COMPARATIVE EVALUATION OF MICROCURRENT ELECTRICAL STIMULATION ON ACUPOINTS TO CONTROL GAG REFLEX IN COMPLETELY EDENTULOUS PATIENTS.

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ABSTRACT

Aim: Assess microcurrent stimulation at auricular and Hegu points for gag reflex control.

Method: Thirty patients were randomized into CV24, PC6, and placebo (LI10) groups; electroacupuncture was applied for 1 minute, and gag indices recorded.

Results: CV24 and PC6 significantly reduced gag reflex; LI10 was ineffective.

Conclusion: Microcurrent stimulation aids gag reflex control, with Hegu (PC6) more effective than auricular points.

INTRODUCTION

The gag reflex protects the airway but can complicate dental procedures like impressions and denture insertion. It may arise from somatic triggers in the oropharynx or psychological factors such as sight, smell, or anticipation, leading some patients to avoid treatment and worsen oral health. Management includes relaxation, distraction, pharmacological, and psychological methods, while severe cases need additional measures. Complementary approaches like acupuncture and acupressure are also used. Based on traditional Chinese medicine, stimulating specific meridian points via electroacupuncture can reduce gag reflex by inhibiting muscle contraction, improving patient comfort and easing dental procedures without replacing conventional care.

METHODOLOGY

This cross-sectional study included 45 completely edentulous patients (50–70 years) from a prosthodontics department. After consent, patients were randomly divided into three groups: CV24, PC6, and placebo (LI10), with 15 subjects each. Microcurrent stimulation using a meridian acupuncture pen was applied to CV24 and PC6 for 1 minute, while LI10 served as a blinded placebo. Gag reflex was assessed using the Gag Severity Index (empty tray) before treatment and the Gag Prevention Index (loaded tray) after treatment. A single blinded observer recorded responses, and impressions were made post-stimulation to evaluate effectiveness.

STATISTICAL ANALYSIS

Statistical analysis is done using SPSS (version 20). Descriptive statistics included mean, standard deviation (SD), and standard error of the mean. To compare the effectiveness of the interventions, a one-way ANOVA was performed to assay differences in GPI scores among the groups. Since ANOVA revealed a statistically significant difference, the Bonferroni multiple comparison test was applied as a post hoc test to assess pairwise differences between groups while controlling for Type I error.

RESULTS

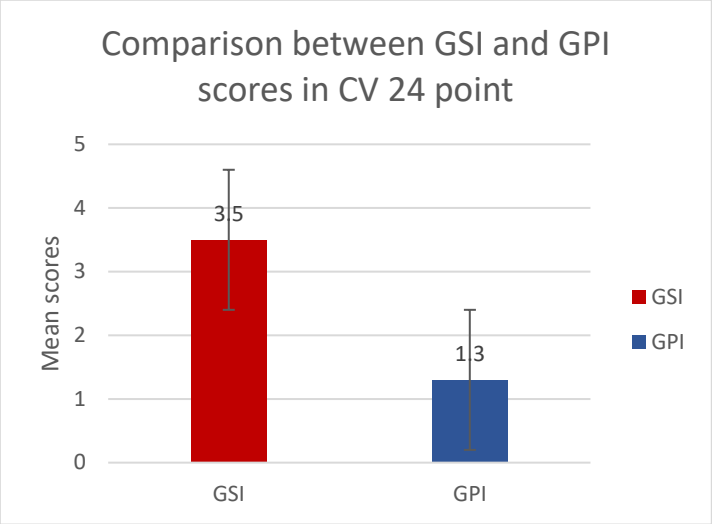
TABLE 3

GROUPING	SAMPLE NO.	GSI (EMPTY TRAY)					GPI (LOADED TRAY)				
		I	II	III	IV	V	I	II	III	IV	V
CONCEPTION VESSEL (CV 24)	P_{CV1}					5		2			
	P_{CV2}				4			2			
	P_{CV3}			3			1				
	P_{CV4}			3			1				
	P_{CV5}					5		2			
	P_{CV6}				4			2			
	P_{CV7}				4		1				
	P_{CV8}				4			2			
	P_{CV9}			3			1				
	P_{CV10}			3			1				
	P_{CV11}			3			1				
	P_{CV12}				4		1				
	P_{CV13}				4			2			
	P_{CV14}			3			1				
	P_{CV15}			3			1				
	P_{PC1}				4		1				
	P_{PC2}				4			2			

PERICARDIUM (PC 6)	**P_{PC3}**			3			1				
	P_{PC4}			3			1				
	P_{PC5}					5		2			
	P_{PC6}					5		2			
	P_{PC7}			3			1				
	P_{PC8}				4		1				
	P_{PC9}					5		2			
	P_{PC10}					5		2			
	P_{PC11}				4		1				
	P_{PC12}			3			1				
	P_{PC13}					5		2			
	P_{PC14}				4		1				
	P_{PC15}			3			1				
SHOU SAN LI (PLACEBO)	**P_{LI1}**			3					3		
	P_{LI2}			3					3		
	P_{LI3}				4					4	
	P_{LI4}					5				4	
	P_{LI5}					5				4	
	P_{LI6}				4					4	
	P_{LI7}				4					4	
	P_{LI8}			3					3		
	P_{LI9}				4				3		
	P_{LI10}			3					3		
	P_{LI11}				4				3		
	P_{LI12}				4					4	
	P_{LI13}					5				4	
	P_{LI14}			3					3		
	P_{LI15}			3					3		

Parameter	Mean	n	SD	SEM	t
GSI	3.50	15	0.65	0.17	12.45
GPI	1.30	15	0.48	0.12	P=0.0001 (S)

TABLE 4: Gagging Severity Index and Gagging Preventive Index (CV 24)

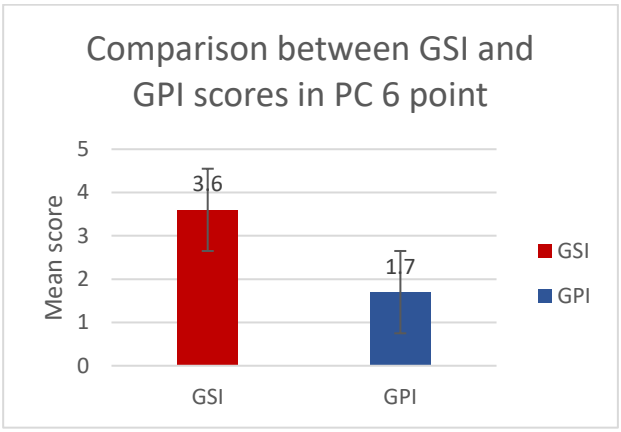


GRAPH 1: GSI AND GPI SCORES FOR CV 24

Table 4 and Graph 1 presents the results of the **Gagging Severity Index (GSI) and Gagging Preventive Index (GPI)** for the **CV 24** acupuncture point.

Parameter	Mean	n	SD	SEM	t
GSI	3.60	15	0.62	0.16	11.32
GPI	1.70	15	0.50	0.13	P=0.0001 (S)

TABLE 5: Gagging Severity Index and Gagging Preventive Index (PC 6)

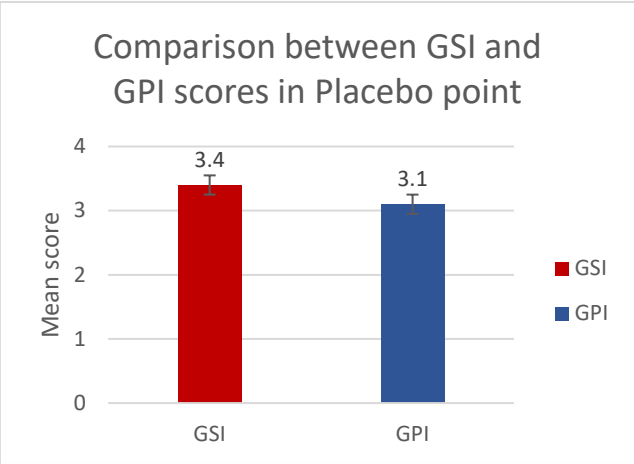


GRAPH 2: GSI AND GPI SCORES FOR PC 6

Table 5 and Graph 2 presents the findings for the **Pericardium (PC 6) acupuncture point**, evaluating its effect on gag reflex control. The **Gagging Severity Index (GSI)** had a **mean score of 3.60** with a **standard deviation of 0.62**, indicating a moderate level of gagging with an empty tray.

Parameter	Mean	n	SD	SEM	t
GSI	3.40	15	0.55	0.14	1.80
GPI	1.10	15	0.60	0.15	P=0.0001 (S)

TABLE 6: Gagging Severity Index and Gagging Preventive Index (Placebo point

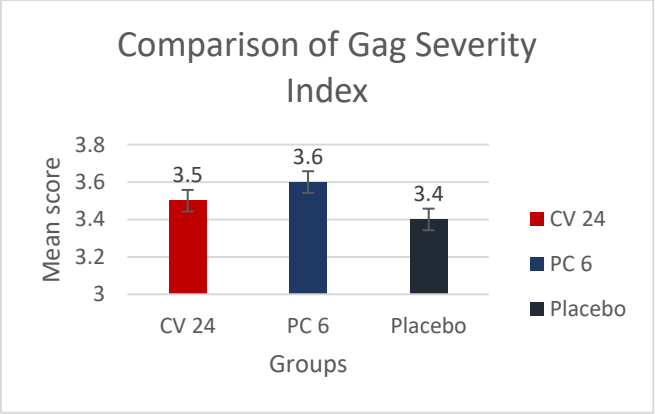


GRAPH 3: GSI AND GPI SCORES FOR PLACEBO GROUP

Table 6 and Graph 3 presents the **Gagging Severity Index (GSI) and Gagging Preventive Index (GPI) for the placebo group (Shou San Li)**.

Group	Mean	n	SD	SEM	95% CI (lower)	F-value	P-value
CV 24	3.50	15	0.65	0.17	3.86		
PC 6	3.60	15	0.62	0.16	3.94	0.77	0.468
PLACEBO	3.40	15	0.55	0.14	3.71		

TABLE 7: GSI SCORES COMPARISON BETWEEN GROUPS

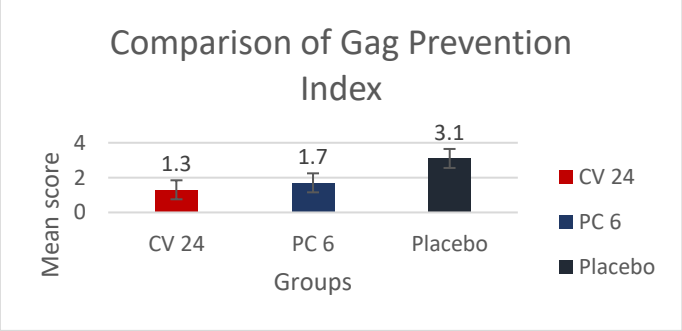


GRAPH 4: GSI SCORES COMPARISON BETWEEN GROUPS

Table 7 and Graph 4 represents the comparison of **Gagging Severity Index (GSI) scores** among the three groups—**CV 24, PC 6, and placebo**—revealed no statistically significant difference, as indicated by the **F-value of 0.77** and a **P-value of 0.468**. The mean GSI scores were **3.50 (SD = 0.65) for CV 24**, **3.60 (SD = 0.62) for PC 6**, and **3.40 (SD = 0.55) for the placebo group**, with overlapping **95% confidence intervals**. The bar chart illustrates these findings, showing similar gagging severity across all groups, including the placebo, suggesting that neither acupuncture point had a significantly greater effect in reducing gag severity compared to the control

Group	Mean GPI score	n	SD	P-value	Statistical Significance
CV 24	1.30	15	0.48	0.0001	Significant (S)
PC 6	1.70	15	0.50	0.0001	Significant (S)
PLACEBO	3.10	15	0.60	0.10	Not Significant (NS)

TABLE 8: GPI SCORES COMPARISON BETWEEN GROUPS



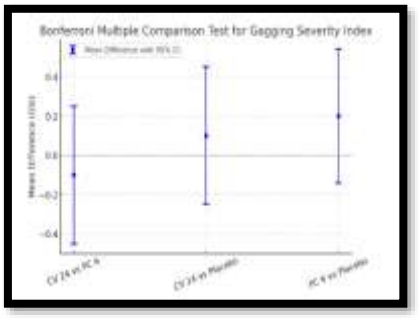
GRAPH 5: GPI SCORES COMPARISON BETWEEN GROUPS

Table 8 and Graph 5 represents **Lowest GPI Score in CV 24 Group:** The CV 24 group had the **lowest mean GPI score (1.30)**, indicating **the highest effectiveness** in preventing the gag reflex. The statistically significant P-value (0.0001) confirms the **strong effect** of acupuncture at CV 24 in reducing gagging. **Moderate GPI Score in PC 6 Group:** The **PC 6 group had a higher GPI score (1.70) compared to CV 24**, showing that it was **less effective** in preventing gagging but still significantly better than the placebo group. The P-value (0.0001) indicates a **statistically significant improvement** in Gag prevention. **Highest GPI Score in Placebo Group:** The placebo group had the **highest mean GPI score (3.10)**,

meaning the least effective gag prevention. The P-value (0.10) is **not statistically significant**, confirming that any reduction in gagging was likely due to chance rather than intervention. **CV 24 is the most effective acupuncture point** for reducing the gag reflex, as indicated by its lowest GPI score. **PC 6 also provides significant relief**, though slightly less than CV 24. **The placebo group showed no significant effect**, reinforcing that acupuncture at CV 24 and PC 6 plays a crucial role in gag reflex prevention.

Group Comparison	Mean Difference (I-J)	SE	P-Value	95% CI Lower	95% CI Upper
CV 24 vs. PC 6	-0.10	0.08	>0.05 (NS)	-0.45	0.25
CV 24 vs. Placebo	0.10	0.09	>0.05 (NS)	-0.25	0.45
PC 6 vs. Placebo	0.20	0.09	>0.05 (NS)	-0.14	0.54

TABLE 9: GSI DIFFERENCE BETWEEN THREE GROUPS



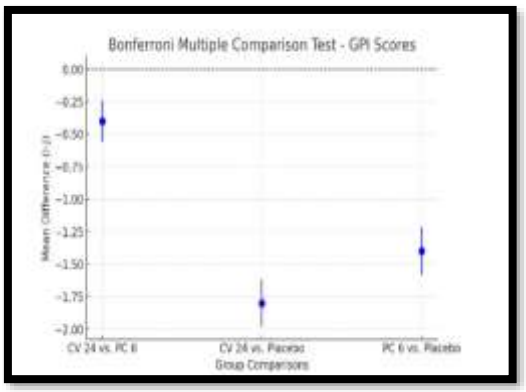
GRAPH 6: GSI DIFFERENCE BETWEEN THREE GROUPS

Table 9 and Graph 6 represents the Bonferroni multiple comparison test for the **Gagging Severity Index (GSI)** showed no statistically significant differences between the three groups (CV 24, PC 6, and the placebo group). The mean differences between CV 24 and PC 6 (-0.10), CV 24 and placebo (0.10), and PC 6 and placebo (0.20) were all small, with **P-values greater than 0.05**, indicating no significant reduction in gag severity between these groups after adjusting for multiple comparisons. Additionally, the **95% confidence intervals (CI)** for all comparisons included zero, further confirming the lack of statistical significance. This suggests that while acupuncture points CV 24 and PC 6 may reduce gag

severity, the differences between them and the placebo group were not strong enough to be considered significant under the Bonferroni adjustment.

Group Comparison	Mean Difference (I-J)	SE	P-Value	95% Cl Lower	95% Cl Upper
CV 24 vs. PC 6	-0.40	0.08	0.000	-0.56	-0.24
CV 24 vs. Placebo	-1.80	0.09	0.000	-1.98	-1.62
PC 6 vs. Placebo	-1.40	0.09	0.000	-1.58	-1.22

TABLE 10: GPI DIFFERENCE BETWEEN THREE GROUPS

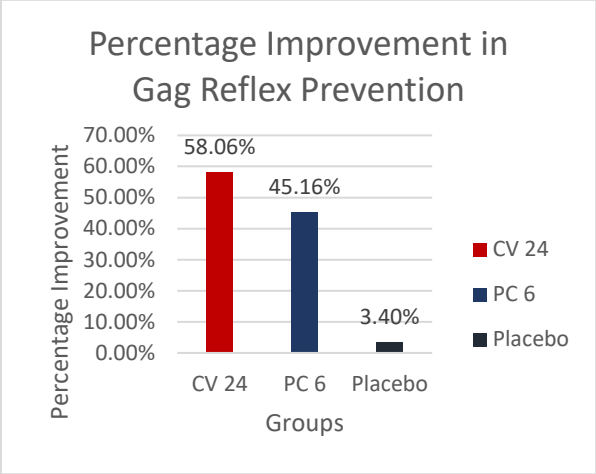


GRAPH 7: GPI DIFFERENCE BETWEEN THREE GROUPS

Table 10 and Graph 7 represents the **Bonferroni multiple comparison test** was conducted to compare the **Gagging Preventive Index (GPI) scores** among the three groups (**CV 24, PC 6, and Placebo**.

Group	Percentage Improvement
CV 24	58.06%
PC 6	45.16%
Placebo	3.4%

TABLE 11: PERCENTAGE IMPROVEMENT IN GAG REFLEX



GRAPH 8: PERCENTAGE IMPROVEMENT IN GAG REFLEX

Table 11 and Graph 8 represents the percentage improvement in gag reflex prevention was highest for **CV 24 (58.06%)**, followed by **PC 6 (45.16%)**, while the **placebo showed minimal improvement (3.4%)**.

DISCUSSION

Acupuncture is an effective adjunct in managing gag reflex, triggered by stimulation of oropharyngeal regions. It activates neural pathways involving the midbrain and hypothalamus, releasing neurotransmitters like serotonin and endorphins that suppress gag response. Points such as CV24 and PC6 stimulate anti-emetic pathways. Previous studies support the role of Hegu (LI4) and auricular points in gag control. Microcurrent electrical stimulation, a form of electroacupuncture, enhances efficacy and is more effective than manual methods.

In this study, CV24 and PC6 significantly reduced gag reflex, while placebo (LI10) showed no effect. The method was non-invasive, painless, and suitable for routine clinical use.

CLINICAL RELEVANCE

Acupuncture has been significantly used during dental treatment in different parts of the world. There have been randomized controlled trials on the analgesic effect of acupuncture for postoperative pain from various dental procedures which include extractions, pulp devitalization, and acute apical periodontitis. Thus, showed that standard acupuncture was more effective than a placebo or sham acupuncture and was concluded that acupuncture will be considered an alternative to current dental practice as an analgesic. Its use in treatment of temporomandibular joint dysfunction was also supported in these studies.

Conclusion

- It's recommended that microcurrent electrical stimulation is a useful

technique in managing unfavorable gag reflex during impression making procedures.

- The effectiveness of microcurrent electrical stimulation at Conception vessel 24 and point Pericardium 6 in reducing the severity of gag reflex has been demonstrated in this study.
- The procedure is safe, rapid, low cost, and non-invasive.
- As a result, it's seen as one of the best methods reducing gag reflex in patients receiving the dental treatment.

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