

# Effectiveness of Periorbital Eye Massager Versus Aculief Acupressure Device for Reducing Anxiety in Children During Pit And Fissure Sealant Application

## Abstract:

**Background/Purpose:** To assess the impact of an aculief acupressure device on reducing dental anxiety in children, and to compare its efficacy with that of a periorbital eye massager.

**Objective:** To mitigate stress and dental anxiety in children aged four to seven years, by means of a periorbital eye massager or LI4 acupressure device during dental treatment.

**Methods:** In this study, thirty children aged between four and seven years, who require pit and fissure sealant application, will be selected. These children will be divided into two groups: Group I will use a Periorbital Eye Massager (PEM), and Group II will use an Aculief Acupressure Device. After receiving instructions on how to use the devices, the participants will undergo dental treatment. Anxiety levels in both groups will be measured before and during the dental treatment using an Animated Emoji Scale (AES) and a pulse oximeter. The collected data will be analysed using the Student t-test.

**Result:** Upon comparing the mean scores of both groups, the differences were not statistically significant. This was true for both the AES as a measure of subjective anxiety and HR as a measure of objective anxiety. These findings suggest that while both interventions resulted in similar levels of anxiety during treatment.

**Conclusion:** - Neither the periorbital eye massager Nor the Aculief acupressure device demonstrated a statistically significant advantage in reducing anxiety

**Key-words:** Aculief Acupressure Device, Periorbital Eye Massager, Animated Emoji Scale, Dental Anxiety, Heart Rate.

## Introduction:

Dental anxiety in children aged 4-7 can hinder procedures and its severity can lower pain threshold in sensitive patients. Therefore, it is crucial be brought under control for effective treatment and patient comfort. Both pharmacological and non-pharmacological methods are used to manage anxiety. Recently acupressure, a Complementary and alternative medicine technique, has received acclamation in the [journal of Global Advances in Health and Medicine](#). [1]

Aculief is an award-winning, wearable acupressure device. It is placed between thumb and index finger at LI4, which alleviates tension and anxiety when applied at the LI4 acupoint. It is simple, durable, and portable. Additionally, it requires no specific skill and provides quick relief within three minutes. Pressure points are scientifically proven to help

different parts of the body communicate with each other. Putting pressure on one part of body can quickly relieve pain elsewhere. This is exactly how Aculief works and why it is so effective. By applying pressure on LI4 it reduces anxiety and

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pain by influencing endorphin levels and decreasing stress hormones. This promotes relaxation and comfort to the patient. [2-5]

Saeid Amini Rarani, N Rajai and Sharififar conducted a study on effects of acupressure at the P6 and LI4 points on the anxiety level of soldiers in the Iranian military. They found that Acupressure can reduce soldiers' anxiety at the acupressure points, especially at the LI4 point. They observed a decrease in postintervention mean anxiety score in the control group. This suggests that products like Aculief, which target the LI4 point, is effective in reducing anxiety. [6]

The periorbital massager i.e. PEM reduces stress and promotes relaxation through heat, vibration, compression, massage, and Bluetooth music. It warms the periorbital area, relaxes muscles, stimulates blood circulation, and relieves tension. It is a valid, non-invasive tool for making dental visits more comfortable. [7]

PEM helps manage dental anxiety by creating a calming environment before, during, and after procedures. A study in the International Journal of Clinical Pediatric Dentistry found PEM and virtual reality i.e VR eyeglasses equally effective in reducing anxiety during restorative procedures in children. [8]

Pit and fissure sealant application is simple procedure because it is non-invasive, quick, and generally well-tolerated. This makes it less intimidating, providing a controlled environment to observe and manage dental anxiety effectively.

Therefore, the purpose of this study was to compare the effectiveness of a periorbital eye massager to the Aculief acupressure device in reducing anxiety among children during the application of pit and fissure sealants.

### Material and Methodology:

After obtaining ethical clearance from the Institutional Ethical Committee in accordance with the Helsinki Declaration of 1975, the study was conducted in the Department of Pediatric and Preventive Dentistry at our institution. [9] Thirty children, aged between 4 and 7 years, who required pit and fissure sealant application, were enrolled in the study. Thirty Children aged 4 to 7 years were chosen. The study aimed to assess and compare dental anxiety levels between two groups: one using Aculief and the other using a periorbital eye massager. The procedure was explained in detail to each parent. Anxiety levels were measured pre-intervention and during treatment using an animated emoji scale and heart rate monitoring.

### Inclusion criteria:

- Normal healthy children of aged 4–7 years.
- Children having deep pit and fissure susceptible to plaque accumulation
- Children in Frankl's Behavior Rating Scale Grade III or IV.

### Exclusion criteria:

- Children with special health-care needs.
- Patients with blisters, rashes, open wounds, and swelling in and around the LI4 acupressure point.



Armamentarium (Fig: -1.1) Mouth Mirror Dental Probe Dental Tweezer Air Rotor Handpiece Pulse Oximeter



Periorbital Eye Massager (Fig: -1.2) Aculief Acupressure Device Dental Etchant Bonding Agent Pit and Fissure Sealant Curing Light

### Method:

The patient's medical and dental history was documented. A pre-intervention anxiety assessment was conducted by measuring the child's heart rate and using the Animated Emoji Scale to evaluate the child's anxiety level. The children were

randomly assigned either the Aculief Acupressure Device or the Periorbital Eye Massager. The assigned device was applied to the child according to the manufacturer's instructions: the Aculief acupressure device for 3 minutes and the Periorbital eye massager for 10 minutes.



Figure: 1.3 Aculief Acupressure Device



Figure: 1.4 Periorbital Eye Massager



Figure: 1.5 Placement of Aculief Acupressure device at LI4 acupoint



Figure: 1.6 Placement of Periorbital Eye Massager



Figure: - 1.7 Application of pit and fissure sealant

Following this, the dental treatment procedure commenced. (Fig: 1.7) During-treatment anxiety assessment was performed by measuring the child's heart rate and using the Animated Emoji Scale to evaluate the child's anxiety level during the treatment.

The novel AES was used to assess the anxiety. It depicts five animated emoji faces showing various facial expressions ranging from happy/laughing to unhappy/sad or crying. The child was asked to choose one of these animated emojis on the paper that best matched their feelings at that moment.<sup>10,11</sup> (Fig: 1.8)

According to Daymont, C., Bonafide, C. P., and Brady, P. W., the normal resting heart rate for children aged 4 to 7 years typically ranges from 75 to 115 beats per minute (BPM). An increase in heart rate beyond this normal range is considered indicative of anxiety.

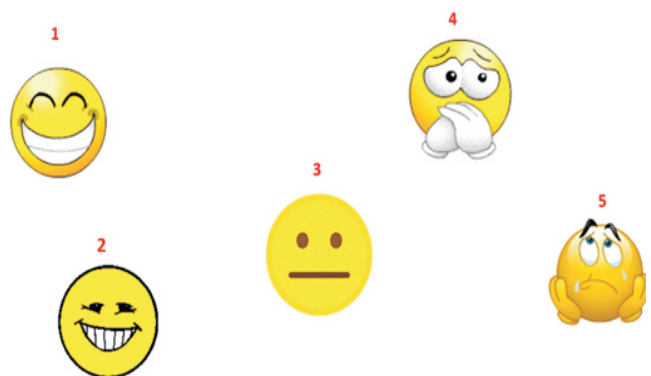


Figure: - 1.8 Animated emoji scale

Data was recorded, analysed, and a comparison of the pre-intervention and during-treatment anxiety values was conducted to evaluate the effectiveness of the interventions.

**Results:**

The study involved children aged 4 to 7, randomly divided into two groups. Group 1 (53.3% male, 46.7% female) received a periorbital eye massager, while Group 2 (66.7% male, 33.3% female) was given an Aculief acupressure device. Subjective anxiety was measured using the Animated Emoji Scale (AES), and objective anxiety was assessed via heart rate (HR).

**Subjective Anxiety:**

In Group 1, the mean subjective anxiety score increased from 2.5 pre-intervention to 3.4 during treatment. Conversely, Group 2 showed minimal change, with scores of 3.2 pre-intervention and 3.4 during treatment. Notably, the mean anxiety score during treatment was 3.4 in both groups. (Fig: - 1.9)

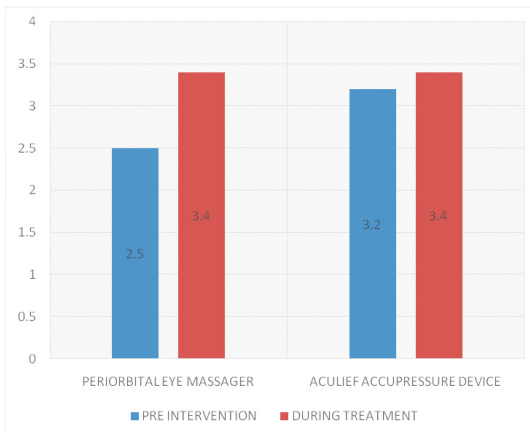


Figure: 1.9 Representation of Subjective Anxiety score

**Objective Anxiety:**

For objective anxiety, Group 1's mean HR rose from 92.8 to 105.5. In contrast, Group 2 exhibited a slight decrease, with pre-intervention HR at 106.8 and during-treatment HR at 103.2. Despite these differences, the mean HR during treatment was similar across both groups, indicating comparable levels of objective anxiety. (Fig: - 1.10)

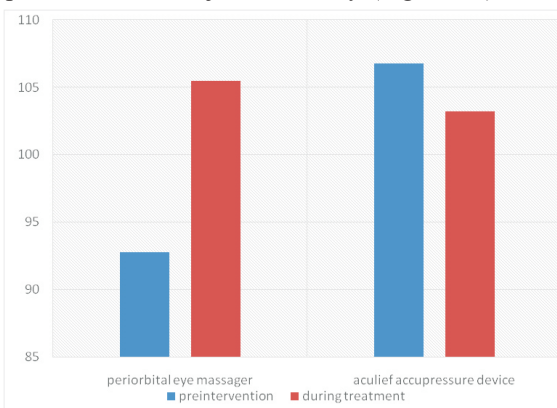


Figure: 1.11 Representation of objective anxiety score

**Statistical Significance:**

Upon comparing the mean scores of both groups, the differences were not statistically significant. This was true for both the AES as a measure of subjective anxiety and HR as a measure of objective anxiety. These findings suggest that while both interventions resulted in similar levels of anxiety during treatment, neither the periorbital eye massager nor the Aculief acupressure device demonstrated a statistically significant advantage in reducing anxiety.

**Discussion:**

Anxiety is brought about by the interplay of many factors such as genetic influences, environmental conditions and life experiences that cannot all be met with simple interventions. Anxiety responses can be highly individual. What works for one person may not necessarily work for another since the physiological, psychological state, and personal preferences of another individual may differ.[13 ]

Although both the Aculief acupressure device and the periorbital eye massager may offer symptomatic relief of anxiety. However, there are many limitations faced by this study, which included the apprehensiveness of the child towards the dental procedure as the child's eye remained closed in PEM. Furthermore, Aculief due to nerve accommodation, the action potential is stimulated for a shorter period of time which diminishes quickly. The young children do not perfectly understand the anxiety evaluation scale. The outcome might not present the true effects of the devices. The results of this study illuminate the effectiveness of devices aimed at reducing anxiety in children aged 4-7 years. The findings indicated that both the periorbital eye massager and the Aculief acupressure device were ineffective equally for subjective and objective measures of anxiety.[14]

Despite these clear differences in these groups, this study did not find any statistically significant benefit of one approach over another in diminishing the anxiety levels of the patients during treatment. The mean subjective anxiety score was slightly increased in group 1. While no change was observed in Group 2. This indicates that, there were nonsignificant differences in anxiety mean scores during the treatment of both groups. Children between 4 to 7 years are at a tender age with regards to their cognitive development. Hence it is likely that they have quite a limited sense of understanding to the AES Scale.

This developmental stage can also make them inconsistent in their responses. The understanding of the concepts of AES may be challenging for young children. A younger child has a shorter attention span. This limits their time to concentrate on

the scales. Another issue could be a parental influence, whereby parents or guardians lead the responses of the children, either by design or otherwise, thereby bringing in bias aimed at displaying results from the perceptions of the parents rather than the actual feelings of the children.

The developmental trajectory of facial emotion recognition follows a steep rise with cognitive limitations. The studies of Bruce et al. (2000) and Mondloch et al. (2003) indicate that although children by the age of 6 years can identify standard emotions, which include happiness, sadness, anger, and surprise. Their ability to relate emotions with facial expressions gets completely developed by age of 10. Kolb, Wilson, and Taylor in 1992 concluded that, improvements in emotion recognition between ages 6 and 8 were seen, with continued development into adolescence. Such findings imply that younger children rely more on local features rather than configural properties of faces, which are usefully used by adults. Thus, it is expected at in between the ages of 4 and 7, children lag behind in the cognitive development associated with recognizing emotions.[15]

As environmental, cultural, and parental influences may play an important role in the assessment of anxiety in children. The accuracy and reliability of the findings may change.

The divergent patterns of the mean change in heart rate in a positive direction for Group 1 and a slight negative for Group 2 have much valuable information about the physiological response related to the devices. These differences occur despite a similar mean HR while being treated in both groups. (Fig: 1.12)

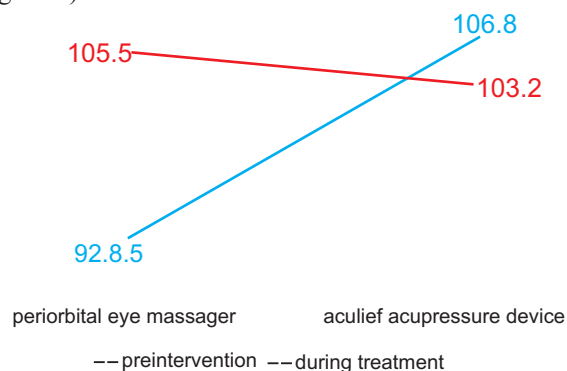


Figure:1.12 Divergent patterns of the mean change in heart rate

These statistically insignificant mean score differences for both subjective anxiety-as measured by the Animated Emoji Scale-and objective anxiety, as assessed via Heart rate. indicates that it's necessary to understand more about these kinds of devices. This result provides the message of

multifaceted approaches to researching the effectiveness of devices for young children that reduce anxiety.

Overall, the findings of this study raise a discussion on the multifactorial nature of anxiety reduction interventions in young children.

### Conclusion:

A study by Gala UP and Kalaskar R in 2024 found that PEM helped to reduce anxiety. Another study by Saeid Amini Rarani, N Rajai, and Sharififar in 2021 showed that pressing on LI4 reduced anxiety in Iranian military. However, the results of our study were not significant. This suggests that we need to use different techniques to understand how devices function to reduce anxiety in young children.

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