ORIGINAL RESEARCH

Comparative Evaluation of the Effectiveness of Bach Flower Therapy and Music Distraction on Dental Anxiety in Pediatric Dentistry

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Abstract

Aim: The present study was conducted to compare the effectiveness of Bach flower therapy and music distraction (MD) in dentally anxious pediatric patients.

Materials and methods: This randomized control trial was done with 120 patients aged 4–8 years who were divided into three groups, namely Bach flower therapy (group 1), MD (group 2), and control group (group 3). All children received restorative treatments. The anxiety and physiological parameters were assessed before, during, and after the procedure along with the behavior of the patient during the entire procedure. The results were tabulated and statistically analyzed using analysis of variance and paired *t*-test.

Results: A better behavior was seen in group 1 as compared to the other groups. Venham picture test (VPT) showed a reduction in anxiety in both groups (1 and 2). A significant reduction in pulse rate (PR) and blood pressure (BP) was found in group 1.

Conclusion: Bach flower can be used as an alternative treatment in reducing dental anxiety.

Clinical significance: This study could aid a dentist to use Bach flower therapy and MD as a technique to alleviate dental fear and anxiety among dental patients.

Keywords: Anxiety, Floral therapy, Music therapy, Randomized control trial, Rescue remedy, Restorative procedures.

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Introduction

A child's first visit to a dentist is a pivotal moment in the reduction or expansion of dental anxiety presenting a challenging situation for any novice or pediatric dentist.[1] Pain or fear of pain is a known primary source of anxiety as well as a major obstacle seeking dental care.[2] Dental injection was found to be the most powerful anxiety-provoking stimulus, followed by the dental drill and the sight and sensation of a local anesthetic. Helping these patients to overcome the fear and anxiety may increase the regular and scheduled dental visits ultimately improving their quality of life.[3]

Worldwide prevalence of dental anxiety is high, reaching 6–15% of the population, and usually starts from childhood (51%) and teens (22%).[4] Dental anxiety has multiple etiologies, and therefore, there is no monotherapy for the treatment. Strategies for managing dental anxiety include both pharmacological and non-pharmacological methods. While pharmacologic interventions use medications that can be costly and have a range of side effects, non-pharmacologic interventions rely on behavioral guidance techniques, being easily accepted by the parents.[5] In addition, complementary and alternative approaches, such as aroma therapy, herbal therapy, music distraction (MD), acupuncture, and hypnosis, for managing anxiety are gaining popularity in medical and dental care.[6,7]

Music has a significant positive potential as an alternative therapy method leading to relaxation and attention distraction, which reduces neuroendocrine activity and sympathetic nervous system resulting in a decrease in fear, heart and respiratory rate, and blood pressure (BP). Music interventions are individualized to the patients, and the perceived clinical value of MD probably depends on the responses of the children, but it is worth exploring as a potentially effective and inexpensive adjunct to standard care.[6]

As anxiety is mostly related to psychosomatic illnesses, methods to minimize this type of behavior like the floral therapy will certainly help to prevent countless diseases originating in emotional factors. Floral therapy treats this kind of personality disorders instead of disorders in physical conditions, harmonizing the ethereal, emotional, and mental body.[8]

Dr. Bach's rescue remedy is a combination of five flower essences created specifically for addressing stress in emergency or crisis situations. The essences used in this formula help with

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trauma and shock [*Star of Bethlehem* (provides comfort and consolation)], terror and panic [*Rock Rose* (gives peace)], hysteria or loss of control [*Cherry Plum* (provides calmness)], impatience and agitation [*Impatiens* (gives patience)], and faintness and stunned feelings [*Clematis* (helps in focusing)].[9]

Studies are available in the literature that has studied the efficacy of rescue remedy (RR) in alleviating situational anxiety but have the mixed results. Both RR and MD have potential in alleviating dental anxiety but had less conclusive evidence. Thus, the aim of this study was to investigate the clinical effectiveness of RR and MD on the dental anxiety of 4- to 8year-old patients undergoing dental restorative treatment.

Materials and Methods

The present study was designed as a randomized, controlled single-blinded study to assess the effect of Bach flower therapy on anxiety reduction in 120 children of age 4–8 years. The study protocol was approved by the Institutional Ethical Committee and was in accordance with the Helsinki Declaration 2008 guidelines. The informed consent was obtained from the parents along with the medical and dental history of the child.

Children with a first dental visit and requiring class 1 and/or class 2 restoration without local anesthesia are included in the study. Children with carious lesions extending in the pulp and children with special healthcare needs or under any medications are excluded from the study.

Children fulfilling the inclusion criteria and after getting the informed consent from their parents were randomly divided into the following three groups; each group consisted of 40 children.

- **BFT group:** Children from this group were administered orally four drops of RR diluted in 30 mL of water 15 minutes before the treatment.
- **MD group:** Children from this group were provided with a headphone (Tech-com, India), and children's familiar music was played randomly during the scheduled dental treatment.
- **Control group:** No interventions were made in this group of children.

Children from all the groups received class 1 and class 2 cavity restorations uniformly as needed. The duration of the treatment was 15–20 minutes. The entire procedure was explained to the child using the Tell-Show-Do technique before starting it. Anxiety was assessed pretreatment and posttreatment with Venham picture test (VPT). The video was recorded of the child during the entire treatment, which was later viewed for assessing his/her behavior during the treatment using Venham's clinical rating scale (VCRS). Oxygen saturation (SpO_2), pulse rate (PR), and BP were assessed at three different times—15 minutes before starting the procedure, during the treatment, and 15 minutes after the treatment–using a Pulse Oximeter (Niscomed, India) and automated blood pressure monitor (Equinox, America), respectively. All children received glass ionomer cement (GIC) or composite restorations as indicated in them. All procedures were carried out by a single operator to avoid bias.

The data were subjected to statistical analysis by statistical package for social sciences (SPSS version 23). Descriptive and paired *t*-test was used for intragroup comparison. One-way analysis of variance was used for intergroup comparison. The level of significance was set as <0.05.

Results

Table 1 shows the distribution of the study population among all the groups according to gender (56 females and 64 males in total).

Table 2 represents intergroup and intragroup comparisons of pre- and postoperative VPT scores.

Table 3 depicts groupwise comparisons of pre- and postoperative VCRS scores.

Table 4 summarizes the intergroup and intragroup comparisons of pre-, intra-, and postoperative PR and SpO_2 levels.

Table 5 summarizes the intergroup and intragroup comparisons of mean systolic and diastolic BP pre-, intra-, and postoperatively.

Discussion

The present study was carried out in 120 children of 4–8 years with their first dental visit for the reason that this age-group shows the most disruptive or negative behavior and is most difficult to manage.[10] However, no significant difference was found in this study between the ages of children among various study groups suggesting that the age factor will not affect the primary outcome of the study (group 1—8.58 ± 1.96; group 2—8.70 ± 1.90; and group 3—8.68 ± 1.94).

Both males and females were included in this study to determine any difference regarding anxiety or behavior scores, and no specific gender predilection (Table 1) was seen concluding that gender distribution will not affect the primary outcome of the study.

In this study, children with no previous dental experiences were taken for the reason that they have no bias toward the dentist and the procedure. In dentistry, restorative dental treatments, namely the sight, sound, and vibrational sensations of airotor, are considered as one of the most potent triggers for dental anxiety. Approximately 20% of children experience high levels of distress, fear, and anxiety, and behavior problems with these restorative dental procedures.[11] To know the effectiveness of the interventions on some anxiety-provoking procedures, this study was carried out with children requiring class 1 and/or class 2 cavity restorations, unlike the study by Dixit and Jasani[7] in which they have done painless procedures like oral prophylaxis and fluoride treatment to minimize the effect of anxiety.

Also, medically compromised patients were not included as their past medical experience could affect their anxiety and behavior during the dental treatment. Some medical condition also affects the normal physiological vital signs of the body like heart rate,[12] which has been observed as an objective parameter to determine anxiety in the present study.

An association between patient's behavior and treatment duration was shown by Aminabadi et al.,[13] who suggested that the treatment duration should not exceed above 40 minutes for 5 years and above 60 minutes for 6–9 years of age to minimize the negative behavior of the child during the procedure. So, in

Table 1: Distribution of the study population according to gender

	Gender n (%)		
Group	*Female*	*Male*	*Total*
Group 1	24 (60)	16 (40)	40
Group 2	16 (40)	24 (60)	40
Group 3	16 (40)	24 (60)	40
Total	56	64	

this study, the time taken to complete the treatment procedure was 15–20 minutes.[14]

There are various randomized controlled trials present in the literature, showing the mixed results of RR or other flower remedies in alleviating situational anxiety. Halberstein et al.[15] reported no benefits of RR in the reduction of trait anxiety, when applied on the tongue every 20 minutes for 3 hours, as compared to a placebo. However, a significant reduction in anxiety in students was seen. Thaler et al.[16] in their systemic review concluded that available evidence failed to show the efficacy of Bach flower remedies over placebo in reducing pain and anxiety in adults. However, they stated that this conclusion was associated with a high level of uncertainty due to a lack of methodologically sound trials.

Furthermore, research has shown that patients also prefer listening to music that helps the patients' minds in occupying with something soothing and familiar. It is also seen in the literature that music might reduce patients' anxiety. Music is a widely used form of auditory distraction because it is noninvasive and inexpensive and requires no active engagement.[17] Edwards[18] in his review of the literature found that singing familiar songs and listening to music were generally effective techniques for distracting pediatric patients from pain and distress during procedures.

In the present study, patients were allowed to listen to their choice of music as suggested by Klein and Winkelstein[19] that playing familiar songs would help the child gain control over an unpleasant situation and feel more familiar with the environment. Patients were asked to wear the headphones while listening to music, which was recommended by Moola[6] as they mask the other dental sounds.

The child's response was assessed using a combination of four measures–heart rate, BP, SpO_2, and cooperative behavior. The patients were made familiar with pulse oximeter and automated blood pressure monitor that were used to measure the various parameters in this study. Regarding the patients waiting time and recording time, the values were assessed at three different times—15 minutes before starting the procedure, during the treatment, and 15 minutes after the treatment. All the procedures were carried out only in the morning and early afternoon. The physiological parameters measured are in accordance with the study of Dixit and Jasani,[7] Moola,[6] and Marwah et al.[19] who concluded that heart rate and BP acted as reliable indicators of anxiety. The reason for assessing the physiologic parameters post 15 minutes could be the variance in the heart rate due to the physical movement of the individual during dental treatment suggested by Howard and Katcher.[21]

The child's anxiety level was measured using VPT, which is a projective and psychometric self-measure test used to measure the state anxiety of the young child.[22] In the present study, on comparing pre- and postoperative VPT scores, a significant decrease in the dental anxiety of the children postoperatively in group 1 and group 2 was seen indicating that both RR and music were effective in relaxing the anxious child. However, intergroup comparisons showed no statistical difference found in preoperative and postoperative VPT scores (Table 2). These results were found to be similar to that of the study done by Dixit and Jasani.[7] Other studies by Marwah et al.,[20] Navit et al.,[22] and Jindal et al.[23] in which the effect of music was investigated using VPT as a self-report anxiety scale found the same results. However, in a study by Aitken et al.,[5] no significant differences were found in pre- and postoperative VPT scores.

For assessing the behavior of the child, VCRS was used, which is a reliable and validated tool to accurately measure the un-cooperative behavior in young children.[24] It measures the situational anxiety of the child. In this study, pairwise comparison of VCRS score showed a highly significant difference in group 1 with group 2 and group 1 with group 3, with the least mean score in group 1 (Table 3). This result concluded that better behavior was seen in Bach flower group compared to other groups, similar to the study by Dixit and Jasani.[7]

In addition to psychological measures, a physiological measurement of anxiety was also made by recording PR, BP, and SpO_2[5] because it was reported that stress and anxiety will alter heart rate and respiratory rate, thereby altering PR and SpO_2 in the blood, respectively.[24] These are governed by the nervous system, especially the autonomic nervous system that reflects the negative emotions in terms of physiological parameters that tell if a person is under stress or relaxation.[22] BP is governed by two basic factors: Cardiac output and peripheral vascular resistance whose alterations may occur in response to the stress of the dental treatment.[25] Pulse oximeter that measures PR and SpO_2 is one of the most acceptable methods for measuring physiological changes. BP apparatus that records BP accurately is another reliable measure to evaluate anxiety level.[22] Here, in this study, an automated blood pressure monitor was used as it provides reasonably accurate data compared to manual sphygmomanometers.[26]

Observations from this study indicated that the PR in group 1 decreases significantly postoperatively compared to preoperative values. However, in group 2, the PR showed a significant decrease postoperatively ($p = 0.002$) compared to intraoperative value, whereas in group 3, it was seen that there is a significant increase in PR ($p < 0.001$) intraoperatively as compared to the preoperative PR of the children. Intergroup comparisons in the PR across the three groups showed no statistical difference revealing that mean PR in relation to pre-, intra-, and postoperative is the same among all the groups (Table 4). These results were similar to the previous studies by Marwah et al.[20] and Prabhakar et al.[10] who reported no significant difference in the PR of the music group as compared to the control group. However, a study by Dixit and Jasani[7] reported a significantly higher PR in the control group intraoperatively as compared to Bach flower and music therapy groups.

Table 2: Comparison of VPT score

Group	*Preop ± SD*	*Postop ± SD*	*Mean diff*	*p-value*
Group 1	3.43 ± 1.87	2.43 ± 1.52	1.000	<0.001**
Group 2	4.10 ± 1.72	2.85 ± 1.39	1.250	<0.001**
Group 3	4.15 ± 1.87	4.00 ± 1.52	0.150	0.240 NS
p-value	0.143 NS	0.336 NS		

NS, not significant ($p > 0.05$); *Significant ($p < 0.05$); **Highly significant ($p < 0.001$)

Table 3: Comparison of VCRS score

Comparison	*Mean ± SD*	*Mean difference*	*F value*	*p-value*
Group 1	1.02 ± 1.14	−1.15		<0.001**
Group 2	2.17 ± 1.21			
Group 1	1.02 ± 1.14	−1.3	10.591	<0.001**
Group 3	2.32 ± 1.71			
Group 2	2.17 ± 1.22	−0.15		0.653 NS
Group 3	2.32 ± 1.71			

NS, not significant ($p > 0.05$); *Significant ($p < 0.05$); **Highly significant ($p < 0.001$)

Table 4: Comparison of PR and SpO_2

			PR			
				Comparison between (p-value)		
Group	*Preop ± SD*	*Intraop ± SD*	*Postop ± SD*	*Pre and intra*	*Pre and post*	*Intra and post*
Group 1	87.58 ± 12.50	85.68 ± 14.84	84.43 ± 11.86	0.946 NS	0.001*	0.233 NS
Group 2	88.35 ± 13.17	89.63 ± 12.57	86.50 ± 11.81	0.241 NS	0.092 NS	0.002*
Group 3	81.93 ± 11.66	85.28 ± 10.45	84.58 ± 11.56	<0.001**	0.057 NS	0.505 NS
p-value	0.073 NS	0.245 NS	0.543 NS			
			SpO_2			
				Comparison between (p-value)		
Group	*Preop ± SD*	*Intraop ± SD*	*Postop ± SD*	*Pre and intra*	*Pre and post*	*Intra and post*
Group 1	99.15 ± 1.05	99.20 ± 0.88	98.85 ± 1.35	0.688 NS	0.154 NS	0.051 NS
Group 2	98.67 ± 1.44	99.00 ± 1.30	99.15 ± 1.29	0.046*	0.020*	0.183 NS
Group 3	98.62 ± 1.35	98.80 ± 1.12	99.00 ± 0.96	0.181 NS	0.002*	0.073 NS
p-value	0.138 NS	0.316 NS	0.459 NS			

NS, not significant ($p > 0.05$); *Significant ($p < 0.05$); **Highly significant ($p < 0.001$)

Table 5: Comparison of systolic and diastolic BP

			Systolic BP			
				Comparison between (p-value)		
Group	*Preop ± SD*	*Intraop ± SD*	*Postop ± SD*	*Pre and intra*	*Pre and post*	*Intra and post*
Group 1	127.48 ± 18.55	129.73 ± 16.49	123.80 ± 20.31	0.145 NS	0.163 NS	0.001*
Group 2	129.15 ± 17.80	132.00 ± 14.25	128.35 ± 14.50	0.054 NS	0.747 NS	0.001*
Group 3	126.68 ± 11.99	128.83 ± 12.16	133.55 ± 13.49	0.173 NS	0.213 NS	0.008*
p-value	0.190 NS	0.271 NS	0.032*			
			Diastolic BP			
				Comparison between(p-value)		
Group	*Preop ± SD*	*Intraop ± SD*	*Postop ± SD*	*Pre and intra*	*Pre and post*	*Intra and post*
Group 1	80.38 ± 11.28	83.38 ± 9.98	79.32 ± 12.32	0.052 NS	0.546 NS	0.002*
Group 2	81.33 ± 11.29	85.10 ± 8.68	80.92 ± 11.27	0.017*	0.829 NS	0.001*
Group 3	74.78 ± 10.00	76.10 ± 6.80	79.58 ± 8.83	0.197 NS	0.001*	0.001*
p-value	0.017*	<0.001**	0.780 NS			

NS, not significant ($p > 0.05$); *Significant ($p < 0.05$); **Highly significant ($p < 0.001$)

On comparing the mean SpO_2 levels, the results showed that there is no statistically significant change seen in group 1 at any duration, indicating that the RR maintained the same pace at any duration throughout the procedure. However, there was a statistically significant increase seen in SpO_2 intraoperatively ($p = 0.046$) and postoperatively ($p = 0.020$) in group 2 and postoperatively ($p = 0.002$) in group 3 as compared to the preoperative SpO_2 value. Intergroup comparisons of SpO_2 showed no statistical difference, which indicates that mean oxygen levels in relation to pre-, intra-, and postoperatively is the same among all the groups (Table 4), similar to the previous studies by various authors in which no changes were found during checkups, preventive treatment, restorative treatment, or extractions.[7,21,27] However, a study by Alemany-Martinez et al.[27] observed changes in SpO_2 at various stages of surgical removal of mandibular third molars.

The mean systolic and diastolic BP varied significantly in all the groups. There is a significant decrease in mean systolic BP postoperatively in both group 1 and group 2 ($p = 0.001$ for both), whereas in group 3, a significant increase was found postoperatively ($p = 0.008$) when compared to the intraoperative values. When all the three groups were compared, there was a statistically significant difference present in the mean systolic BP postoperatively ($p = 0.032$) with the lowest value in group 1 (Table 5). However, in a study by Dixit and Jasani,[7] the lowest value was found in the music group intraoperatively, and no significant differences were found postoperatively among any of the groups.

The mean diastolic BP after an analysis showed a significant difference in preoperative ($p = 0.017$) and intraoperative ($p < 0.001$) values among all the three groups, with the lowest value in group 1. When intragroup comparisons were done, a significant increase in value was seen in group 2 compared to preoperative. And postoperatively, a significant decrease in diastolic BP was found in group 1 ($p = 0.002$) and in group 2 ($p = 0.001$), whereas in group 3, it was found to be significantly increased ($p = 0.001$) compared to the intraoperative values. Comparing postoperative with preoperative

values, no significant change was seen in group 1 and group 2, while in group 3, a significant increase was seen ($p = 0.001$). These results were in accordance with that of the study by Dixit and Jasani[7] (Table 5). On contrary, a study by Rayen et al.[21] found an increase in heart rate and BP in dental anxiety in children during various dental treatments. Also, in a study by Toyota,[28] to evaluate the reduction of presurgical anxiety with RR in adult surgery patients, no reduction in either the PR or the BP was observed.

So far, there is only one published study evaluating Bach flower therapy on children's behavior in the dental setting by Dixit and Jasani.[7] Their results revealed that both Bach flower therapy and music therapy resulted in lowering of PR, systolic pressure, and diastolic pressure in children during the dental procedure as compared to their preoperative levels. Another study by Pintov et al.[29] attempted to compare the effects of RR on children with attention deficit hyperactivity disorder reported no significant change in children's behavioral performance as evaluated by the teachers. Other randomized control study by Toyota,[28] where adult patients scheduled for surgery were administered either RR or plain water before surgery, showed no significant differences in anxiety and tension of the patients, as measured by the visual analog scale, between the two groups.

In the literature, there is only one study that compares the Bach flower and MD in reducing dental anxiety in children undergoing oral prophylaxis and pit and fissure sealants,[7] whereas this study compares the efficacy of Bach flower and music in reducing dental anxiety in children undergoing more anxiety-provoking procedures such as restorative treatment as the 4 "S" (sight, sound, sensations, and smell) are the major triggers for dental anxiety.[10]

However, there are certain limitations of the study like the sample size taken was 120; increasing the sample size could have reduced the margin of error. Also, children with anxiety-related disorders and other medical conditions were not included, which could limit the use of this study in various groups of the population.

As there are limited studies in this field, further researches are required to increase the knowledge and implications of RR before clinical application in children. In the future, studies could be done on different age-groups as they have different cognitive and behavioral patterns and also with more anxiety-provoking procedures like the use of local anesthesia. Furthermore, children with anxiety-related disorders could also be included in the study to assess their behavior patterns.

Conclusion

This study showed that Bach flower and music both significantly reduced anxiety in children showing a better behavior in Bach flower group. There was a significant decrease in all the physiological parameters postoperatively in both Bach flower and music groups. It can be concluded from this study that the Bach flower therapy can be preferred as an alternative behavior management technique to other methods in reducing the dental anxiety of the children.

Clinical Significance

This study could aid a dentist to use Bach flower therapy and MD as a technique to alleviate the dental fear and anxiety among dental patients.

Manufacturers Name

Headphones—Tech-com, India
Pulse oximeter—Niscomed, India
Automated blood pressure monitor—Equinox, America

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