

Research Article

Comparative Evaluation of Dental Anxiety and Behavioural Assessment after using Colored Restorative Material in Children.

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Abstract

Background: Children tend to have an unfound fear and anxiety. Placing colored restoration can reduce anxiety in the child and helps to improve their oral hygiene.

Aims: To assess the effect of colored restoration on the anxiety level and behavior of pediatric patients at the dental clinic and its motivational effect on their oral hygiene status.

Study design: In vivo study

Material and methods: Study includes a total of 30 children of age 6-8years who has class I carious lesions on any primary molars. Two different types of restorative materials were used (coloured compomer and conventional composite), children were randomly allocated in both the groups. Parameters assessed were- behavior was assessed using the Frankl's Behavior rating scale (FRS), dental anxiety level using the facial image scale (FIS) and Oral hygiene status. The data was statistically analyzed using SPSS version 25.0 using Mann-Whitney U test, chi square test and paired t-test.

Results: Both groups revealed reduction in the anxiety level and improvement in their behavior at the dental office during follow up period, but did not reach significance. Plaque index showed statistically significant results when compared preoperatively and during follow up.

Conclusion: The use of the multicolored restoration could be an alternative to conventional restorative materials which helps to improve the oral hygiene of children and might aid in enhancing their behaviour at dental clinic particularly younger age groups.

Keywords: Children, Behaviour Management, Multi-Colored Restoration, Plaque Index and Twinky Star.

1. Introduction

Children are fascinating creatures of God and treating such children is an art and science in Pediatric Dentistry. Pediatric dentist plays a major role in developing and gaining confidence and trust towards the dental treatment as well towards a doctor. Children tend to have unfound fear and anxiety towards dental treatment. Dental fear is a normal emotional response towards dental situation which might occur at any age, most commonly seen in younger age group [1].

Dental caries is the frequently seen ailment in children from all age groups due various factors. Different restorative materials are available in the market for restoration of decayed primary teeth, which includes transparent, tinted and opaque and these are usually referred as non-colored restorative materials. Recent advancement in technology has discovered use of colored restorative materials and is gaining popularity in the arena of Pediatric dentistry. One way of motivating children to provide effective dental treatment is to

use multicolored restorative materials. Colored compomers have been available with similar filler contents and physical properties with that of conventional compomers with different colors incorporated into it [2]. Although these colored restorative materials are abundantly used in pediatric dentistry, but very few experimenters have studied the effect of these multicolored restorations on reducing the children's anxiety at the dental office along with adding their acceptance towards the dental procedure and raising their awareness towards their oral hygiene.

Therefore the purpose of this paper is to evaluate the dental anxiety and behavioural pattern following use of colored restorative material in children aged 6 to 8 years old.

2. Methodology

Source of Data: An aggregate of 62 cases who were reporting to the Department of Pediatric and preventive dentistry, College of Dental Science, Davangere were assessed and

30 children who met the inclusion criteria were included in the study. The purpose and clinical procedures of the study were explained and an informed consent was obtained from the parents/guardians. The study protocol received ethical clearance from the Institutional Review Board.

Study Groups:

Group A: Conventional composite

Group B: Multicolored compomer

Inclusion Criteria:

- Children of age 6– 8years who haven't visited the dental clinic before.
- Initial class I carious lesion without any pulpal pathology in any primary molars
- Periodontally healthy teeth
- Children with Frankl behavior rating 2 and 3

Exclusion Criteria:

- Presence of pain, fistula, or abscess of teeth, any pulpal pathology
- Children with special health care needs
- Children with transmissible or systemic diseases
- Children with Frankl behavior rating 1 and 4

2.1. Materials Required: i. Coloured compomer Voco Twinky star, Germany ii. Compoglass f, Dtech Dental Technologies, Pune iii. High speed hand piece IV. Mouth mirror and probe v. Self-etch adhesives (Optibond™all in one, Kerr, Italy) VI. Curing light vii. Applicator tip viii. Finishing burs (STRAUSS CO.) and Soflex disks (3M, USA). ix. Carbide burs (Mid-west®) x. Teflon coated plastic filling instruments xi. Rubber Dam xii. Sterile gloves xiii. Mouth mask (Figure 1).



Figure 1: Armamentarium Used in the Study

Study design: In-vivo split mouth design. Duration of the Study: 5-6 months

2.2. Procedure

Every child who entered the department for the first time was screened and only children who met the inclusion criteria were selected. All the information was recorded in the individual forms. The children selected were being the ones who had no previous dental experience. During the procedure, patient was comfortably seated on the dental chair; the step-by-step procedure was explained to the parents as well as the children. Followed by rubber dam isolation, pumice prophylaxis was done on the concerned tooth. The tooth preparation was carried out as per the principles of minimum invasive dentistry using spoon excavator and rotating high speed handpiece with carbide burs. Each prepared cavity was carefully inspected to assure absence of any remaining caries. A bonding system and etchant was used according to the manufacturer's instructions in both groups. Based on the type of the restorative materials used, participants were allocated to Group B, to receive multicolored compomer restoration, or Group a, receiving conventional composite restoration. In the Group B (experimental group) received colored compomer (Twinky star; Voco, Cuxhaven, Germany) according to child's preferred color (Figure 2) [3]. Both the restorative materials were inserted in increments of 2 mm or less. Each increment was polymerized for 40 s using light curing device. The occlusion was checked using an articulating paper and adjusted accordingly. The restorations were finished and polished (Figure 3 and 4). The children were given post-operative instructions.



Figure 2: Multi-coloured compomer restorative materials



Figure 3: Tooth restored with colored restoration



Figure 4: Primary second molar restored with colored restoration

For each participant, the following were assessed before, during, and at the end of the dental procedure as well as at the follow up visit:

1. The participant behavior was assessed using the Frankl's behavior rating scale-FRS (Frankl, 1962). It divides the behavior into four categories according to the Guidelines on Behavior Guidance for the Pediatric Dental Patient ranging from definitely negative to definitely positive on the basis of children actions at the dental office.
2. The dental anxiety level using the facial image scale (FIS) consists of a row of five gray scale faces ranging from very happy to very unhappy, and each image has a score from 1 to 5 where 1 represents the most positive response and 5 represents the most negative response.

Each child was asked to choose the face that represent his condition at that instant.

3. The extent of dental plaque accumulation using plaque index (PI) and the gingival index (GI) was used to evaluate the gingival condition. Plaque accumulation was scored on a scale from P0 to P3, where P0 indicates no plaque whereas P3 reflects plaque covering more than one half of the clinical crown. Assessment of the gingival condition was on scale from 0 to 3, where 0 score in case of absence of inflammation whereas 3 score for severe inflammation and spontaneous bleeding. Both PI and GI were assessed before the dental procedure at the first visit and at the follow-up. All children were given thorough oral hygiene instructions for daily oral health care [3]. a follow-up recall was scheduled for each participant after 4 weeks to evaluate the inserted restorations and to assess the child oral health status, anxiety level, and behavior.

2.3. Statistical analysis:

The data collected was analysed using IBM SPSS version 25. Paired t-test was used to compare the plaque and gingival index scores between the two groups. Wilcoxon sign rank test was used to compare the pre-op, post-op and follow-up facial index scores between the two groups. Chi-square test was used to compare the behaviour between the two groups at the three time points. The comparison of behaviour and facial index scores across age was done using chi-square and Kruskal-Wallis ANOVA respectively. A p value of <.05 was considered significant for all analyses.

Table 1: Comparison of pre-op and follow-up scores for Plaque index using paired t test.

Plaque index score	Mean	Std deviation	T (p value)
pre-op	1.0817	.54874	T= 6.191
follow-up	.5230	.30203	P= .000

The pre-op plaque index scores were significantly greater than that of follow-up.

Table 2: Comparison of pre-op and follow-up scores for gingival index using paired t test.

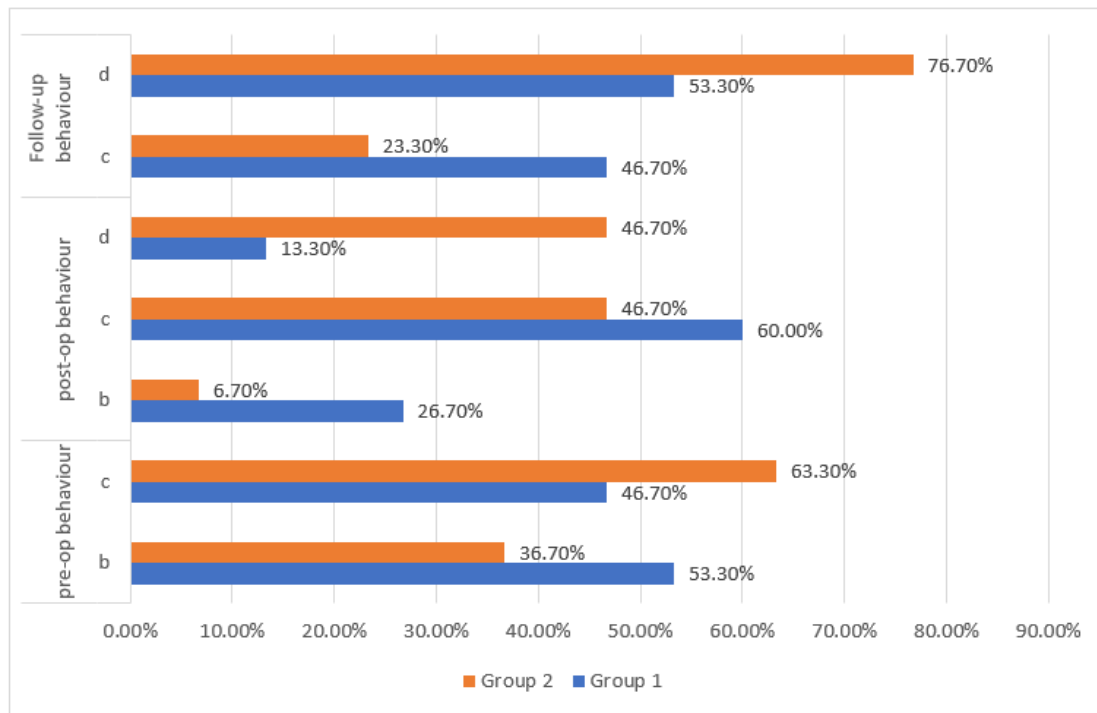
Gingival index score	Mean	Std deviation	T (p value)
pre-op	.114	.236	T= 1.55
follow-up	.088	.183	P= .131

The pre-op gingival index scores did not differ from that of follow-up.

Table 3: Inter-group comparison of pre op, post-op and follow-up facial index scores using Wilcoxon sign rank test

Time point	Group	Mean	Std deviation	Median	Z (p value)
pre op	Composite	3.67	1.093	4	Z=-.743
	Coloured compomer	3.80	.997	4	P= .458
post-op	Composite	1.80	.997	2	Z=-.807
	Coloured compomer	1.60	.814	1	P=.420
follow-up	Composite	1.07	.365	1	Z=-1.00
	Coloured compomer	1.00	.000	1	P= .317

The facial index scores did not vary significantly between the two groups at any of the three time points



Graph 1: Intergroup comparison of behaviour between both the groups at three-point time

The post-op behaviour between the two groups was significantly different with greater number showing behaviour types c and d in group 2-coloured compomer. The follow-up behaviour between the two groups did not show a statistically significant difference

Discussion

Dental anxiety is found to be common factor present among pediatric dental patients.⁴ It was reported that about 23.5% of children witness some kind of anxiety prior to any dental procedure despite their age, gender, or the behavior management technique used with them. Increased anxiousness of child could yield reduced cooperative behavior on the dental chair and possible effect the effective dental care.⁵ Multicolored restorative materials are recent advances in dentistry, which claimed to have a positive effect on the child's behavior.³ Therefore the aim of this study was to assess behavior and anxiety level after using coloured restorative material and their motivational effect on oral hygiene status.

Different techniques have been used to measure dental anxiety in children, some relay on measuring physiologic signs such as pulse rate, some use psychometric scales. Assessing the child behavior during the dental visit (like Frankl Rating Scale) or using projective method (such as Facial Image Scale) has been proven successful. Children behavior was assessed using Frankl's behavior rating scale, which poses up to 93.4% sensitivity and has acceptable validity reaching up to 77.8%.⁶ The anxiety level has been assessed using the FIS, which was known to produce high reproducibility, simplicity, and validity for both clinical and scientific purposes.⁷ Different authors have suggested that FIS is a useful tool to assess dental anxiety even in very young children.^{8, 9} Hence, the same was used in our study with gray scale version to avoid any color bias that could occur with colored facial scale index.⁷

The age of the children in this study was in the range of 6–8 years, which is known as the preoperational phase. This phase is characterized by development of attention and cognitive abilities, which prepare children for proper social and interpersonal communication. Apparently, they will be become more suitable to express themselves and further prone to be affected by motivational approaches. (Radhakrishna et al., 2019)¹⁰

Several authors reported that dental anxiety reduces as age increases (Oba et al., 2009; Radhakrishna et al., 2019).^{11, 10} But, the results of our study conveyed that there were no significant differences seen in anxiety level between the age groups. This could be attributed to the elaboration of their cognitive ability, enhanced understanding of the surrounding environment with better appreciation of unpleasant situations, and improved capability to deal with anxious conditions, this was also a finding of a study done by Blomqvist et al., 2013.¹² As the younger children couldn't identify or choose the image to show their anxiety level hence there was no significant differences seen while ranking and rating their anxiety between the groups, because the IQ or maturity is not enough to be so sure while choosing.

The children who participated in the current study displayed either positive or negative behavior on Frankl scale. The children were assessed for the behavior during the post treatment period, where the child displayed better cooperation, which is more easy for the dentist to carry out a better treatment for the child which is analogous to a clinical research associated study, where 90% of dentists found that possibility of opting the color of restoration not only relaxed the children but also inspired them to have continued interest in the condition of their teeth which was a positive finding of our study also. Venham and Cipes have shown that the be-

behavior of children improves in subsequent dental visits.¹³ The improvement during subsequent visits suggests that the experience gained by the child during former visits helped the child to recognize and deal with nonthreatening dental procedures. Hence, our study results also revealed that there was significant enhancement in the children's cooperation level during the follow up period.

It has been reported that young patients who are allowed to choose the color of their restorations tend to accept the idea of treatment. The success of the treatment is aided further by the dentist's explanation to the children that the fillings will continue to look good as long as the patient maintains them properly.¹

The tools used for assessment of gingival condition and the oral hygiene were modified Silness and Loe plaque index and gingival index, which are considered to be highly sensitive and reproducible.³ The assessment of plaque index yielded a significant reduction per group and a clear tendency toward significance upon comparing between the two groups; where the scores were comparable in the group B, this might be due to raised mindfulness of the children regarding restorations they shared in choosing. This could also be due to the dentist's explanation to the children that the restoration will continue to look good as long as they maintain good oral hygiene (Arora et al., 2014).² Biesbrock, Walters, and Bartizek (2004)¹⁴ reported that 1-month reassessment was successful to provide a significant enhancement in PI score in 6 to 9 years old children.

In the current study, the gingival index records did not reveal a significant improvement between the two groups. This finding is in correlation with the finding of Esfahanlzadeh, 2011,¹⁵ who reported statistically insignificant change in gingival index score in 6year old children by the end of the follow-up period in a dental health education program. This could be attributed to that gingivitis is seen more prominent in older age group during the adolescence period from 13- to 17-year-olds which occurs mostly due to the hormonal disturbance, which induces intensive gingival response.³ Therefore, the effect of hormonal disturbance associated gingivitis isn't applied to the present study as the included participants were of younger age group (from 6 to 8year old).

A strong negative correlation was setup between Frankle rating scale and plaque index score at the follow-up visit in both the groups; this finding suggested that with improving the children behaviour during the dental appointment, a direct enhancement of oral hygiene practice could occur. This finding was supported by the study done by Nguyen, Nguyen, Nguyen, Saag, and Olak (2018).¹⁵

Further studies using larger sample sizes and extended follow up period are needed to confirm the significance of the motivational impact of multicolored restorations and their effect on behaviour level of children in the dental clinic.

Conclusion

The aim of the present study was to assess the effect of colored restoration on the anxiety level and behavior of pediatric patients at the dental clinic and its motivational effect on their oral hygiene status. From the current study following conclusions were made.

- Multi-coloured restorative materials help in the enhancement of child behaviour and helps in reducing anxiety level at the dental clinic.
- The use of multi-coloured restorations helps to improve the oral hygiene which is an added advantage especially for younger children.

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