



STUDY OF VALSALVA RATIO IN GENERALISED ANXIETY DISORDER (GAD)

Jai Kumar*	Associate Professor, Department of Physiology, VCSG Government Institute of Medical Sciences & Research, Srinagar, Garhwal, Uttarakhand – 246174. *Corresponding Author
Deepti Aggarwal	Senior Resident, Department of Physiology, Maharaja Agrasen Medical College, Agroha(Hisar) Haryana – 125047.
Rajiv Gupta	Senior Professor & Head, Department of Psychiatry, PGIMS, Pt. B. D. Sharma University of Health Sciences, Rohtak, Haryana – 124001
Vimal Singh Gusain	Professor & Head, Department of Physiology, VCSG Government Institute of Medical Sciences & Research, Srinagar (Garhwal), Uttarakhand – 246174

ABSTRACT

Introduction: Generalised anxiety disorder(GAD) is know to imbalance the sympathetic and parasympathetic branches of autonomic nervous system. Valsalva Ratio (VR) is the ratio of heart rate phase IV and phase II of valsalva manoeuvre. Valsalva ratio is a tool to study the balance between sympathetic and parasympathetic branch of autonomic nervous system.

Material and Method: Present study was conducted on 60 GAD patients & 60 age and sex matched normal subjects.

Conclusion: Valsalva ratio was found to be higher among female GAD patients in comparison to male patients. We conclude that effect of generalised anxiety disorder on autonomic nervous system is more pronounced among female compared to male GAD patients.

KEYWORDS : Generalised Anxiety Disorder (GAD), Valsalva Ratio (VR), Autonomic Function Test

INTRODUCTION:

Cardiac automaticity is intrinsic to various pacemaker tissues but heart rate and rhythm is mainly under the control of autonomic nervous system. During resting conditions, vagal tone is the main regulator of variations in heart rate. The activity and relative balance between sympathetic and parasympathetic nervous system is regulated by afferent input directed primarily to the brain¹⁻³. Effects of stimulation of baroreceptors results in vasodilatation and decrease in heart rate thus decreases blood pressure by reducing peripheral resistance as well as cardiac output^{2,4}. Impaired autonomic functions may result from diseases that affect either the CNS or peripheral autonomic nervous system. Various chronic disorders also have their effects on autonomic nervous system. Several studies have documented increased incidence of morbidity and mortality in patients suffering from various chronic disorders with autonomic irregularity^{5,6}.

Generalised Anxiety Disorder (GAD) is an anxiety disorder that is characterized by excessive, uncontrollable and often irrational worry about everyday things that is disproportionate to the actual source of worry⁷. Major depressive disorder (MDD) and generalised anxiety disorder (GAD) are highly morbid psychiatric disorders⁸. Few studies have found GAD as a risk factor, although two population studies claim no significant association of GAD with mortality⁹⁻¹¹. Anxiety has also been linked up with some chronic diseases like diabetes, hypertension and hypercholesterolemia. Possible mechanisms for the association of anxiety with CVD include changes in autonomic tone manifested as decreased vagal and increased sympathetic tone¹². Increased incidence of sudden cardiac death in population exposed to traumatic events has been implicated to increased sympathetic nervous system activity^{13,14}.

Valsalva Ratio (VR):Valsalva manoeuvre (VM) is a noninvasive autonomic function test. During VM, there is an abrupt, transient, voluntary elevation of intrathoracic and intra-abdominal pressure caused by blowing against a pneumatic resistance maintaining a predetermined

pressure¹⁵. Changes occurring in blood pressure and heart rate during and after the procedure reflect not only the mechanical effects on the heart and blood vessels (phase I, early phase II and phase III), but also ongoing reflex changes in autonomic activity (late phase II and phase IV). VR is the ratio of heart rate phase IV and phase II, and is a measure of vagal function. Normal valsalva ratio is >0.05 . In autonomic neuropathy, valsalva ratio is < 0.05 ¹⁶⁻¹⁸. The normal response is increased heart rate during phase II in response to the fall in blood pressure, and the baroreflex response to the blood pressure overshoot in phase IV is transient bradycardia. Phase II can be divided into two phases: early and late phases. In early phase II, reduced preload and stroke volume lead to a fall in cardiac output despite the tachycardia caused by decreased vagal activity. Total peripheral resistance increases due to the increased sympathetic discharge. The fall in blood pressure is arrested and is termed as "Late Phase II"; in normal subjects there is actually a rise in blood pressure just before release¹⁹.

Due to many confusing studies, few showing increased stimulation of sympathetic branch of autonomic tree whereas few other showing negligible or no effect, we planned this study to observe the effect of generalised anxiety disorder on autonomic system through valsalva ratio.

MATERIAL AND METHODS:

The present study was conducted in Department of Physiology in collaboration with Department of Psychiatry, Pt. B. D. Sharma University of Health Sciences, Rohtak. The study was carried out on 60 patients of Generalised Anxiety Disorder (GAD) of 18-45 years of age of either sex. The normal age and sex matched subjects were selected from our staff members, medical students and healthy attendants accompanying the patients to the institute. The subjects and patients were divided into the following two groups:

GROUP I (60 in number) included normal healthy subjects. This group was further divided into two subgroups based on gender (30 each):

- GROUP I_A- 30 male healthy subjects.
- GROUP I_B- 30 female healthy subjects.

GROUP II (60 in number) included GAD patients diagnosed as per ICD-10 guidelines with Hamilton Anxiety Scale score of 28 (i.e. moderate anxiety), further divided into two subgroups based on gender (30 each):

- GROUP II_A- 30 male GAD patients.
- GROUP II_B- 30 female GAD patients.

Recording was done by digitalised polygraph (POLYRITE D system). Consent was taken from every individual to undergo the whole procedure.

Valsalva manoeuvre – A sphygmomanometer, connected with mouthpiece, was used. The length of rubber tubing connecting sphygmomanometer to mouthpiece was appropriate enough (35 cm) to keep an eye on the meter reading, while blowing through it. Subjects were trained to blow properly before performing the test.

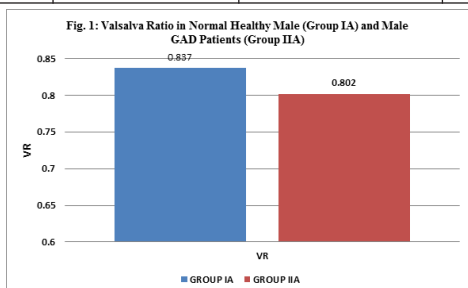
The subjects were informed about the whole procedure in detail in their own language to allay any fear or apprehension. Consent was taken from every individual to undergo the whole procedure. All the experiments were conducted in a particular time period (from 10 AM to 1 PM) to avoid the diurnal variations. All the subject were asked to lie down in supine position on wooden tilt table. Three disposable pre-gelled electrodes were attached to the left arm, right arm and left leg for ECG. Then for valsalva manoeuvre, the subjects were asked to blow into a mouthpiece connected to a sphygmomanometer so that a pressure of 40 mmHg was maintained for about 15 seconds. It was carefully supervised to make sure that glottis remained close during the procedure and the subject was not merely blowing with his/her cheeks. The ECG was recorded during this manoeuvre and recording was continued for 5 minutes more (post VM recording). For interpretation of the results the data set of each group was analysed statistically by unpaired student t test.

RESULT:

Results observed are compared in tabular form as well as figures.

Table I: Comparison of Valsalva Ratio in Normal Healthy Male (Group IA) and Male GAD Patients (Group IIA)

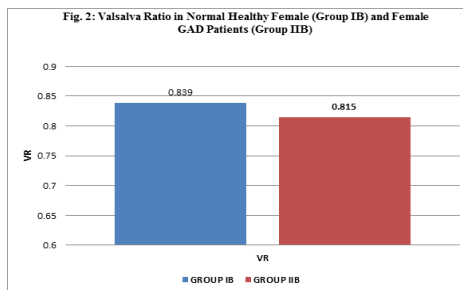
Parameter	GROUP IA (MEAN ± SD)	GROUP IIA (MEAN ± SD)	P VALUE
VR	0.837 ± 0.080	0.802 ± 0.084	0.099



Results in table I & fig.1 shows decreased VR in male GAD patients (Group IIA) as compared to the normal male controls (Group IA) though the difference is statistically non significant.

Table II: Comparison of Valsalva Ratio in Normal Healthy Female (Group IB) and Female GAD Patients (Group IIB)

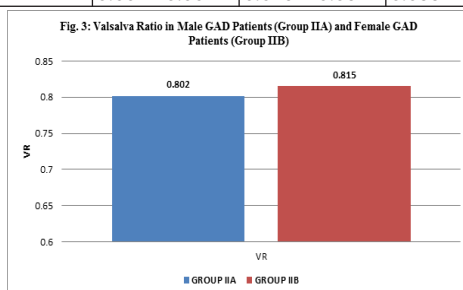
Parameter	GROUP IB (MEAN ± SD)	GROUP IIB (MEAN ± SD)	PVALUE
VR	0.839 ± 0.073	0.815 ± 0.054	0.099



Results in table II & fig.2 shows reduced VR in female GAD patients (Group IIB) as compared to the normal female controls (Group IB) though the difference is statistically non significant.

Table III: Comparison of Valsalva Ratio in Male GAD Patients (Group IIA) and Female GAD Patients (Group IIB)

Parameter	GROUP IIA (MEAN ± SD)	GROUP IIB (MEAN ± SD)	PVALUE
VR	0.802 ± 0.084	0.815 ± 0.054	0.099



Results in table III & fig.3 shows increased VR in female GAD patients (Group IIB) as compared to the male GAD patients (Group IIA) though the difference is statistically non significant.

DISCUSSION:

Valsalva ratio is a tool to study the balance between sympathetic and parasympathetic branch of autonomic nervous system. Valsalva Manoeuvre (VM) is an autonomic function test mainly to assess parasympathetic activity. During VM, normally there is an increase in parasympathetic activity, a baroreceptor response to blood pressure changes resulting from changes in intrathoracic pressure, which is indicated by valsalva ratio. Valsalva ratio (VR) is the ratio of longest RR interval to shortest RR interval during VM. Normal value of VR is 0.05. In the present study, VR is decreased in GAD patients Group II (A&B) as compared to respective normal controls but the difference is nonsignificant (Tables I & II). While comparison among Group IIA and Group IIB, VR is higher in Group IIB (female GAD) as compared to Group IIA (male GAD) although difference is nonsignificant. Higher valsalva ratio among female GAD patients compared to male GAD patients suggest more sympathetic stimulation.

CONCLUSION:

We conclude that effect of generalised anxiety disorder on autonomic nervous system is more pronounced among female in comparison to male patients. But to come to the final conclusion we need further studies to be done among large number of patients.

Ethical Clearance:

Taken from PGIMS, Rohtak Institute Ethical Committee (IEC)

Source of Funding: Self

Conflict of Interest: Nil

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