

COVER LETTER

To,

The Editor in chief,

International Journal of Innovations in Dental Sciences

Respected Sir/Madam,

Sub: Submission of Original article for publication to your journal.-Reg

We intend to publish an article entitled “**EFFECTIVENESS OF ANANDHABHAIRAVI RAGA ON DENTAL ANXIETY AMONG 6-10 YEAR OLD CHILDREN UNDERGOING ROUTINE DENTAL TREATMENT**” in your esteemed journal as Original article.

On behalf of all the contributors I will act as guarantor and will correspond with the journal from this point onward.

Prior publication - NIL

Support – NIL

Conflicts of interest – NIL

Permissions – NIL

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We kindly request you to review our manuscript for publication in your journal.

Yours sincerely,

S.Sriram

TITLE PAGE

Title of the article: EFFECTIVENESS OF ANANDHABHAIRAVI RAGA ON DENTAL ANXIETY AMONG 6-10 YEAR OLD CHILDREN UNDERGOING ROUTINE DENTAL TREATMENT

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Keywords: children, dental anxiety, anandhabhairavi raga

ABSTRACT

Introduction: Dental anxiety remains a significant and common problem faced by children worldwide which is an obstacle in providing quality dental care. The inability of children to deal with harmful dental stimuli often manifests as problems governing behaviour management. Non-aversive behaviour management techniques are advocated which include listening to calming music. Therefore, this interventional study was conducted to find out the effectiveness of Anandhabhairavi raga on dental anxiety of children reporting to the dental office. **Materials and methods:** 30 children aged between 6-10 years, reporting to the dental clinic for the first time were assessed for their baseline anxiety scores using Venham's Picture Test (VPT), Venham's Clinical Anxiety Rating Scale (VCARS), Chotta Bheem Chutki (CBC) scale and their pulse rate was measured using pulse oximeter. Anandhabhairavi raga was played through headphones to the children for 2 minutes during the dental treatment and their post-interventional anxiety pulse rate and anxiety scores were assessed. **Results:** There was a significant decrease in the anxiety scores and also the pulse rate post-intervention with Anandhabhairavi raga. **Conclusion:** Anandhabhairavi music proves to be an effective adjuvant tool in reducing anxiety among children in the dental office.

Keywords: children, dental anxiety, anandhabhairavi raga

MAIN TEXT

EFFECTIVENESS OF ANANDHABHAIRAVI RAGA ON DENTAL ANXIETY AMONG 6-10 YEAR OLD CHILDREN

UNDERGOING ROUTINE DENTAL TREATMENT

INTRODUCTION

Dentistry has grown leaps and bounds in terms of techniques and technologies. But anxiety related to the dental setting and its procedures remains a significant and common problem faced by children worldwide which is an obstacle in providing quality dental care. Various factors lead to dental anxiety in children which include fear or pain of invasive dental procedures, separation from parents and experience of loss of control.^[1] In India, the prevalence of dental anxiety among 6-10 year old children ranges from 5.8 to 7.1%.^[2]

The American Association of Pediatric Dentistry (AAPD) has given a series of behaviour management techniques to deal with dental anxiety and fear which includes voice control, distraction and even physical restraint.^[1] For highly anxious patients, conscious sedation and anxiolytic drugs are often used. However, studies indicate that adult patients as well as parents of pediatric patients with dental anxiety prefer non-pharmacological interventions because of perceived medical risks.^[3,4] By being an age-specific specialty, pediatric dentistry encompasses disciplines such as behavior guidance, care of the medically and developmentally compromised and disabled patient, supervision of orofacial growth and development, caries prevention, sedation, pharmacological management, and hospital dentistry, as well as other traditional fields of dentistry. These skills are applied to the needs of children throughout their ever-changing stages of development and to treating conditions and diseases unique to growing individuals.

The current trend of usage of non-aversive behaviour management techniques have proven to be equally effective to children and practitioners where the patient is slowly diverted from an unpleasant situation. One such technique is audio distraction where the patient listens to music or stories while undergoing a stressful procedure. The success of audio distraction technique has been proven in medical setup. But there is a dearth in literature regarding its effect in dental setting among children . Primary benefits of music therapy are being completely risk-free, cost effectiveness and having no side effects.

The effect of music on dental anxiety has been proven by various mechanisms. One of the mechanisms is the Gate Control Theory where pain signals are transmitted from the place of injury, via nerve receptors in the spinal cord, to synapses that receive the pain information in the brain. Music sends enough competing sensory inputs through pathways descending from the brain to cause the brainstem to signal some of the gates shut, thereby reducing the amount of pain that the patient listening to the music experiences.

The other mechanism is distraction, where there is a diversion of attention from noxious stimuli which includes the sound of the instrument while the dentist works on the tooth surface. The third mechanism is masking where music has got the power to mask unpleasant sound like the noise of dental handpieces which ultimately reduce the child's anxiety .^[1]

Traditional music based on raga has got its own effects on the human body. Symphonies of raga have a soothing and relaxing effect on the mind and body . Hindustani/classical musical considers raga

as reflecting specific moods in an individual. An appropriate mood has to be evoked in the listener's mind before initiating the musical treatment .^[5] Among the numerous ragas in the world of music, Anandhabhairavi raga has got a special soothing effect on one's mind. It has also proved to be effective in relieving stress and mental tension and also reducing blood pressure.^[6]

The effect of Anandhabhairavi raga has been proven in the medical field to reduce preprocedural anxiety .^[6] But there is a dearth in literature regarding its effectiveness in dentistry. Hence, the aim of this study was to assess the effectiveness of Anandhabhairavi raga on dental anxiety among 6-10 year old children undergoing routine dental treatment. The objectives of this study were

- i) to assess the baseline score of dental anxiety with Pulse Oximeter, Venham's Picture Test (VPT), Venham's Clinical Anxiety Rating Scale (VCARS), Chotta Bheem Chutki (CBC)scale
- ii) Assessment of anxiety scores after playing Anandhabhairavi raga
- iii) Comparison of pre and post interventional anxiety scores.

MATERIALS AND METHODS

Study Design

An interventional study was carried out in 3 private pediatric dental clinics in Chennai city from September to October 2017 .The study was ethically approved by the Institutional Review Board. Informed consent was obtained from the parents before the start of the study. A convenience

sampling method was used to recruit the study participants.

A total of 60 children were initially approached for the study. Children aged between 6-10 years who were visiting the dental clinics for the first time were included in the final study. Children with no previous dental experience, those children with chief complaint other than pain & swelling with a minimum score of 2 in Venham's Clinical Anxiety Rating scale were included in the study. Children with a systemic disease, learning disability, physical or mental disability and children with experience of previous harmful events (accidents or crime etc) were excluded from the study. 30 children took part in the final study.

PROCEDURE

At baseline, the 30 children were assessed initially for their anxiety scores using the anxiety scales and their pulse rate using Pulse Oximeter. The children included in the study and their parents were explained about the entire procedure and the music to be played. The treatment procedures carried out were oral prophylaxis and restoration (non invasive). Children were asked to listen to prerecorded Carnatic music in the raga of Anandhabhairavi selected by the researcher through Bluetooth headphones for 2 minutes during the dental procedure. Post interventional anxiety scores and the pulse rate were assessed using the above mentioned anxiety scales and pulse oximeter after the music has been played. The presence of parents inside the dental operatory was allowed in order to make the children feel at ease and to avoid any untoward scenarios. The role of the researcher was to assess the anxiety levels of the children in the operatory before and after the music was played. The pediatric dentists operating on the children were blinded of

the music played and their role was to perform non-invasive dental procedures required for the children.

ASSESSMENT OF ANXIETY

1. **Pulse oximeter:** Choicemmed MD300C2D- Used to measure pulse rate before and after the intervention (music- Anandhabhairavi raga).
2. **Venham's Picture Test (VPT) :** A subjective method of assessing anxiety which comprises of eight cards with anxious and non anxious figure in each of the cards. The cards were given to the children to point to the figure which made them feel most like at that instance. Score of 1 and 0 were given for anxious and non anxious figures respectively with scores ranging from 0 (minimum) to 8 (maximum).
3. **Venham's Clinical Anxiety Rating Scale (VCARS):** An objective method of measurement of anxiety by the clinician with scores from 0 to 5 indicating the behaviour of the child in the clinic/operatory at that specific point of time.
4. **Chotta Bheem Chutki (CBC) Scale :** A prevalidated novel pictorial scale used to measure anxiety. This scale consists of two separate cards –one for boys and another for girls. Chotta bheem cartoon character for given to boys and chutki cartoon character to girls which depicted various emotions. Each card consists of 6 figures varying from happy to unhappy and running emotions and the children were asked to choose from those cartoon characters which they felt at that instance. The scores ranged from 0 (happy) to 6 (running).^[7]

The data were entered into the Microsoft Office Excel 2007 and analysis of data was performed using Statistical Package for the Social Sciences (SPSS) version 20. Normality of the data were assessed using Shapiro-Wilk test. The mean pre and post interventional anxiety scores and the mean pulse rate scores were calculated using Descriptive statistics. Paired t test was used to assess the pre and post interventional pulse rate and Wilcoxon Signed rank test was used to compare the pre and post interventional anxiety scores .

RESULTS

30 children aged between 6-10 years were divided into two treatment groups ie) children requiring only oral prophylaxis and those requiring only restoration. The mean age of the children was 8.3 years. Out of the 30 children, 13 were girls and 17 were boys.

Table 1. Comparison of pre and post interventional pulse rate scores in the two treatment groups

Treatment Groups	Pre Interventional pulse rate (mean±S.D)	Post Interventional pulse rate (mean±S.D)	Within groups p value
Oral prophylaxis	91.53±2.56	78.07±1.34	<0.001*
Restoration	92.20±1.85	81.67±2.09	<0.001*
Between groups p value	0.46	0.66	

* p value ≤ 0.05: Statistically significant

Table 1 showed the mean pre and post interventional pulse rate scores among two treatment groups. For the group where oral prophylaxis was done, mean pre and post interventional pulse rate were 91.53 and 78.07 respectively . For the restoration group mean pre and post interventional pulse rate were 92.20 and 81.67 respectively. Comparison within two treatment groups after intervention showed a statistically significant reduction in pulse rate.

Table 2 Comparison of pre and post interventional anxiety scores assessed through Venham’s Picture Test (VPT) in the two treatment groups

Treatment Groups	Pre Interventional anxiety score(mean±S.D)	Post Interventional anxiety score (mean±S.D)	Within groups p value
Oral prophylaxis	2.87	1.40	<0.001*
Restoration	2.87	1.60	<0.001*
Between groups p value	0.00	0.36	

* p value ≤ 0.05: Statistically significant

Table 2 showed the mean pre and post interventional anxiety scores assessed through Venham’s Picture Test (VPT) among two treatment groups. For the oral prophylaxis group, mean pre and post

interventional anxiety scores were 2.87 and 1.40 respectively. For the restoration group mean pre and post interventional anxiety scores were 2.87 and 1.60 respectively. Comparison within two treatment groups after intervention showed a statistically significant reduction in anxiety scores.

Table 3 Mean pre and post interventional anxiety scores assessed through Venham's Clinical Anxiety Rating Scale (VCARS) in the two treatment groups

Treatment Groups	Pre Interventional anxiety score(mean±S.D)	Post Interventional anxiety score (mean±S.D)	Within groups p value
Oral prophylaxis	2.40	1.27	<0.001*
Restoration	2.46	1.20	<0.001*
Between groups p value	0.001	0.32	

*p value ≤ 0.05: Statistically significant

Table 3 showed the mean pre and post interventional anxiety scores assessed through Venham's Clinical Anxiety Rating Scale (VCARS) among two treatment groups. For the oral prophylaxis group, mean pre and post interventional anxiety scores were 2.40 and 1.27 respectively. For the restoration group mean pre and post interventional anxiety scores were 2.46 and 1.20 respectively. Comparison within two

treatment groups after intervention showed a statistically significant reduction in anxiety scores.

Table 4 Mean pre and post interventional anxiety scores assessed through Chotta Bheem Chutki Scale (CBC) in the two treatment groups

Treatment Groups	Pre Interventional anxiety score(mean±S.D)	Post Interventional anxiety score (mean±S.D)	Within groups p value
Oral prophylaxis	4.87	2.80	0.001*
Restoration	5.00	2.73	<0.001*
Between groups p value	0.35	0.44	

*p value ≤ 0.05: Statistically significant

Table 4 showed the mean pre and post interventional anxiety scores assessed through Chotta Bheem Chutki Scale (CBC) among two treatment groups. For the oral prophylaxis group, mean pre and post interventional anxiety scores were 4.87 and 2.80 respectively. For the restoration group mean pre and post interventional anxiety scores were 5.00 and 2.73 respectively. Comparison within two treatment groups after intervention showed a statistically significant reduction in anxiety scores.

DISCUSSION

In the Indian population, there have been very few studies which have assessed the effectiveness of musical interventions on

dental anxiety of children undergoing routine dental treatment^[1]. Also there is a scarcity in literature regarding the effectiveness of raga based music on dental anxiety of children.

In this study, the objective measurement of anxiety was done by measuring the pre and post interventional pulse rate. The pulse rate is influenced by the autonomic nervous system (ANS) which reflects emotions in terms of physiologically measurable parameters such as heart rate, respirations and body temperature.⁸ Pulse rate is also a direct measure of physiological arousal and its increase is attributed to stress during dental procedures because of which it is an index of patient's response to dental stimuli.⁹ In the present study, there was a statistically significant reduction in pulse rate post musical intervention in both scaling and restoration groups which proves the effect of Anandhabhairavi raga in reducing dental anxiety. The findings were similar to those by Saumiya Navit et al, in which there was reduction in pulse rate of children who listened to audio distraction like nursery rhymes, songs and audio stories and also with those by Marwah Nikhil et al where the pulse rate among children in the instrumental music group was lower than those in the control group.^[1,9] However our findings were in contradiction with research by Amal Al Khotani et al where there was no significant difference in the mean pulse rate between the audiovisual distraction group and control group.^[10]

The subjective assessment of anxiety was done with the use of 3 anxiety scales ie) Venham's Picture Test (VPT), Venham's Clinical Anxiety Rating Scale (VCARS) and Chotta Bheem Chutki (CBC) scale. These

three anxiety scales showed a statistically significant reduction in anxiety scores post musical intervention with Anandhabhairavi raga in both scaling and restoration groups. The findings of our study are in concurrence with the study by Parkins et al and in partial concurrence with the study of Prabhakar et al which highlighted the importance of audio music distraction in

managing anxiety among children.^[11,12] Our study findings were contrary to the findings of the study by Aitken et al and Corah et al where audio music distraction did not have a significant effect on anxiety of children.^[4,13] Also, there was a slight increase in the anxiety scores in children who were in the restoration group compared to the those who were in oral prophylaxis group which could be due to the sound and sight of the handpiece which was used for preparation of cavities, a finding in line with the study by Kleinknecht et al.^[14]

Anandhabhairavi raga, which was used as a musical intervention, was set up in the headphones such that it could mask other sounds in the dental operatory like the high speed handpiece, ultrasonic scaler and high vacuum suction and also, not deter the children from listening to the instructions from the dentist during the treatment procedure.^[15] The musical intervention showed positive effects in reducing anxiety owing to the reason that the children were engrossed in listening to the music

.However it would have been better if there was the option of the child choosing the type of music he/she wanted to hear. Research by Klein and Winklestein suggested that familiar songs which the children bring with them to the dental office would help them feel at ease and also reduce their anxiety to a greater extent.^[16]

The strengths of the study were the novel use of traditional music like Anandha bhairavi raga in assessing the anxiety among children in the dental office and the inclusion of both subjective and objective measures of anxiety. The limitations of the study were smaller sample size and the absence of control group for comparison.

CONCLUSION

Based on the present study, it can be concluded that distraction by traditional raga based music did reduce anxiety among the young children attending the dental clinic for treatment. Anandhabhairavi raga can be used as an effective adjuvant tool in modern day dental practice along with other non aversive behaviour management techniques in coping with the dental anxiety of children.

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INFORMED CONSENT FORM

TITLE: EFFECTIVENESS OF ANANDHABHAIRAVI RAGA ON DENTAL ANXIETY AMONG 6-10 YEAR OLD CHILDREN UNDERGOING ROUTINE DENTAL TREATMENT

UNDERTAKING BY THE INVESTIGATOR:

Your consent for the above study is sought. We undertake to maintain complete confidentiality regarding the information and assessment obtained from you during the study. If you have any doubts regarding the study, please feel free to clarify the same. The investigator's name and contact number is given below:

Dr.S.Sriram, Mob no- 8870197212.

PARTICIPANT’S CONSENT

I _____,
residing at _____
_____, do
hereby solemnly and state as follows.

I am the deponent herein; as such I am aware of the facts stated here under.

I was informed and explained about the pros and cons of the study, the assessment that will be made for my child.

I give my consent after for my child, knowing the full consequences of the study.

I have also been informed about the purpose and procedures of the study that is to be conducted on my child. I understand that if I give my consent for the study, I will have to provide the necessary details required for the study and co-operate to the assessment that will be made during the study.

I _____ give my consent for the investigator on behalf of my child for the study.

Signature of the investigator.

Signature of the Parent/guardian.

Date:

Place:

Signature of the Witness.