

CHANGES IN BLOOD PRESSURE DUE TO POSTURAL VARIATION**Rebecca Wig, Dr. Vivek Nalgirkar and Mrunalini Kanvinde***

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ABSTRACT

Purpose: In this study, we wanted to correlate the change in the blood pressure in supine position on immediately standing up to the change in blood pressure after 2 minutes of standing in hypertensive and normotensive individuals. **Materials and Method:** By keeping inclusion and exclusion criteria, the 50 subjects selected for this study were aged between 15 and 55 years, were of both sexes and were categorized into four groups based on their age. By taking the position of the patient into consideration, blood pressure was recorded in the

lying and the standing posture. Error difference in blood pressure was found in standing position by double recording. Questionnaires evaluated about smoking habits, medication use and history of past illness. Statistical analysis was done by t-test. **Result:** From the above study, it is found that blood pressure in hypertensive patients varies in lying position than in standing position ($p < 0.01$) with less error in blood pressure recording ($p < 0.05$). It also shows that in hypertensive persons, systolic blood pressure increases compared to diastolic blood in standing position as well as sitting position. **Conclusion:** Thus it was concluded that there is significant correlation between blood pressure and posture which varies in lying position than in standing position in hypertensive patients.

KEYWORDS: Hypertension, Systolic Blood Pressure, Diastolic Blood Pressure, Postural Variation.

INTRODUCTION

In this study, we wanted to establish the changes in the blood pressure in supine position, on immediately standing up and again after 2 mins of standing. The usual cardiovascular changes that follow postural change from the supine to standing position are well known. Blood begins to pool in the venous system on standing due to gravitational effects. This causes a decrease in venous return and a resultant drop in cardiac output. Systolic Blood

Pressure(SBP) falls with cardiac output, so the baroreceptors in the carotid arch relax and induce sympathetic stimulation. This promotes vasoconstriction and increases heart rate, which stabilizes cardiac output at a level lower than when supine. Mean blood pressure is maintained by an increase in total peripheral resistance. After a person moves from the supine to the standing position if the SBP drops more than 20 mmHg within 1 to 3 minutes, this person is said to have postural or orthostatic hypotension. Postural hypotension may be either symptomatic or asymptomatic. It may be idiopathic or may result from known causes; some of these causes are functional and reversible, whereas others have an anatomic basis and may be progressive. Blood pressure is a measure of cardiovascular reactivity reacting autonomic function. Also such elder ones having some associated diseases like hypertension, diabetes mellitus, and low blood volume become further weaker.

MATERIAL AND METHODS

Selection of Groups

The subjects selected for this study are 50 in number with age group 15 to >55 years of both sex and they are categorized into four groups based on their age.

Inclusion Criteria

The study includes healthy subjects, subjects of mixed socioeconomic status.

Exclusion Criteria

Subjects with diabetes mellitus, hypertension, any other debilitating illness, cardio-respiratory diseases and other diseases (subjects with obesity were excluded) Subjects with smoking and alcoholism, Subjects who are on medication were excluded, who unable to stand were excluded.

Study Protocol

When assessing blood pressure it is important to take the position of the patient into consideration. For one minute, the blood pressure was subsequently taken lying position. Then immediately on standing, the blood pressure was then taken standing, with the arm supported at the elbow and the cube at the heart level. Finally, after one minute the blood pressure was again taken in this last position to find out the error difference. The blood pressure tended to drop in the standing position compared with the lying. Error difference in blood pressure was found in standing position by double recording. Questionnaires evaluated about smoking habits, medication use and history of past illness.

Measurement of Blood Pressure

Blood pressure was measured with a standardized sphymanometer, adjusted to zero. Blood pressure was recorded as per guidelines given by World Health Organization/International Society of Hypertension (WHO/ISH) -the patient may also be supine or standing provided that the arm is supported at heart level for all body postures.^[1]

Statistical Analysis

Statistical analysis was done by t-test.

RESULTS

From Table I, it was found that study was done on 50 hypertensive persons, on the basis of their age.

Table 1

Age Groups (Years)	Males	Females	Total
15-25	15	13	28
26-35	3	5	8
36-45	1	1	2
46-55	5	7	12
Total	24	26	50

Table 2: Blood Pressure Recorded in Hypertensive Persons

Lying down	Standing I	Standing II
189/80	169/69	185/82
142/78	147/82	144/82
142/76	132/84	145/85
150/83	133/84	134/84
154/89	129/85	136/85
149/70	129/75	135/77
169/116	156/114	168/110
150/91	138/92	140/93
120/77	128/73	131/74
138/66	130/58	138/62
168/88	160/91	174/84
167/80	144/104	152/67

Note only some readings are provided.

From Table II, it is found that blood pressure in hypertensive patients varies in lying position than in standing position ($p < 0.01$) with less error in blood pressure recording ($p < 0.05$). Table II also shows that in hypertensive persons, systolic blood pressure increases as

compared to diastolic blood in standing position as well as sitting position. After doing statistical analysis, it was found that there is significant correlation in between blood pressure varies in lying position than in standing position in hypertensive patients ($p < 0.01$) with less error in blood pressure recording ($p < 0.05$).

DISCUSSION

Many epidemiologic studies have identified blood pressure as an important risk factor for both cardiovascular disease and total mortality. Elevated levels of either Diastolic Blood Pressure (DBP) or Systolic Blood Pressure (SBP) are associated with an increased mortality risk. As a result of these findings, the importance of the detection and treatment of individuals with high blood pressure has been established.^[2] Normally, properly taken BP measurements show only minor variations with changes in position. Certain patients with an imbalance of the Auto-nomic Nervous System (ANS), however, may tend to have a fall in BP with the upright position. The ANS normally controls the constriction (narrowing) and the dilation (widening) of blood vessels and thus helps regulate a person's BP. Such a fall in BP with standing is called Postural Hypotension (low blood pressure), which, when significant, can cause weakness, lightheadedness, and even fainting. The treatment of high blood pressure (hypertension) with medication in these patients may actually lead to an excessive fall in BP with standing.^[1] In the upright posture, cardiovascular adjustments occur to maintain the blood pressure. These actions include reflex arteriolar and venous constriction, reflex acceleration of heart rate, increase in muscle tone, and an immediate increase in plasma catecholamines. The net result of these adjustments in the normal individual is that blood pressure remains largely unchanged, although a 10 to 15 mmHg rise or fall in SBP is probably not an uncommon experience.^[2]

Prevention of hypertension and control of blood pressure in patients with hypertension, are necessary for the reduction of cardiovascular morbidity and mortality. Lifestyle modifications are one of the most important tools for effectively lowering blood pressure. Most randomized controlled studies have shown that even a modest weight loss of 3-9% is associated with a significant reduction in systolic and diastolic blood pressure of roughly 3 mmHg in overweight people. Limitation of sodium chloride in food has historically been considered the critical change for reducing blood pressure. While changes in sodium intake do adjust blood pressure in older persons and in patients with hypertension and diabetes, its role in population blood pressure has proven controversial.^[3] Dietary Approaches to Stop Hypertension

(DASH) demonstrates that a diet rich in fruits, vegetables, low-fat dairy products, fibre and minerals (calcium, potassium and magnesium) produces a potent antihypertensive effect. Such a diet is not very restrictive and should not produce compliance problems. Additional high-quality research on the influence of macronutrients and food will yield data for updated recommendations, thus enabling better prevention and control of the blood pressure problem.^[3] Thus postural change in blood pressure is an easily obtainable measurement that may have clinical significance in both normotensive and hypertensive individuals. Such a measurement deserves further study as a potential risk factor.

Thus it was concluded that there is significant correlation between blood pressure and posture which varies in supine position than in standing position in hypertensive individuals.

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