



Full Length Research Article

VARIATION OF AUTONOMIC FUNCTION TESTS IN YOUNG HEALTHY MALES & FEMALES

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ABSTRACT

There is much clinical evidence to suggest that the activity of autonomic nervous system varies with gender. The present study was initiated and an attempt was made to bring out the association of autonomic functions with gender. Our cardiovascular system is governed by autonomic nervous system. Since women have a lower cardiovascular risk, this study is aimed to find out gender differences in the autonomic modulation. The study was carried out for 100 people (50 males and 50 females) in the age group of 17 – 25 years. Autonomic function tests are broadly divided into sympathetic and parasympathetic nervous tests. Various autonomic function tests Valsalva ratio and Handgrip test were carried out for sympathetic and parasympathetic nervous system. The tests showed more parasympathetic activity in males and more sympathetic activity in females.

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INTRODUCTION

The Autonomic Nervous System is a part of the peripheral nervous system and it controls many organs and muscles within the body cavity. The autonomic nervous system through its sympathetic and parasympathetic divisions regulates and modulates most of the cardiovascular functions. The autonomic nervous system is the primary system for regulating heart rate in normal persons. The cardiovascular responses of blood pressure, cardiac output, heart rate and other variables to change in posture differ between the sexes. The differences are related to greater decrease of thoracic blood volume with standing in women than the men. The overall complexity of heart rate dynamics is higher in women than men. A few reports on gender-related differences in cardiac autonomic modulation reveal that, in normal Population, parasympathetic tone dominates over sympathetic in women and vice versa in men (Moodithaya and Avadhany 2012). Gender differences in the autonomic nervous system may be present because of developmental variations or due to the effect of varied concentrations of male and/or female sex hormones (Dart et al., 2008) Coronary Heart Diseases (CHDs) are major causes of mortality globally.

In Indian sub-continent, they cause more than 25% of all deaths annually. According to the “Global Burden of Diseases Study” in India, by the year 2020, projections for CHD mortality are 1.46 and 1.12 millions in men and women respectively (Gupta et al., 2008). Our cardiovascular system is governed by autonomic nervous system. Since women have a lower cardiovascular risk, this study is aimed to find out any gender differences in the autonomic modulation.

MATERIALS AND METHODS

A total of 100 healthy young adults (50 males and 50 females) were included in this study with age range from 18 to 26 years. The study was conducted in the Department of Physiology at Rohilkhand Medical College, Bareilly, UP, from 2012 to 2013. The approval of the Ethical Committee was obtained. The non smoker, non alcoholic, non diabetic, having normal pulse rate, blood pressure, normal heart sounds and having no evidence of illness and having perfect physical, mental and psychological well being were included in the study. A brief history was taken and general physical examination of all the volunteers was done with main emphasis on cardiovascular diseases, renal diseases. None of the subjects took any medication at the time of study. All the tests were carried out between 11 am to 4 pm. The procedure was explained and informed consent was obtained after the subjects had read a description of the experimental

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protocol, which was approved by the ethical committee of the college. The height, weight and blood pressure of the subject was measured with measuring tape, weighing machine and sphygmomanometer respectively. On auscultation, the heart sounds were found to be normal. The parasympathetic activity was assessed by heart rate response to Valsalva manoeuvre. Each subject was told to perform Valsalva manoeuvre for 15 seconds by blowing into a mouth piece attached to a sphygmomanometer and maintain a pressure of 40 mm Hg for 15sec. Three trials were performed at intervals of 5 minutes. A continuous ECG was recorded 1 minute before the maneuver (resting period), during maneuver (strain period, 15 seconds) and 60 seconds subsequently after the strain period. Valsalva ratio was taken as the maximum ratio of maximum R-R interval after the strain to that of shortest R-R interval during the strain.

Maximum R-R Interval after maneuver

Valsalva ratio (VR) = $\frac{\text{Maximum R-R Interval after maneuver}}{\text{Shortest R-R Interval during maneuver}}$

The sympathetic activity was assessed by blood pressure response to sustained hand grip. The subject was asked to sit comfortably in chair. Initially the subject was asked to exert maximal strength on hand grip dynamometer with right hand. First the maximum voluntary contraction (MVC) was determined and then the subject was asked to exert 30% of MVC for 5 minutes with right hand. Diastolic blood pressure was measured in left hand at rest and at 1 minute interval during handgrip. The maximum rise of diastolic pressure during 30% of MVC over the resting diastolic blood pressure was noted. The data was statistically analyzed using the SPSS software (version 12.0) and by applying Student's t-test.

RESULTS

Table no 1 shows that anthropometric parameters of males and females. There was no significant difference in age on two groups, but there is significance difference in height, weight, Systolic blood pressure, Diastolic blood pressure, Pulse Pressure, Mean Arterial Pressure in males was high compared to females.

Table.1 Anthropometric parameter of both genders

S.No	Parameters	Males (n=50)	Females (n=50)
		Mean \pm SD	Mean \pm SD
1	Age(Yrs)	20.24 \pm 2.01	19.12 \pm 2.04
2	Height (cm)	165.36 \pm 7.2	155.0 \pm 4.3
3	Weight (Kg)	65.1 \pm 6.1	55.8 \pm 6.00
4	Pulse/min	75.43 \pm 9.66	76.07 \pm 8.53
5	SBP(mmHg)	114.67 \pm 8.58	111.13 \pm 7.15
6	DBP(mmHg)	68.73 \pm 8.07	67.00 \pm 5.07
7	PP(mmHg)	46.30 \pm 5.70	44.34 \pm 4.40
8	MAP(mmHg)	85.10 \pm 7.8	81.0 \pm 5.81

The difference being statically insignificant. Table no 2 shows that Autonomic function parameter of Males and females. Significance difference could be established in Valsalva Ratio in males was significantly higher compare to females. SBP values were lower in females compare to males in Hand Grip

Test. The values of diastolic blood pressure slightly higher in females than males in Hand Grip Test.

Table. 2 Comparative studies of Autonomic function tests amongst the males and females

S.No	Parameters	Males (n=50)	Females (n=50)	P value
		Mean \pm SD	Mean \pm SD	
1	Valsalva Ratio (PS)	1.54 \pm 0.32	1.42 \pm 0.15	<0.002
	Hand Grip Test (Sympathetic)			
2	SBP(mmHg)	126.65 \pm 10.50	120.18 \pm 8.15	<0.005
	DBP(mmHg)	92.42 \pm 5.67	98.04 \pm 6.18	<0.02

DISCUSSION

The present cross sectional study was carried out in 50 Healthy males and 50 Healthy females. Evaluation of status of autonomic nervous system was done with the help of two non invasive tests like Valsalva maneuver and sustained hand grip. Work done over the past few years gives us an indication of effect of gender on the autonomic nervous system activity. The data on this aspect was lacking in this part of the country, so the present study was conducted to measure the autonomic nervous system activity in males and females. The results of the study by Joyce M. Evans showed that autonomic modulation was significantly different in men and women as revealed by the values of relevant indexes. (Antelmi *et al.*, 2004) Men had greater sympathetic activity whereas women had parasympathetic dominance. (Evans *et al.*, 2001). In our study Autonomic functions tests in males and females subjects are well balanced and individuals in both groups did not differ significantly in age (Tulppo *et al.*, 1998), weight and blood pressure (Serve *et al.*, 2001) Mehta Ahuja Veena and Ramesh Kumar Basal (1999) studied the gradual decline in parasympathetic activity with ageing and in the same sex. In sympathetic functions tests during the hand grip test, it was found that the statistical significance. The above results of low parasympathetic activity in females are consistent with the studies carried out in this field by Cowan *et al.* (1994), Ramaekers *et al.*, (1998) and Sinnreich *et al.*, (1998).

Conclusion

The above discussion it is concluded that on comparison of autonomic function tests in males and females, was found that the parasympathetic activity is lower in females as evident from Valsalva ratio, while sympathetic activity is higher in females.

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