reported in other studies [Al-Namankany et al., 2012b; Folayan and Idehen, 2004].

In order to reduce bias, the randomisation process was concealed, dentist and children were blinded, and a single dentist conducted the reatments for all children. It was not really surprising that the children aged 6 to 10 years in this study had no previous dental treatment, as it is reported that 35.6% of the children in Madinah have never visited a dentist before this age [Al-Namankany, 2017]. The study included only children with no previous fissure sealants experience, which could be considered as a limitation, including children with previous bad experience could test the effect of the intervention in the management of these situations; however, it could be a recommendation for future studies.

Conclusion

Video modelling seems an effective method to reduce dental anxiety in children receiving fissure sealants. The mother's expectation of her child's behaviour appears to be a good indicator of the child's actual behaviour at the dentist.

Compliance with ethical standards
Conflict of Interest: This research has only one author and there is no any Conflict of interest.

Ethical approval
The ethical approval was obtained from College of Dentistry Research Ethics Committee (TUCD-REC)

Informed consent
Written consents were obtained from parents and verbal assents were obtained from children.

References

» Consolidated Standards of Reporting Trials (CONSORT). Accessed [18-4-2018].
» Al-Namankany, A. 2017. Cross sectional study to assess the potential causative factors of dental anxiety in girls aged 6-14 years in Medina-Saudi Arabia. J Taibah Univ Med Sci 2017; 11, (5) 1-6 available from: https://doi.org/10.1016/j.jtumed.2017.11.005
» Al-Namankany A, Ashley P, Fawcett C, Petire A. The development of a Dental Anxiety Scale with a Cognitive component for Children and Adolescents. Paediatric Dentistry 2012a; 34 (7): 219-224.
» Al-Namankany A, Ashley P, Moles D, Parekh S. Assessment the quality of reporting of Randomised Clinical Trials in paediatric dentistry. Int J Paediatr Dent 2009; 19 (5); 318-324.
» Al-Namankany A, Ashley P, Petire A. Development of the first Arabic cognitive dental anxiety scale for children and young adults. World J Meta-Anal 2014a;2 (3): 64-70.
» Al-Namankany A, de Souza M, Ashley P. Evidence-based dentistry: analysis of dental anxiety scales for children. Br Dent J 2012b; 212 (5): 219-222.
» Al-Namankany A, Petrie A, Ashley P. Video modelling and reducing anxiety related to dental injections - a randomised clinical trial. Br Dent J 2014b; 216 (12): 675-9.
» Al-Namankany A, Petrie A, Ashley P. Video modelling and acceptance of the nasal mask for Inhalation Sedation- A randomised clinical trial. Eur Arch Paediatr Dent 2015; 16 (1): 13-8. available from: http://www.ncbi.nlm.nih.gov/pubmed/25377934 Accessed [18.11. 2014].
» Arnrup K, Broberg AG, Berggren U, Bodin L. Treatment outcome in subgroups of uncooperative child dental patients: an exploratory study. Int J Paediatr Dent 2003; 13(5): 304-319.
» Brown L, Hammill D. Behavior Rating Profile, 2nd ed. Austin; 1990.
» Do C. Applying the Social Learning Theory to Children with Dental Anxiety. J Contemp Dent Pract 2004; 5 (1): 126-135.
» Folayan MO, Idehen E. Factors influencing the use of behavioral management techniques during child management by dentists. J Clin Pediatr Dent. 2004; 28 (2): 155-161.
» LeBlanc LA, Coates AM, Daneshvar S, Charlop-Christy MH. Morris C, Lancaster BM. Using video modeling and reinforcement to teach perspective-taking skills to children with autism. J Appl Behav Anal 2003;36 (2): 253-257.
» Luoto A, Lahti S, Nevanperä T, Tolvanen M, Locker D. Oral-health-related quality of life among children with and without dental fear. Int J Paediatr Dent 2008; 19: 115-120
» Melamed BG. Assessment and management strategies for the difficult pediatric dental patient. Anesth Prog 1986; 33 (4): 197-200.
» Nikopoulos CK, Keenan M. Using video modeling to teach complex social sequences to children with autism. J Autism Dev Disord 2007; 37 (4): 678-693.
» Paterson CR, Arco L. Using video modeling for generalizing toy play in children with autism. Behav Modif 2007; 31 (5): 660-681.
» Peretz B, Kharouba J, Blumer S. Pattern of Parental Acceptance of Management Techniques Used in Pediatric Dentistry. J Clin Pediatr Dent 2013; 38 (1): 27-30. available from: https://www.ncbi.nlm.nih.gov/pubmed/24579279
» Raadal M, Strand GV, Amarante EC, Kvale G. Relationship between caries prevalence at 5 years of age and dental anxiety at 10. Eur J Paediatr Dent 2002; 3 (1): 22-26.
» Rosenthal T, Zimmerman B. Social Learning and Cognition, 1st ed. Academic Press; 1978.
» Tickle M, Jones C, Buchannan K, Milsom K, Blinkhorn AS, Humphris GM. A prospective study of dental anxiety in a cohort of children followed from 5 to 9 years of age. Int J Paediatr Dent 2009; 19: 225-232.
» Townend E, Dimigen G, Fung D. A clinical study of child dental anxiety. Behav Res Ther 2000; 38 (1): 31-46.