

Influence Of Posture On Autonomic Nervous Dysfunction By Valsalva Maneuver (V.M) Responses In Middle Aged Subjects Having Hypertension And Diabetes Mellitus. Randomized Clinical Trail

Dr. Ganesh B.R.

Associat Professor
K.L.E. University Institute of Physiotherapy,
Belagavi, Karnataka, India

Abstract:

Purpose of study: To assess Autonomous Nervous System responses in the middle aged persons by using Valsalva Maneuver in different postures.

Material and methods: 67 subjects reporting to department of physiotherapy of K.L.E.S Hospital and MRC were evaluated after inform consent and they were subdivided into grouped into 4 groups (Group 1 control; Group 2 H.T. Group 3 D.M; and Group 4 H.T with D.M) by simple random sampling method taking into inclusion and exclusion criteria. Baseline data for study were noted with respect to DBP;P.R in 3 positions and body composition (fat and BMR). Then the participants were subjected to V.M test and DBP; P.R changes were noted.

Results: The DBP fall after VM test in all above 3 groups in different positions was not statistically significant; whereas combined group which showed a statistically significant DBP fall with 'P' value = <.001. The P.R increase after V.M in all above 3 groups in different positions was statistically significant with 'P' value = <.0001, except in the combined group which was not defined.

Conclusion: Taking in to account of fall of D.B.P and increase in P.R following post V.M in 3 different positions; it is concluded here that V.M test are simple, reliable and bedside clinical tests which can be used to assess the ANS dysfunction in subjects with Dm, HT and DM+HT.

Keywords: Valsalva maneuver (V.M); pulse rate (P.R); diastolic B.P (D.B.P); diabetes mellitus (D.M) and hypertension (H.T).

I. INTRODUCTION

Autonomic Nervous System (ANS) is an important involuntary nervous system which controls and integrates the unconscious regulatory functions of the body. The functioning of this system is dependent upon the situations and physical activities. It controls functions of the vital body organs. Any condition which directly affects this system, may be responsible for hyperfunction or dysfunction of this system.

Presently people with stress and strain of life are prone to hypertension as reported in various studies. Valsalva maneuver (VM) is a commonest test to artificially activate or inhibit this system functions. This maneuver is used to assess the integrity of autonomic cardiovascular control mechanism; consists of voluntary elevation of intra-thoracic and intra-abdominal pressure provoked by blowing against pneumatic pressure.¹ So it is intended to understand autonomic nervous

changes in middle aged persons by using V.M is 3 different positions i.e., supine; sitting and standing.

II. METHODOLOGY

SOURCE OF DATA

Data was collected from physiotherapy OPD of KLES Dr. Prabhakar Kore Hospital and MRC, during the study period of Oct 2000 to July 2001.

STUDY DESIGN

The study design used for this research was randomized clinical trial. For this R.C.T ethical clearance was obtained from the institutional ethical committee, JNMC, Belgaum before commencement of the study

STUDY SAMPLE

The study sample consisted of both male and female participants referred to the physiotherapy outpatient department There were 67 participants were included in the clinical trial.

INCLUSION CRITERIA

- ✓ Normal middle aged 40 to 65 subjects.
- ✓ Subjects with hypertension without any complications.
- ✓ Subjects with DM without other systemic manifestation.
- ✓ Subjects with H.T + D.M.

EXCLUSION CRITERIA

- ✓ Subjects with general debility, malignancy.
- ✓ Cardiac problem.
- ✓ PVD.
- ✓ Pulmonary complications.
- ✓ Recent surgery.
- ✓ Thrombotic or embolic history.

PROCEDURE

The demographic data of all the participants consisting name, age, sex, height, weight & BMI were collected. This study included 67 subjects divided in to 3 groups with 20 subjects in each group. Group 1 (control group) consisted of 20 subjects (i.e., male 10 subjects and female 10 subjects), the group 2 (hypertension group) consisted of 20 subjects (M=10, F=10); The group 3 (D.M. group) consisted of 20 subjects (M=10; F=10) while group 4 (combined group i.e. HT+DM) consisted of HT + DM with 7 males subjects only.

The materials used in study were:

- ✓ A standard mercury sphygmomanometer.
- ✓ A single tube stethoscope of Litman Company.
- ✓ Body fat analyzes manufactured by maltron; BF-905 made in England.

All the subjects were subjected to V.M test and B.P and P.R responses before and after above tests in supine; sitting

and standing position were measured. Pre and post values for BP and PR changes with respect to V.M in different positions were noted. And body composition was also assessed for each individual.

STATISTICAL ANALYSIS

Simple statistical analysis measures that is mean, S.D, and 't' test were used for data analysis. The 'P' value was also determined at confidence level of 95%.

III. RESULTS

After the processing of data, the data's were analyzed with respect to V.M test and body composition assessments. These findings are presented comprehensively below as follows:

- ✓ **DEMOGRAPHIC PROFILE ANALYSIS:** The first 3 groups were equally matched with respect to gender i.e., 10 males and 10 females except the group 4 which had 7 males only. Height (Ht) and body weight (wt) parameters of subjects of 4 groups were with range between 150cm to 168cm and wt range was 56 to 69 Kg respectively.
- ✓ **STUDY PARAMETERS ANALYSIS :** This study outcomes were analyzed with respect to DBP responses, P.R. changes and body composition components [(i.e. Fat, Basal metabolic rate (B.M.R) etc] separately and they are stated briefly below as follows :

A. DIASTOLIC B.P (D.B.P) RESPONSES WITH RESPECT TO POST V. M TEST:

POST VM DBP CHANGES ANALYSIS: responses showed no change in DBP in all the 3 groups namely control; H.T and D.M, in 3 different postures except in the combined group [(i.e. H.T with D.M)] where decrease in D.B.P was in standing position only and was with S.D of 88.86 ± 3.02 with 't' value = 14.99 and 'P' value = $<.001$ which was statistically significant. [Tab 1,2,3 and 6A].

B. P.R RESPONSES WITH RESPECT TO POST V.M TEST

POST V.M P.R CHANGES: Post V.M results showed statistically significant increase in P.R in all first three groups in all 3 positions ('p' value = $<.0001$); but in combined group 4 it was not defined (Tab 1,2,3).

C. BODY COMPOSITION ANALYSIS

Fat composition: There was statistically significant percentage of fat in H.T and D.M group ('P' value = $<.001$) while in control group it was not significant (Table 4).

D. BMR ANALYSIS

It was found that BMR was statistically significant for H.T and D.M groups ('p' value = $<.0001$) but it was not significant for control group ('P' value = $<.7$) as presented in Table 4.

IV. DISCUSSION

This study involved 67 middle aged subjects without any history of heavy work or manual occupation (Table 2).

All subjects in different groups had very minimal deviation with respect of their body ht and wt (Table 3). The study outcome with respect post V.M, DBP change in both males and females in different positions such as supine; sitting and standing were not significant in all 1st 3 groups. This was substantiated by 't' values. In combined group, D.B.P changes following post V.M was decreased significantly and was substantiated by 'P' values Eduardo E. Benarroch, Paola Sandroni and Philip A. Low (1993) published a comprehensive study of V.M and its responses and reported that there used to be changes in B.P responses due to change in posture. In our study we have not seen such statistically significant decrease in DBP but there was statistically significant DBP decrease in combined group. This study also co-relates with Tandon et al (1985) study about the effect of V.M in ANS dysfunction in supine and in standing positions in patients with D.M. The P.R response (i.e., PR increase) with respect to post V.M showed statistically significant increase in all 1st 3 groups but the same was not defined for the combined group. This study co-relates with the study of Ewing D.J (1981) with respect to P.R changes in D.M in different positions. He concluded that increase of P.R in D.M are due to cardiac parasympathetic damage alone in some patients and combine parasympathetic cardiac sympathetic damaged in others. It must be recalled that both the H.T and D.M in this combined 2 risk groups 2 and 3 were detected earlier and were treated with appropriate medications. This early intervention may be considered in favour of ANS function towards stability and their detection in experimental group could be questionable. Also they could have been moderated by early intervention of drugs leading to control of autonomic dysfunction. In order to verify the relevance of these tests and to increase their sensitivity, a separate group called as the combined group (i.e. H.T + DM) having 7 males patients with both risk factors were subjected to these test (V.M.). There was a fall of DBP in this group following the test. This indicates that ANS dysfunction is due to V.M test. So, V.M test can be considered as bedside screening test for ANS dysfunction. In this study; it is also found that body mass index (BMI) of diabetic female was more than 27 which is towards obese side; whereas BMI in the other groups were

less than 25. It signifies that majority of the subjects were not obese. On analyzing body composition it was found that females of all the groups were having fat percentage more than 25 percentage but in control group males were having more than 30 percentages as a fat content. Male population of other groups were having less than 25 percentage of body fat; water percentage was less than 49.6 percentage in all the groups significance of body composition in this study is that the conductivity of impulse is depend upon fat and water content. BMR was 1340 in control group and >1600 in rest all groups. BMR was found to be raised in H.T and D.M groups and in combined group.

LIMITATIONS OF THIS STUDY:

- ✓ Small sample size in each group.
- ✓ Subjects were under medication in DM and H.T groups.
- ✓ Invasive and other non-invasive methods were not used to assess ANS dysfunction.

V. CONCLUSION

Taking in to account of fall of D.B.P and increase in P.R following post V.M test in 3 different positions; it is concluded here that V.M is simple, reliable and clinical bedside test which can be used to assess the ANS dysfunction or changes in subjects with Dm, HT and DM+HT.

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