ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 6, Issue – 3, May - 2023, Page No. : 335 – 343

Evaluation of the ability of distraction technique in the form of novel intellectual game to avoid gag reflex caused during maxillary impression in the children of age group 4-6 years - A Randomized Cross-Sectional Study.

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Citation of this Article: Dr. Ruchi Saple, Dr. Bhushan Pustake, Dr. Swapnil Patil, Dr. Darpan Kotha wade, "Evaluation of the ability of distraction technique in the form of novel intellectual game to avoid gag reflex caused during maxillary impression in the children of age group 4-6 years - A Randomized Cross-Sectional Study", IJDSIR- May - 2023, Volume – 6, Issue - 3, P. No. 335 – 343.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim: The objective was to evaluate the ability of distraction technique in the form of novel intellectual game to avoid gag reflex caused during maxillary impression in the children of age group 4 -6 years.

Materials and Methods: There were two groups of children; Group A (n=37): An upper alginate impression was taken using an impression tray that had been specifically chosen.

Distraction technique was used during impression. The distraction technique used was in the form of an intellectual game that involved counting various geometrical forms and colours. Group B (n=37): Upper alginate impressions were evaluated similarly without the use of games or other intellectual diversion. By using the Fisher's Exact test, two groups were compared to one another.

To examine associations, Wilcoxon Signed Ranks Test were applied. For graphical representation, simple/ multiple bar/pie graphs were used.

Result and Conclusion: This study emphasizes the clinical efficacy of the management of gag reflex through intellectual distraction.

Keywords: Gag Reflex, Maxillary Impression, Alginate Impression, Distraction Technique, Intellectual Game

Introduction

The gag/vomiting reflex is a reflex action that causes an unexpected evacuation of the stomach's contents through the mouth and exterior. We encounter this problem frequently as a dentist and encounter situations like this frequently.

The gag reflex (GR) is an innate healthy defense mechanism that helps prevent foreign bodies from entering the trachea. The GR is influenced by systemic, local, anatomical, iatrogenic, psychological, and anatomical variables. The five oral triggering zones for the pharyngeal reflex, which stops choking, are the palatoglossal and palatopharyngeal folds, the post-pharyngeal wall, the uvula, the palate, and the base of the tongue. The medulla oblongata receives afferent impulses from these zones, which in turn produce efferent impulses that result in the spasmodic, disorganized motions of gag ging. Children with anxiety may get benefited from distraction, desensitization, and relaxation techniques. Drugs with peripheral and central actions have both been used to treat the gag reflex. Additionally, gag reflex can be reduced in direct proportion to the degree of stimulus awareness [1] For instance, intraoral treatments can be completed effectively while the patient is preoccupied with games or other forms of entertainment [1].

Dental fear and an unpleasant dental experience may also affect the gagging. Gagging and dental fear were found to be significantly correlated in children ages 4 to 12 years old [2].

Gagging can limit patient care, disrupt dental procedures, and also distress the patient. The literature has described a wide range of management techniques, including pharmacological methods like local anesthesia, conscious sedation, and general anesthesia; complementary therapies like acupressure, acupuncture, and hypnosis; and behavioural modification techniques like relaxation, distraction, and systemic desensitization. Additionally, there are non-drug approaches that can help patients with vomiting reflexes. Our objective was to show that one of these non-drug approaches to prevent the vomiting reaction that occurs during dental impressions were effective.

Other methods which are mentioned in literature for management of gagging is application of acupressure or acupuncture but these are not feasible in children as it can lead to increase in the anxiety of child. One of the methods to avoid gagging is administration of local anesthesia in the posterior hard palate area which can again lead to increase in the anxiety of child hence leading to uncooperative behavior of child. Therefore, there is a need for an easy method which should be feasible for the child as well as for the operator.

Therefore, it is necessary to add to or modify the impression procedure in order to obtain an accurate impression without setting off the gag reflex. This study will test the effectiveness of a distraction approach called an intellectual game, which involves counting geometrical forms, colours, and effects, during the maxillary impression. This diversionary tactic is simple for the operator and enjoyable for the child [3].

The aim of this management method was to desensitize the patient to suppress their gag reflex during therapy, enabling them to undergo treatments normally. The goal was to significantly reduce the gag reflex score/index.

Materials and Methods:

The study was conducted in the Department of Pediatric and Preventive Dentistry in children of age group of 4 to 6 years. The study design was a cross-sectional rando mization study, which was carried out in the Department

of Pediatric and Preventive Dentistry with the approval of each patient's parent or guardian.

Children between the ages of 4 years and 6 years who required maxillary alginate impressions were chosen and separated into two groups.

They were divided into two groups randomly using a lottery approach, and the allocation was concealed using the sequentially numbered opaque sealed envelope (SNOSE) method.

• **Group A:** In this group, a maxillary alginate impression was obtained using an impression tray that had been specifically chosen and loaded in all of its designated spaces. The distraction technique used was in the form of an intellectual game that involved counting various geometrical forms and colours.

• **Group B:** In this group, a maxillary impression was taken using a chosen tray with alginate loaded inside the boundaries of the impression tray in all dimensions, without the use of playing or engaging in any intellectual games for distraction.

Inclusion Criteria

involved children who had never taken a dental impression before and those who received a positive or unquestionably positive assessment on a Frankl scale during the initial session. Children who needed a maxillary imprint for space maintainers, orthodontic treatment, a habit-breaking device for their mouth, or to manage space management were included.

Exclusion criteria

involved children who had an upper respiratory illness or a nasal blockage, youngsters with cleft lip or palate, and all children who showed up with a G4 or G5 grade gag reflex according to the gag reflex scale proposed by Saita et al were disqualified from the study due to severe technical issues. Children who had ailments such pulmonary aspiration, achalasia, dysphagia, neuro logical ab normalities, and other systemic medical issues were also excluded.

Following the selection of the children, a Pediatric Dentist assessed the gag reflex in a clinical setting. Prior to the impression procedure, the GR grade was assessed using Saita et al proposed classification of gagging problem index [5].

• G1: Usual but unsensitized gagging (the child tolerates a basic periodontal examination with a probe)

• G2: Mild gag reflex (the child does not tolerate the basic periodontal examination with a probe)

• G3: Mild gag reflex (the child does not tolerate molar region examination with a dental mirror)

• G4: Extreme gag reflex (the child does not tolerate anterior teeth examination with a dental mirror)

• G5: Extremely bad gagging (the child does not tolerate momentary insertion of dental mirror)

All children presenting with a G4 or G5 GR were excluded from the study for advanced technical difficulties. There were two groups of children.

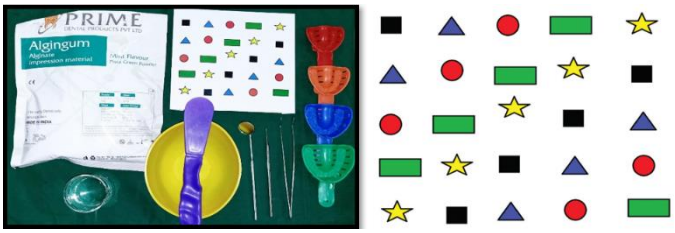


Figure 1: Represents armamentarium used for the present study.

In both of these groups, a comparative examination was conducted. Armamentarium used for the study included set of diagnostic instruments, maxillary trays of different sizes, alginate, mixing bowl, alginate mixing spatula, beaker and water. Printout of the intellectual game including different shapes and colours.

The children were given a color printout of the shapes and colours, and the operator asked them to point out the shapes and colours that were mentioned.

In Group A, an upper alginate impression was obtained using a selected tray. The distraction technique used was in the form of an intellectual game that involved counting various geometrical forms and colours

While taking the impression, the Gag Reflex score was recorded by the assistant standing beside the dental chair.

Figure 2: Taking maxillary alginate impression with distraction technique.

In Group B, an upper alginate impression was obtained using an appropriate tray. There was no use of any kind of distraction. While the impressions were being taken, the Gag Reflex score was recorded by the assistant standing beside the dental chair.

Figure 3: Taking alginate maxillary impression without distraction technique.

Microsoft Excel 2010 was used to enter all the data. For each group, descriptive statistics for gag reflex were shown as Frequency and Percentage.

Two groups were compared to one another using the Fisher's Exact test. To examine test were Wilcoxon Signed Ranks Test were applied. Simple/multiple bar/pie graphs were employed for graphical representation.

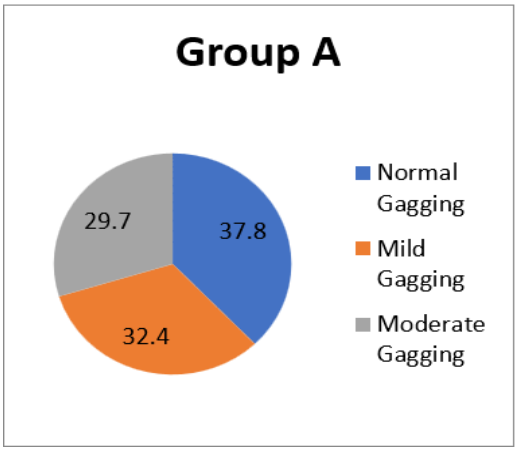
All the above test 'p' values were considered statistically significant when they were <0.05.

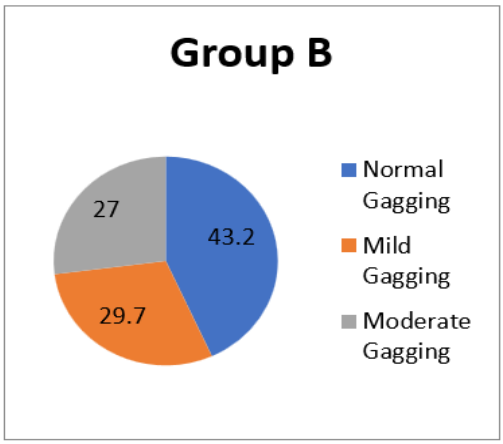
Results

Table 1: Association between Groups and Gag reflex before impression by Fisher's Exact Test

Groups * Before Impression Crosstabulation						
Groups		Before Impression			Total	Fisher's Exact Test p value
		Normal Gagging	Mild Gagging	Moderate Gagging		
Group A-Impression (without alginate) of children with distraction technique	Count	14	12	11	37	0.915
	% within Groups	37.8%	32.4%	29.7%	100.0%	
	% of Total	18.9%	16.2%	14.9%	50.0%	
Group B-Impression (without alginate) of children without distraction technique	Count	16	11	10	37	
	% within Groups	43.2%	29.7%	27.0%	100.0%	
	% of Total	21.6%	14.9%	13.5%	50.0%	
Total	Count	30	23	21	74	
	% within Groups	40.5%	31.1%	28.4%	100.0%	
	% of Total	40.5%	31.1%	28.4%	100.0%	

Graph 1: Association between Groups and Gag reflex before impression



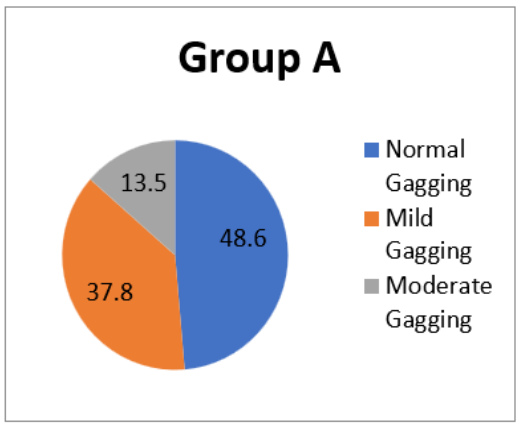


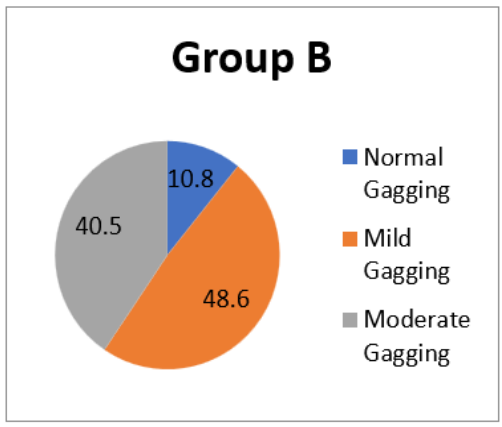
There was statistically insignificant difference for gag responses among two group before impression with p = 0.915

Table 2: Association between Groups and Gag reflex during impression by Fisher's Exact Test.

Groups * During Impression Crosstabulation						
Groups		During Impression			Total	Fisher's Exact Test p value
		Normal Gagging	Mild Gagging	Moderate Gagging		
Group A-Impression of children with distraction technique	Count	18	14	5	37	<0.001*
	% within Groups	48.6%	37.8%	13.5%	100.0%	
	% of Total	24.3%	18.9%	6.8%	50.0%	
Group B-Impression of children without distraction technique	Count	4	18	15	37	
	% within Groups	10.8%	48.6%	40.5%	100.0%	
	% of Total	5.4%	24.3%	20.3%	50.0%	
Total	Count	30	22	32	74	
	% within Groups	40.5%	29.7%	43.2%	100.00%	
	% of Total	40.5%	29.7%	43.2%	100.00%	

Graph 2: Association between Groups and Gag reflex during impression



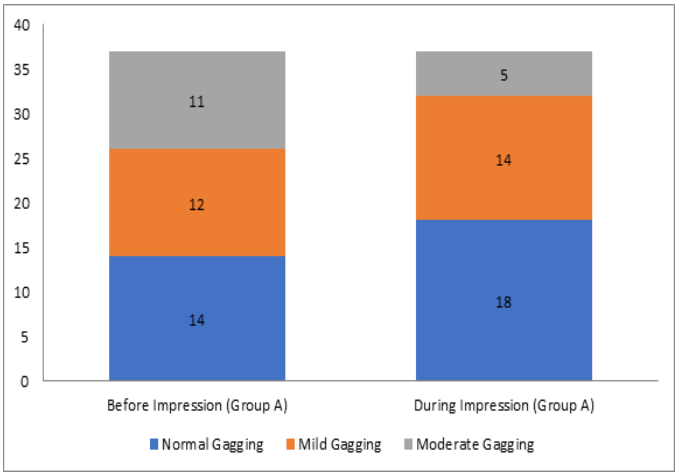


There was statistically significant difference for gag responses among two group at during impression with p<0.001*

Table 3: Comparison of Gag reflex before impression and during impression among Group A-Impression of children with distraction technique by Wilcoxon Signed Ranks Test.

Frequencies			
Groups			N
Group A-Impression of children with distraction technique	During Impression - Before Impression	Negative Differences[a]	9
		Positive Differences[b]	0
		Ties[c]	28
		Total	37
		P value	0.004*

Graph 3: Comparison of Gag reflex before impression and during impression among Group A-Impression of children with distraction technique.



There was overall increase in responses of normal and mild gagging during impression (18+14) than before impression (14 +12) among Group A.

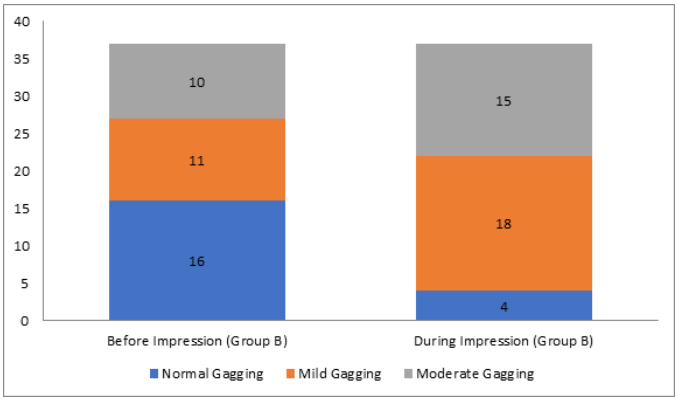
There were only 5 cases of moderate gagging during impression as compared to 11 cases before impression.

There was statistically significant difference for gag reflex before and during impression among Group A with p=0.004.

Table 4: Comparison of Gag reflex before impression and during impression among Group B-Impression of children without distraction technique by Wilcoxon Signed Ranks Test.

Frequencies			
Groups			N
Group B-Impression of children without distraction technique	During Impression – Before Impression	Negative Differences[a]	2
		Positive Differences[b]	17
		Ties[c]	18
		Total	37
		P value	0.001*

Graph 4: Comparison of Gag reflex before impression and during impression among Group B-Impression of children without distraction technique.



There was overall increase in responses of Moderate gagging during impression (15) than before impression (10) among Group B.

There were only 4 cases of normal gagging during impression as compared to 16 cases before impression.

There were increase in mild gagging cases during impression which were 18 as compared to 11 cases before impression.

There was statistically significant difference for gag reflex before and during impression among Group B with p=0.001.

Discussion

To our knowledge this is the only randomized controlled trial in the literature evaluating the effect of interactive distraction technique on the success of impression recording and the severity of gag reflex during impression taking in children. We observed that this counting of geometrical shapes and colours attracted sufficient interest of all children in the Test group and did not obstruct with the impression taking procedure. All children played the game till the impression tray was removed. Results of this study showed that children who engaged in the interactive game had significantly less severe gagging as compared to those who did not. An earlier investigation has found support for these conclusions (Debs and Aboujaoude 2017).

It was amazing that every child who participated in our study's intellectual game even those who gagged during the impression-taking process completed it successfully. After an initial failed attempt, Debs and Aboujaoude (2017) found an impression success rate of 88.1 percent when impression was captured in youngsters while they were playing an interactive game. The type of interactive distraction approach used in our study may have contributed to the higher success rate of the participants. The game was attractive, easy to play and yet cognitively demanding as well as providing multisensory interaction (visual, tactile, kinesthetic) to children of varied age range. Dental care frequently involves the invasive concern of gagging. Problems with gagging have not been found to vary with sex, age, or educational attainment, indicating that they are prevalent across all socioeconomic and demographic groups [12]. The four factors that are believed to be important in the etiology of gagging include – local, systemic disorders such as nasal obstruction, postnasal drip, sinusitis, nasal polyps, upper respiratory tract mucosal congestion, and dry mouth, medications induced nausea, chronic gastritis, peptic ulceration, stomach carcinoma, hiatus hernia, and uncontrolled diabetes, anatomic and psychological factors and iatrogenic factors like poor clinical techniques such as overloaded impression tray, unstable or poorly retained prosthesis, overextended borders of prosthesis, increased vertical dimension of occlusion, and smooth highly polished surface coated with saliva.

The major goal of the treatment is to reduce the patient's stress and anxiety while they receive dental care. Numerous different management techniques have been described in the literature, including pharmacological techniques like local anesthesia, conscious sedation, and general anesthesia, behavioural modification techniques like relaxation, distraction, systemic desensitization, training bases, cognitive behavioural therapy, and sensory flooding, and complementary therapies like acu pressure, acupuncture, transcutaneous electrical nerve stimulation, hypnosis, and anesthesia [1-6,8,9].

A subjective sensation called the GR serves to keep foreign objects out of the mouth and throat [1,10]. According to somatogenic and psychogenic origins, there are two primary groups of gagging patients, according to Bassi et al. However, it might be challenging to distinguish between them because a physical stimulus could cause psychogenic gagging [11].

Exaggerated reflexes can make obtaining a maxillary alginate imprint more difficult and, in some situations, impossible. Since gagging can make children feel uncomfortable, understanding how to manage it can be crucial in treating patients' psychological conditions.

Additionally, gag reflex can be reduced in direct proportion to the degree of stimulus awareness. For instance, intraoral treatments can be completed effectively while the patient is preoccupied with games or other forms of entertainment. (Debs N. et al 2017).

We choose children between 4-6 years as we found that this age group children needed alginate impression for orthodontic treatment, oral habit breaking appliance and space management the most. Telling them to play our intellectual game was much convenient as compared to smaller age group patients.

In 2017, Debs N. et al The web-based gagging study found that pedo dontists in India had a considerably poor level of awareness regarding managing patients' gags, which is a significant barrier to clinical practise [9]. In 2016, Roy S. et al's study; the dentist's objective estimate of gagging severity, and the child's subjective perception of gagging all showed strong correlations in the dental environment. In 2018, Katsouda et al also concluded that, In the dental setting, there were signifi cant relationships between dental fear, the dentist's objective measurement of gagging severity, and the child's subjective gagging assessment [10-11].

The results of the present study are in line with those of Al-Khotani et al., who showed that audio-visual distraction can lessen anxiety during dental treatments [15]. Similar to this, Prabhakar et al. shown that multi-sensory distraction and video display were effective in treating nervous children [16].

On the other hand, most authors concluded that gagging is caused by psychological reasons [17]. Children sometimes exhibit their anxiety by becoming more likely to gag. This is regarded as a deliberate kind of self-defence against an oral cavity invasion. Touching a triggering area may have resulted in a greater gag response in the G3 group than the G1 group (P = 0.010). Vagal nerve sensitivity was linked to the development of GR by Bassi et al [18].

Psychogenic Randall et al. hypothesised that a particular sort of gag during dental treatments might be a behavioural reaction influenced by psychological factors [19]. Additionally, GR is brought on by emotional factors that may be connected to the child's prior dental experiences, according to Armfield et al [20].

Emotional gagging is thoughts to be due to the stimulation of the gag centre located at the level of the diencephalon, limbic system, and sympathetic nervous system [21].

GR severity at (T2) and FIS-based anxiety decrease were found to be statistically significantly correlated (P = 0.010). As a result, Randall et al. found a connection between anxiety levels and gagging frequency. Psycho logical gagging can occasionally be brought on without any physical touch. Some people's GR might be brought on by sight, sound, smell, or even just the prospect of receiving dental care [1-20].

Conclusion

In view of the findings, it is possible to draw the conclusion that, for children between the ages of 4 and 6 years, obtaining a maxillary impression while utilizing a distraction strategy can help prevent gag reflex. Therefore, this technique can be used as a behavior management technique when making an maxillary im pression.

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Abbreviations

Abbreviations	Full Form
GR	Gag Reflex
IG	Intellectual Game
MI	Maxillary Impression