

Effectiveness of Distraction on Gag Reflex and Anxiety among Children during Impression Procedure - A Randomized Clinical Trial

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Abstract

The Gag Reflex (GR) is an innate defensive reaction that serves to prevent the intrusion of foreign entities into the pharynx and throat. This involuntary response often poses a difficulty for pedodontists while taking dental impressions, leading to heightened stress and difficulty for both the practitioner and the kid during future dental operations. The research seeks to assess the effects of a distraction strategy, known as "Buzzy Bee," on the occurrence of the GR and the degree of anxiety in children while undergoing dental alginate impressions. The study included 20 children aged between 3 and 8 years, who exhibited a gag reflex ranging from mild to moderate during alginate impression procedures. The Gag Reflex was measured before and after impression taking, with and without the distraction method, using the Gag Severity Index (ranging from G1 to G5). Additionally, the baseline anxiety levels were assessed using the Facial Image Scale (FIS). The study found a statistically significant reduction in both the gag reflex ($P \leq 0.05$) and anxiety levels ($P \leq 0.05$) when the Buzzy Bee distraction method was employed. Notably, 90% of the patients showed a decrease in both GR and anxiety scores. The Buzzy Bee distraction technique proves to be a beneficial approach to managing the gag reflex in pediatric patients during dental procedures.

Keywords: Children, Dental anxiety, Distraction, Gag Reflex, Maxillary impression.

Full length article *Corresponding Author, e-mail: yshobaf@gmail.com

1. Introduction

The Gag Reflex (GR) is an innate and vital defensive reaction that aims to obstruct the passage of foreign objects or noxious chemicals into the pharynx, larynx, or trachea [1]. A subset of the population has a pronounced and powerful gag reflex, which greatly impairs their ability to endure dental operations and hampers the dentist's capability to carry out these treatments. The prevalence of this issue in dental settings is not clearly established [2]. The causes of gagging are typically classified into two types: somatic, which is triggered by direct sensory nerve stimulation, and psychogenic, influenced by the brain's higher cognitive functions [1]. Somatic gagging is triggered by the stimulation of particular

locations that are distinct to each person, leading to the initiation of the reflex. Frequent areas that might provoke a response include the sides of the tongue and different parts of the roof of the mouth, typically resulting in the gag reflex [1]. On the other hand, psychogenic gagging may happen in the absence of any physical touch. For many people, the simple visual, auditory, or olfactory stimuli associated with dental operations, or simply the contemplation of receiving oral care, might elicit the gag reflex [1]. Additional contributors to an exaggerated gag reflex include factors like nasal blockages, gastrointestinal issues, variations in the soft palate's anatomy, and prior negative dental experiences [3]. Moreover, psychological aspects such as fear and anxiety, which lead to dental treatment avoidance in about 20% of

patients, are also recognized as potential causes of gagging [4]. It's crucial to reduce dental avoidance, particularly in children, to enhance the quality of overall dental care [5]. Maintaining comprehensive and precise patient records is a critical component of dental practice [6]. Among the various procedures, making impressions for records is often one of the initial steps that can provoke a gag reflex. This reaction is also commonly seen during radiographic procedures while placing restorations in the posterior teeth, and sometimes even during a simple oral examination [7,8]. To address and manage the gag reflex, various strategies have been employed. These include relaxation techniques, desensitization exercises, and distraction methods, particularly for managing anxiety in pediatric patients [9]. Both peripherally and centrally acting medications have been utilized to control the gag reflex. Additionally, reducing the patient's awareness of the stimulus can also diminish gagging [10]. For instance, engaging the patient in distraction can lead to the successful completion of intraoral procedures. The present study focuses on evaluating the impact of a distraction technique, referred to as "Buzzy Bee", on the frequency of Gag Reflex (GR) occurrences and the level of anxiety in children during the process of taking dental alginate impressions.

2. Material and methods

After obtaining approval from the Institutional Review Board and obtaining informed consent from patients, a three-month randomized clinical study was undertaken. The study had a sample of 20 children, including 9 males and 11 females, with ages ranging from 3 to 8 years. The children selected for upper alginate impressions, either for diagnostic purposes or other dental procedures, were chosen from the outpatient division of the Pediatric and Preventive Dentistry department at Narsinhbhai Patel Dental College & Hospital in Visnagar, Gujarat. Before the imprint process, the GR level was assessed using the Gagging Severity Index, as recommended by Dickinson C. and Fiske J. The assessment was conducted in a tranquil setting. The research excluded children with severe difficulties or those demonstrating a grade level of 4 or 5. The children's initial anxiety levels were assessed using Buchanan's Facial Image Scale (FIS) before any efforts to make an impression, at baseline (point T0). The FIS encompasses a sequence of five distinct facial emotions, ranging from extreme joy to extreme sadness. The participants were directed to choose the face that best depicted their present emotional state. The method for taking impressions was determined randomly using the Chit pick method, with options being either with the Buzzy Bee distraction or without any distraction. The impressions were taken using flavoured alginate (TropicalginZhermack®, Italy), following the randomly assigned method (either with or without distraction). The FIS was then administered again (at point T1) following the first impression. Subsequently, a second impression was made using the alternate method. After this, the children's psychological state was reassessed using the FIS (at point T2). The Buzzy Bee is a vibrating gadget that may be optionally fitted with an ice pack. The objective of this is to divert the patient's attention away from the present procedure.

2.1. Statistical analysis

The Wilcoxon Signed Ranks Test was employed to evaluate the correlation between the Gag Severity Index scores under conditions with and without distraction. Additionally, this test was utilized to examine the relationship between anxiety levels at baseline and during the procedure, both in the presence and absence of distraction.

3. Results

Before starting the impression procedure, none of the children exhibited a GR exceeding Stage 3. Notably, 65% of the children (13 out of 20) were assessed with a level 3 anxiety according to the Facial Image Scale (FIS). A majority of the children displayed a GR at Stage 2 severity (11 children, 55%) and an FIS score of 3 (13 children, 65%). There was a statistically significant difference in baseline anxiety compared to procedural anxiety when distraction was used, regardless of whether the impression was the first or second attempt. The FIS scores showed a marked improvement from the initial score to the score when distraction was applied, with 90% of the children (18 out of 20) showing this trend. The FIS score showed a slight increase in the absence of distraction ($p > 0.05$) but significantly dropped after the effort to create an impression with the Buzzy Bee distraction ($p < 0.05$). Among a group of 10 children, each individual exhibited a decrease in anxiety score from the first measurement to the first encounter while employing the Buzzy Bee approach. The decrease in anxiety exhibited statistical significance. Out of the 10 individuals, 8 had a reduction in their anxiety levels, while 2 maintained their baseline values, after the implementation of the Buzzy Bee approach. The observed discrepancy in scores was determined to have statistical significance [Table 1]. The application of the Buzzy Bee distraction method resulted in a statistically significant decrease in the GR. Among the children, 90% (18 out of 20) showed a reduction in their GR, while the remaining 2 children exhibited no change in their GR levels. Notably, there were no instances of increased GR severity observed [Table 2].

4. Discussion

The GR is a subjective reaction that acts as a safeguard, obstructing the entry of foreign things into the mouth and pharynx [11,12]. Gagging may elicit fear and cause shame in youngsters. Approaches to managing the GR can be classified into various categories, including behavioural techniques, pharmacological interventions, complementary therapies, and other miscellaneous methods [11]. Dental anxiety is a widespread issue, with a study showing that in India; around 6.3% of children aged 5 to 10 years' experience this form of anxiety [12]. Effectively managing anxious children in a dental environment requires a substantial level of dedication and proficiency in child management techniques from the dentist and the dental staff. While numerous management techniques have proven effective, contemporary non-aversive distraction methods focus on altering the patient's attention, making the stimuli appear more agreeable than the dental treatment itself [12]. The Buzzy Bee distraction specifically shifts the children's focus away from the dental procedure.

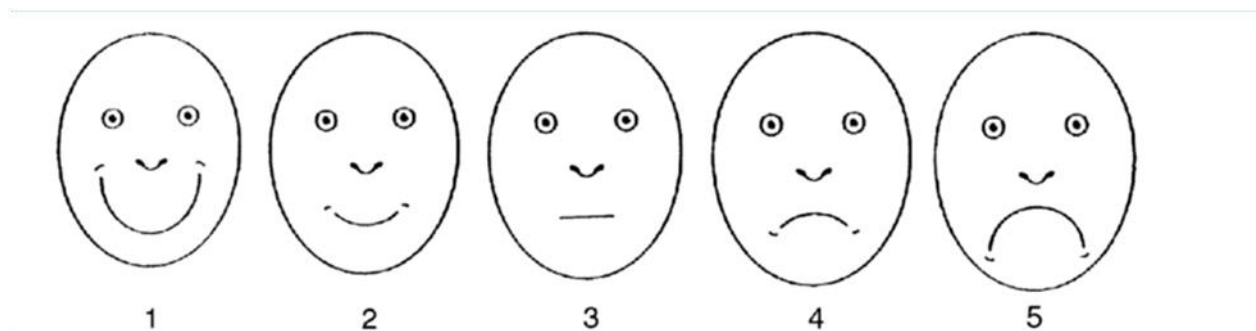


Figure 1: Buchanan’s Facial Image Scale

Table 1: Association between Baseline anxiety and Procedural anxiety with Buzzy Bee

Impression	Ranks	Number	Mean Rank	P Value
1 st	Negative Ranks	10 ^a	5.50	≤ 0.05 S
	Positive Ranks	0 ^b	.00	
	Ties	0 ^c		
2 nd	Negative Ranks	8 ^d	4.50	≤ 0.05 S
	Positive Ranks	0 ^e	.00	
	Ties	2 ^f		

“**a** - Anxiety at 1st Impression < Anxiety at Base Line, **b** - Anxiety at 1st Impression > Anxiety at Base Line, **c** - Anxiety at 1st Impression = Anxiety at Base Line, **d** - Anxiety at 2nd Impression < Anxiety at Base Line, **e** - Anxiety at 2nd Impression > Anxiety at Base Line, **f** - Anxiety at 2nd Impression = Anxiety at Base Line”

Table2: Association between Gag severity with/without Distraction (Buzzy Bee)

Type	Ranks	Number	Mean Rank	P Value
Without Distraction	Negative Ranks	3 ^a	2.00	> 0.05 NS
	Positive Ranks	0 ^b	.00	
	Ties	17 ^c		
With buzzy bee	Negative Ranks	18 ^d	9.50	≤ 0.05 S
	Positive Ranks	0 ^e	.00	
	Ties	2 ^f		

“**a** – Gag Severity Index without Distraction < Gag Severity Index at Base Line, **b** - Gag Severity Index without Distraction > Gag Severity Index at Base Line, **c** - Gag Severity Index without Distraction = Gag Severity Index at Base Line, **d** - Gag Severity Index with buzzy bee < Gag Severity Index at Base Line, **e** - Gag Severity Index with buzzy bee > Gag Severity Index at Base Line, **f** - Gag Severity Index with buzzy bee = Gag Severity Index at Base Line”



Figure 2: Buzzy Bee Distraction

Its combination of vibration and a cold pack serves as a diversion from the discomfort associated with the alginate impression process. According to Richmond and Sato, the perception of pain is closely related to how much attention a patient gives to the unpleasant stimulus. Techniques like raising limbs might have limited effectiveness but could be useful for mild gag reflex cases [13]. There is a variety of tools available for assessing dental anxiety and fear. In this particular study, Buchanan's Facial Image Scale (FIS) was chosen for its simplicity, ease of comprehension, and effectiveness in measuring the level of anxiety among pediatric patients in a dental setting [14]. At the initial assessment (T₀), the children showed a range of anxiety levels, spanning from very happy (FIS 1) to very unhappy (FIS 5) (Figure 1). The underlying causes of this anxiety at baseline could be attributed to dental anxiety and negative perceptions about dental care. Often, anxious children might resort to any means to avoid dental treatments, such as alginate impressions [11]. The results of the current study are statistically significant ($P < 0.05$) in evaluating changes in anxiety levels, as measured by the Facial Image Scale (FIS), during dental impressions both with and without the use of the Buzzy Bee distraction. With the Buzzy Bee distraction, all participants registered FIS scores between 1 and 2 (Figure 2). This aligns with findings from studies by S. Nuvvula [15] and Al-Khotani et al., [16] which also reported comparable outcomes using audio-visual (AV) distractions [15]. Additionally, research by Prabhakar et al. indicated that methods like AV presentations and multi-sensory distractions are effective in managing anxiety in pediatric dental patients [16,17]. In the present study, 85% of children encountered difficulties with impressions when no distraction was used. In contrast, the use of the Buzzy Bee distraction led to a 90% reduction in GR and a significant decrease in anxiety ($p < 0.05$), as shown

in Table 2. This is in line with findings by Debs NN et al., where a 69% reduction in GR score was observed using an Intellectual Coloured Game as a distraction method [11]. The current study, focusing on the Buzzy Bee method, demonstrates a significant decrease in both GR and anxiety during dental impressions, with 90% of children showing reduced gag reflexes. In contrast, the referenced survey of postgraduate dental students reveals a broad acknowledgement of the challenge of gag reflex during dental procedures, with 76.1% encountering it mostly during impressions and 70% preferring distraction techniques to mitigate it [18]. This juxtaposition underscores the practical efficacy of specific, engaging distraction methods in managing gag reflex, particularly in pediatric dental settings where patient comfort and cooperation are paramount. Behavioural challenges in children can often be attributed to factors like underdeveloped reasoning abilities and limited skills in managing anxiety. The present research found that the Buzzy Bee distraction was beneficial in improving children's cooperation, resulting in successful alginate impressions by lowering gag reflex and anxiety. Therefore, it presents itself as a potential alternative technique for reducing gag reflex and oral anxiety in young patients. Nevertheless, due to the small sample size, this study serves as a preliminary investigation, and more research is required to validate these results and broaden their relevance to a wider demographic, including adult participants. Comparing the Buzzy Bee method with other established techniques could offer deeper insights into its effectiveness in reducing gagging. Similarly in a systematic review conducted by M Mehdizadeh et al., [19] the effectiveness of methods like distraction techniques, nitrous oxide, and low-level laser therapy in managing gag reflex, emphasised tailored approaches based on treatment type, gag severity, patient age, and resource availability [19]. Using intellectual distraction as a method for managing the GR in pediatric

dentistry is safe, potentially effective, and economical. The practical success of distraction techniques is particularly relevant as many parents favour non-pharmacological approaches. The interactive distraction approach used in the present study is simple, non-intrusive, and cost-effective. It has been shown as a viable method for managing the reflex of gagging, enabling the effective way of upper jaw impressions in children between the ages of 5 and 10.

5. Conclusion

The effectiveness of distraction techniques in clinical settings holds considerable importance, particularly because many parents are inclined towards non-pharmacological methods for their children. The Buzzy Bee distraction proved useful in diverting the child's attention away from the anxiety-inducing alginate impression procedure, making it a valuable complement to behavioural management strategies in pediatric dentistry. This method is not only safe and potentially effective but also offers a cost-efficient and time-saving approach to managing the Gag Reflex (GR) in young patients.

Financial support and sponsorship

Nil.

Conflicts of interest

Nil

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