MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.721.725

Modifying Gag Reflex in Children with Acupressure: A Clinical Study

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ABSTRACT

A Pharyngeal reflex or Gag reflex is a protective mechanism by which foreign particles are prevented from aspiration into the upper respiratory tract. The palatoglossal and palatopharyngeal folds in conjunction with the base of tongue, palate, uvula and posterior pharyngeal wall have been recognised as the "Trigger areas", which are specific to each individual. The present research were to modify gag reflex in children with acupressure and to compare point Hegu with Yintang and a placebo point. The study was carried out from November 2021 to April 2022 in the Department of Pediatric and Preventive Dentistry, Manav Rachna Dental College. Total sample size 165. Estimated sample size for each group = 55 children were selected to participate in the study based on the inclusion and exclusion criteria. 2 acupressure points used in the study were Yintang and Hegu point and a placebo point was added in the study to eliminate bias. Group 1: Hegu point Group 2: Yintang point Group 3: Placebo (PC-3) With the help of a ball/t- burnisher, Gag was induced and the scoring was recorded according to the Gag Severity Index. After waiting for 2 min, gentle finger pressure was applied for 1 min on the allocated acupoint. After 1 min, pressure was increased, simultaneously Gag was induced and scoring was done according to the index. Results were recorded. Trigger zones identified were posterior pharyngeal wall, posterior faucial pillar, palatoglossal arch and internal cheek. The mean age of the children involving all three groups was 11.09±1.87 years. Of the total sample of 165, the ratio of girls (34.55%) was less than boys (65.45%) in the groups. Wilcoxon sign rank test was carried out to determine the difference between and within groups (pre and post intervention). All statistical tests were performed at a significance level of 5% ($p<0.05$). The current study has described acupressure at point Yintang and Hegu as effective in altering gag reflex in children of age 8-14 years, this is in accordance with a study conducted by Sivinagini and Agrawal, who reported that point Hegu is successful in regulating gag reflex. There are varying reasons why acupressure was selected over acupuncture. There is a need to give some information regarding the safety of acupuncturing, incorrect insertion of needle, risk of cross infection and injury to tissues. According to a meta-analysis between acupuncture, acupressure, laser acupuncture and electrical stimulation in controlling post-operative vomiting in children and reported acupressure to be equally effective. The current study has reported that Hegu point and Yintang point are effective in altering gag reflex in children aged 8-14 years and Yintang point is more effective than Hegu point.

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Key Words
Children, acupressure, pharyngeal, gag

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Received: 15 July 2023
Accepted: 2 August 2023
Published: 4 August 2023

Citation: M. Piraveen, Shruthi Chopra, Naresh Sharma, Shveta Sood, Akshara Singh, Madhulika Srivastava and Puneet Khari, 2023. Modifying Gag Reflex in Children with Acupressure: A Clinical Study. Res. J. Med. Sci., 17: 721-725, doi: 10.59218/makrjms.2023.721.725

INTRODUCTION

A Pharyngeal reflex or Gag reflex is a protective mechanism by which foreign particles are prevented from aspiration into the upper respiratory tract. The literature identifies gagging to be either somatic or psychogenic. Gagging in the somatic class results due to a physical stimulus directly at the trigger areas, whereas in the psychogenic class, it results due to a psychological stimulus. The palatoglossal and palatopharyngeal folds in conjunction with the base of tongue, palate, uvula and posterior pharyngeal wall have been recognised as the "Trigger areas", which are specific to each individual[1].

Stimulus such as sound, smell, sight or even the thought of previous dental treatment is sufficient to initiate a gag response in some patients. The most frequent, physician originated, etiologic factors are excess loading of impression trays, faulty technique and positioning. This may result in acute restriction to accept dental treatment by the patient. The definite prevalence of gag still remains uncharted but is expected to have an incline with advancing age and is found higher in females as compared to males[2].

The literature suggests different means of management of gag reflex in patients such as acupuncture and acupressure, behaviour modification, pharmacotherapy with the use of local anaesthetics, low level laser therapy (LLLT), conscious and general sedation and even hypnosis[3].

Acupuncture and acupressure have been a part of Traditional Chinese Medicine, even though its use seems unlikely in dental practice, Chinese therapy presents with an alternative approach which can be used as a complementary treatment. It's based on the concept of energy or Ch'i which passes through 14 various pathways and that 361 acupoints can restore the balance of Yin and Yang which define health and represent equilibrium. Yin is responsible for calmness and rest and Yang provides activation and transformation. So, if we apply this concept to pharyngeal gag, we can assume that Yin is defective and is therefore causing the patient to gag and stimulation of acupoints will reinstate equilibrium[4].

Acupuncture involves placement of a solid needle into acupoints of the body for the prevention of diseases, treatment and maintaining health. However, such an invasive technique is difficult to conduct in children. To overcome this complication, acupressure was developed. It's a non-invasive procedure that is based on the same principle as acupuncture and utilises gentle finger pressure to stimulate the acupoints. Acupressure works by stimulating the nerves and by altering pain perception, this in turn releases Endorphins and Serotonin which act as natural pain relievers[5].

The first acupressure point for anxiety is located between the medial ends of the eyebrows and is known as Yintang or Hall of Impressions or even the third eye in many cultures. It's known to have a calming effect on the mind. Other points identified are point Hegu (Li-14) which is located between the concave area between first and second metacarpal bones, REN 24 point situated in horizontal mentolabial groove approximately midway between chin and lower lip and point Neiguan[6].

The objectives of the present research were to modify gag reflex in children with acupressure and to compare point Hegu with Yintang and a placebo point.

MATERIALS AND METHODS

The study was carried out from November 2021 to April 2022 in the Department of Pediatric and Preventive Dentistry, Manav Rachna Dental College.

Sample size estimation:

- Total sample size = 165
- Estimated sample size for each group = 35
- Sample size estimation was done using Statistical Software SPSS Version 3.1.9.4
- The assumption of the sample size was done at minimum 95% power and 5% significance

Inclusion criteria:

- Children between the age group of 8-14 years
- Subjects with no prior knowledge of acupressure therapy for controlling gag

Exclusion criteria:

- Patients with
- Abnormalities of the palate or lip
- Any systemic disorder
- Awareness of acupressure therapy for controlling gag

Materials used: Ball/T-burnisher, Dickinson and Fiske Gag Severity Index

Methods:

- 165 children were selected to participate in the study based on the inclusion and exclusion criteria.
- The 2 acupressure points used in the study were Yintang and Hegu point and a placebo point was added in the study to eliminate bias.
- The patient was seated comfortably, to ensure randomisation chits were used to allocate the points. The patient and operator were both blinded to the groups:

    - Group 1: Hegu point
    - Group 2: Yintang point
    - Group 3: Placebo (PC-3)

- With the help of a ball/t-burnisher, gag was induced and the scoring was recorded according to the gag severity index
- After waiting for 2 minutes, gentle finger pressure was applied for 1 min on the allocated acupoint
- After 1 min, pressure was increased, simultaneously Gag was induced and scoring was done according to the index
- Results were recorded

Trigger zones identified were posterior pharyngeal wall, posterior faucial pillar, palatoglossal arch and internal cheek.

Location of points:

- **Hegu point:** The mid-point of meta carpal II is identified. The patient is asked to place the thumb tightly below the index finger and the highest point of the muscle bulge is noted (Fig. 1)
- **Yintang point:** Mid-way between the medial end of eyebrows (Fig. 2)
- Placebo (Fig. 3)

Fig. 1: The mid-point of meta carpal II is identified. The patient is asked to place the thumb tightly below the index finger and the highest point of the muscle bulge is noted

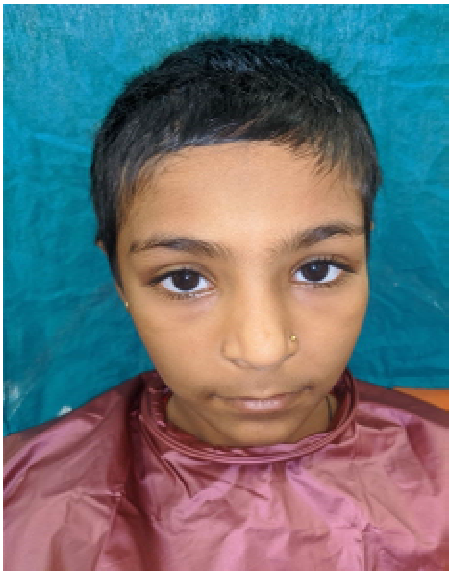

Fig. 2: Mid-way between the medial end of eyebrows

RESULTS

Statistical analysis: The data were entered in Microsoft Excel and analysed statistically using the SPSS software, version 21, SPSS Inc., USA. Data was found to be qualitative type (ordinal). Non-parametric test was chosen. Descriptive statistics were used to calculate frequencies and mean values. Kruskal-Wallis test followed by Mann-Whitney U test were carried out to determine the difference between the acupressure points. Wilcoxon sign rank test was carried out to determine the difference between and within groups (pre and post intervention). All statistical tests were performed at a significance level of 5% ($p<0.05$) (Table 1-5).

Table 1: Comparison of gag response among children received three various acupressure point

					Statistics	
Timeline	Group	No.	Mean±SD	95% CI	F-value	p-value
Pre-test	A	55	1.33±0.771	1.12-1.54	0.194	0.908
	B	55	1.38±0.782	1.17-1.59		
	C	55	1.35±0.751	1.14-1.55		
Post-test	A	55	0.82±0.669	0.64-1.00	11.44	0.003*
	B	55	1.09±0.776	0.88-1.30		
	C	55	1.29±0.712	1.10-1.48		

Group A received Yintang acupressure point, Group B received Hegu acupressure point, Group C received placebo acupressure point, The statistical test used: Kruskal-Wallis test, Level of significance: *$p \leq 0.05$ is considered statistically significant

Table 2: Gag response among children received three different acupressure points

	Pre-intervention			Post-intervention		
	A n (%)	B n (%)	C n (%)	A n (%)	B n (%)	C n (%)
Normal	7 (12.7)	7 (12.7)	7 (12.7)	18 (32.7)	14 (25.5)	8 (14.5)
Grade I gagging	26 (47.3)	23 (41.8)	24 (43.6)	29 (52.7)	22 (40.0)	23 (41.8)
Grade II gagging	19 (34.5)	22 (40.0)	22 (40.0)	8 (14.5)	19 (34.5)	24 (43.6)
Grade III gagging	3 (5.5)	3 (5.5)	2 (3.6)	0 (0)	0 (0)	0 (0)
Grade IV gagging	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Grade V gagging	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	55 (100)	55 (100)	55 (100)	55 (100)	55 (100)	55 (100)

All values are expressed as the frequency with percentages (in parentheses)

Table 3. Comparison of gag response among children received three various acupressure point

Timeline	Group	*n*	Mean±SD	95% CI	Statistics	
					F-value	p-value
Pre-test	A	55	1.33±0.771	1.12-1.54	0.194	0.908
	B	55	1.38±0.782	1.17-1.59		
	C	55	1.35±0.751	1.14-1.55		
Post-test	A	55	0.82±0.669	0.64-1.00	11.44	0.003*
	B	55	1.09±0.776	0.88-1.30		
	C	55	1.29±0.712	1.10-1.48		

Group A received Yintang acupressure point, Group B received Hegu acupressure point, Group C received placebo acupressure point, The statistical test used: Kruskal-Wallis test, Level of significance: *p≤0.05 is considered statistically significant

Table 4: Pairwise comparisons of group

Pairwise Comparisons	*Z*-value	p-value
Group A-B	-1.963	0.149
Group A-C	-3.367	0.002*
Group B-C	-1.404	0.481

Group A received Yintang acupressure point, Group B received Hegu acupressure point, Group C received placebo acupressure point, The statistical test used: Mann whitney U test, Level of significance: *p≤0.05 is considered statistically significant

Table 5: Intragroup comparisons of groups, pre and post intervention

Timeline	*Z*-value	95% confidence interval		Statistics
		Lower bound	Upper bound	p-value
Group A				
Pre-post	-3.157	0.062	0.072	0.002*
Group B				
PRE-post	-1.924	0.062	0.072	0.054
Group C				
Pre-post	-1.342	0.062	0.072	0.180

Group A received Yintang acupressure point, Group B received Hegu acupressure point, Group C received placebo acupressure point, The statistical test used: Wilcoxon sign rank test, Level of significance: *p≤0.05 is considered statistically significant and **p≤0.001 Highly significant

The mean age of the children involving all three groups was 11.09±1.87 years. Of the total sample of 165, the ratio of girls (34.55%) was less than boys (65.45%) in the groups (Fig. 4).

DISCUSSIONS

A severe gag reflex serves as a barrier to performing dental procedures. Even minor dental procedures such as impression making of the maxillary arch results in increased stress and anxiety, notably in pediatric patients and can cause excessive salivation, lacrimation or even vomiting[7].

The etiology of gagging remains complex, it may be somatic, psychogenic or both. At times it may be due to elevated sensitivity to taste or smell and may be generated without contact with the oral cavity. Evidence reports that up to 87% of dentists come across patients with gag at least once a month and the rate of prevalence of gagging is reported to be 28.47% among children[8].

Considerable research on management of gag reflex has been done and many researchers believe that behaviour management techniques by the means of distraction or desensitisation reduces the incidence of gag. Alternative therapies are used around the world for the management of gag, Acupressure is one such therapy that involves utilisation of steady pressure using circulatory motion on an acupoint for two minutes. This constant pressure stimulates

Fig. 3: Placebo

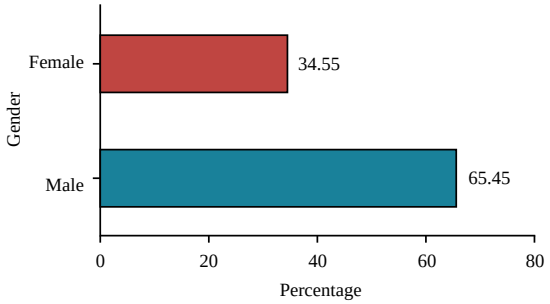

Fig. 4: Characteristics of study population

afferent Type 1 and Type 2 nerves and causes release of Endorphins that has anti-emetic properties therefore, when acupoints are pressed, serotonin pathway is activated, releasing 5-HT which suppresses gag reflex[9].

The impact of acupressure on two acupoints to alter gag reflex in children was investigated in this research. The two acupoints chosen were Yintang and Hegu point. A third point (PC-3) was also included as a placebo to eliminate bias and for blinding of the subjects. There are several researches that have compares the efficacy of CV-24, P-6, Yintang and Hegu point but there is no study that has compared the efficacy of points considered in this study together[10-12].

The current study has described acupressure at point Yintang and Hegu as effective in altering gag reflex in children of age 8-14 years, this is in accordance with a study conducted by

Katsouda *et al*.[13] and Agrawal *et al*.[14], who reported that point Hegu is successful in regulating gag reflex.

In our study, group A i.e., Yintang point was more effective in altering gag reflex as compared to the other two groups. This is in accordance with a case report by Saravanan, who reported successful management of gag reflex via stimulation of Yintang point. In the current study, the altered gag response is presumed to have resulted from the calming effects of acupressure.

There are varying reasons why acupressure was selected over acupuncture. There is a need to give some information regarding the safety of acupuncturing; incorrect insertion of needle, risk of cross infection and injury to tissues. According to a meta-analysis between acupuncture, acupressure, laser acupuncture and electrical stimulation in controlling post-operative vomiting in children and reported acupressure to be equally effective.

CONCLUSION

The current study has reported that Hegu point and Yintang point are effective in altering gag reflex in children aged 8-14 years and Yintang point is more effective than Hegu point.

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