

Effect of Vestibular Stimulation on Depression, Anxiety, Stress in Gastric Ulcer Patients

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ABSTRACT

Aim: The present study was undertaken to assess the effectiveness of vestibular stimulation in the management of stress in gastric ulcers patients.

Materials and Methods: This was a longitudinal follow-up study in which participants were assessed for stress parameters for 3 times. Before the intervention and after 3 months and 6 months of the intervention. 12 females of gastric ulcers were recruited for the study after written informed consent by convenient sampling. Permission obtained from the Institutional Ethics Committee of Sattva Cultural Space and Research Centre, Angamaly. Six months of vestibular stimulation was given. Data analysis was done using SPSS version 20.0. All the data were expressed as mean \pm standard deviation. The pre and post data were analyzed using paired *t*-test. $P < 0.05$ was considered significant.

Results: Depression, anxiety, and stress levels are significantly decreased after 3 months of vestibular stimulation ($P < 0.05$) when compared with baseline values. Scores further decreased after 6 months of intervention ($P < 0.05$) which indicates long-term intervention is beneficial.

Conclusion: Our study results preliminary support the hypothesis that vestibular stimulation may be effective natural supplementary therapy in the management of gastric ulcers. Hence, we recommend further detailed studies in this area with higher sample size to understand the underlying mechanisms and to recommend vestibular stimulation in the treatment of gastric pathology.

KEY WORDS: Gastric ulcer, natural treatment, stress, vestibular stimulation.

Introduction

A peptic ulcer is a break in the continuity of mucosa of esophagus, stomach, duodenum, or any other part of the gastrointestinal tract which comes into contact with gastric juice. Its incidence is about 10% and most common in the age group of 40-60 years. It is comparatively more common in males than females. Gastric ulcers are due to the break in the mucosal barrier found at the junction of fundus and pylorus. Common symptoms experienced by the patients are

a pain, nausea, vomiting, hemorrhage, perforation, pyloric obstruction, and discomfort.^[1] Stress-induced ulcers are multiple, superficial erosions or ulcerative lesions of the stomach, and duodenum that occurs in temporal relationship with, and in response to, stressful physical or mental situations in adults and children.^[2,3] Stress influence irritates regio hypothalamica not only in its anterior but also in its posterior part with the excitement of the vagal nerve or the anterior lobe of the hypophysis, respectively (adrenocorticotrophic hormone-release with following the release of cortisol). Irritation of the sympathetic nerve and diminution of the circulating plasma volume are additional sides of the pathophysiological course. Sequels of this are: Reduction of blood flow through the gastric mucosa, decrease of the protective ability of the mucus, secretion excess of gastric juice and reflux of bile into the stomach causes breakdown of the mucosa barrier

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with releasing of histamine in the mucosa, to peptic, destruction of the gastric walls damaged regions and thus to the development of erosions and acute ulcers (acute gastric mucosal lesions). Stress-induced ulcers cannot be differentiated from those lesions of the mucosa which are induced by medicaments.^[4] The stress-induced peptic ulcer manifests itself in hematemesis, melena, blood in the stools and in perforation. The latter is often unrecognized because of its asymptomatic and frequently un-dramatic course. Two-thirds of the lesions are in the stomach, predominantly in the form of multiple hemorrhagic erosions; on-third of the cases are located in the duodenum, almost exclusively in the form of an acute ulceration; bleeding, due to arrosion, occurs in a high percentage of these cases.^[2]

The vestibular system is one of the first sensory-system that starts functioning in the course of early development, and optimal vestibular stimulation is beneficial.^[5,6] It was reported that vestibular stimulation inhibits the stress axis and decrease the cortisol levels and also reduce the gastric secretion.^[7-9] Hence, vestibular stimulation has dual benefits in the management of gastric ulcer and can be considered as a natural therapy for gastric disorders. The present study was undertaken to assess the effectiveness of vestibular stimulation in the management of stress in gastric ulcers patients.

Materials and Methods

Study design

This was a longitudinal follow-up study in which participants were assessed for stress parameters for 3 times. Before the intervention and after 3 months and 6 months of the intervention.

Participants

12 females of gastric ulcers were recruited for the study after written informed consent by convenient sampling. Permission obtained from the Institutional Ethics Committee of Sattva Cultural Space and Research Centre, Angamaly. Six months of vestibular stimulation was given for the participants, along with the antacids. The following criteria were followed while selecting the participants for the intervention group.

Laboratory setting

The present study was carried out at the Sattva Cultural Space and Research Centre, Angamaly, Kerala, India.

Vestibular stimulation

Vestibular stimulation was achieved by swinging on a swing, according to their comfort. (Back to front direction) as previously described.^[8,10]

Depression, anxiety, stress scale (DASS)

A previously validated and standardized survey instrument, DASS 42 was used to assess information on depression, anxiety, and stress.^[11,12]

Statistical analysis

Data analysis was done using SPSS version 20.0. All the data were expressed as mean \pm standard deviation. The pre and post data were analyzed using paired *t*-test. $P < 0.05$ was considered significant.

Results

Depression, anxiety, and stress levels are significantly decreased after 3 months of vestibular stimulation ($P < 0.05$) when compared with baseline values (Table 1). Scores further decreased after 6 months of intervention (Table 3) ($P < 0.05$) which indicates long-term intervention is beneficial (Tables 2 and 3).

Discussion

Gravity is the essential fact of life on earth; therefore, it is not strange that the vestibular system, which relates us to gravity, is very closely connected with the entire physiology of the body.^[5] Swinging is a natural method of stimulating vestibular system

Table 1: Depression, anxiety, stress scores in the participants before and after 3 months of intervention

Parameter	Before	After 3 months	<i>t</i> value	<i>P</i> value
Depression	26.33 \pm 3.98	19.83 \pm 3.43	4.2856	0.0003*
Anxiety	16.0 \pm 2.92	12.83 \pm 2.03	3.1700	0.0054*
Stress	24.50 \pm 6.93	18.0 \pm 5.84	2.4846	0.0211*

Values expressed are mean \pm SD. * $P < 0.05$ is significant. SD: Standard deviation

Table 2: Depression, anxiety, stress scores in the participants after 3 months and after 6 months of intervention

Parameter	After 3 months	After 6 months	<i>t</i> value	<i>P</i> value
Depression	19.83 \pm 3.43	16.25 \pm 4.86	2.0848	0.0489*
Anxiety	12.83 \pm 2.03	11.08 \pm 2.06	2.0961	0.0478*
Stress	18.0 \pm 5.84	14.50 \pm 3.55	1.7740	0.0899

Values expressed are mean \pm SD. * $P < 0.05$ is significant. SD: Standard deviation

Table 3: Depression, anxiety, stress scores in the participants before and after 6 months of intervention

Parameter	Before	After 6 months	t value	P value
Depression	26.33±3.98	16.25±4.86	5.5587	<0.0001*
Anxiety	16.0±2.92	11.08±2.06	4.7694	<0.0001*
Stress	24.50±6.93	14.50±3.55	4.4489	0.0002*

Values expressed are mean±SD. *P<0.05 is significant.
SD: Standard deviation

optimally. Swaying decreases salivary cortisol levels in African elephants.^[13] Vestibular stimulation is performed twice a day for 10 days using infant water bed in infants, decreased urinary cortisol levels significantly when compared with control group.^[14] The soothing effects produced by rocking and other forms of stimulation may be related to brainstem inhibitory mechanisms.^[6] Markia *et al.* reported that vestibular stimulation modulates hypothalamic-pituitary-adrenal (HPA) – axis.^[15] Vestibular stimulation inhibits HPA axis directly and through gamma-aminobutyric acid and through the hippocampal formation.^[16-20] Vestibule-sympathetic reflex plays a key in gravitational adaptation.^[21] It was reported that electrical or natural stimulation modulates blood pressure and respiratory motor output and maintains homeostasis.^[22,23] Biaggioni *et al.* reported that Vestibular stimulation has been consistently found to reduce blood pressure by reducing sympathetic activity.^[24] Vestibular stimulation activates lateral and ventrolateral subnuclei of the nucleus tractus solitarii (NTS), where the first synapse of the carotid sinus baroreflex is located. Activation of NTS inhibits rostral ventrolateral medulla, where sympathetic activity is thought to be mainly controlled.^[25,26] Further, it was reported that blood was lowered followed by caloric and rotational vestibular stimulation, and this effect was abolished on the vestibular lesion.^[27,28] The relation between mental stress and gastric acid secretion is not clear. It was reported that there is a great individual variability in gastric acid response to acute mental stress.^[29] Vestibular stimulation given to nodular cerebellar lesioned animal decreased volume and acidity of gastric juice but increased enterochromaffin-like cell count.^[9] Our study results support earlier studies as we have observed a decrease in the depression, anxiety, and stress scores followed by vestibular stimulation. We have observed further decrease the stress levels followed by long-term intervention.

Limitations

A major limitation in our study was less sample size.

Conclusion

Our study results preliminary support the hypothesis that vestibular stimulation may be effective natural supplementary therapy in the management of gastric ulcers. Hence, we recommend further detailed studies in this area with higher sample size to understand the underlying mechanisms and to recommend vestibular stimulation in the treatment of gastric pathology.

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Financial Support: None; **Conflict of Interest:** None

How to cite this article: Rajan S, Archana R, Sailesh KS, Mishra S, Vijay A, Reddy BUK, Mukkadan JK, Antony NJ. Effect of vestibular stimulation on depression, anxiety, stress in gastric ulcer patient. *J Med Sci Health* 2016;2(1):30-33.

Date of submission: 06-12-2015
Date of peer review: 21-12-2015
Date of acceptance: 13-01-2015
Date of publication: 15-02-2016

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