WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 8, Issue 2, 1433-1448. Research Article ISSN 2277– 7105

A STUDY TO ASSESS THE EFFECT OF BODY POSITIONS ON BLOOD PRESSURE AMONG HYPERTENSIVE PATIENTS AT CARDIOLOGY OPD, APOLLO, AND HYDERABAD

Manasa Godati*, Lavanya Uriti and Dr. Ghada Abd El Raouf Youssif (Assistant Professo)

King Khalid University, KSA.

Article Received on
20 Dec. 2018,
Revised on 10 Jan. 2019,
Accepted on 31 Jan. 2019
DOI: 10.20959/wjpr20192-14107

***Corresponding Author**
Manasa Godati
King Khalid University, KSA.

ABSTRACT

The research approach used for the study was "descriptive" and the research design was "descriptive correlation design". The aim of descriptive co relational research is to describe the relationships among variables that exist in a situation. The setting of the study was Cardiology OPD, at Apollo, Hyderabad. The sampling technique used was non probability Convenience sampling. The tool used in the study was consisting of two sections: Section- **I** dealt with identification of data and socio demographic variables of the individual, Section –**II** consists of clinical examination which included height, weight, BMI, Waist and hip ratio and blood pressure measurements in various body positions and validated by experts. The reliability of the tool was confirmed by split-half method. After obtaining the permission from the Cardiology HOD, a pilot study was conducted on 10 hypertensive patients in the same set up. The clarity, feasibility were established to proceed further with the actual study. The actual study was done on 110 hypertensive patients, who were falling under the inclusion criteria and were selected as sample. After the Sample selection, written consent was taken. The collected data was analyzed and tabulated by using descriptive and inferential statistics. The findings of the study revealed that there was a significant difference present in blood pressures in various body positions. The fowler's position had higher blood pressure when compared to supine and upright positions. The effect of demographic variables on blood pressure in various body positions was determined by multi variant regression analysis. The regression analysis t-value revealed that annual income, frequency in visiting the doctor, frequency of taking non vegetarian diet, sex, number of cigarettes smoked each day, duration

of smoking and frequency in doing exercises had a significant effect on blood pressure. Based on these findings, null hypotheses **$H_0$1, $H_0$2** were rejected.

KEYWORDS: Effectiveness, body positions, blood pressure, hypertensive patients.

INTRODUCTION

Throughout the continuum of the care, whether in a home, hospital or rehabilitation setting, every patient with any health problem requires similar assessments like vital signs checking.[15] Among these vital signs, the **blood pressure** measurement is an important component.

Blood pressure is a pressure exerted on the walls of the arteries during the ventricular systole and diastole. Blood pressure usually expressed as the ratio of the systolic pressure over the diastolic pressure. Normal adult values ranging from 100/60 to 139/89 mm of Hg. The average normal blood pressure usually cited is 120/80 mm of Hg.

The first recorded instance of the measurement of blood pressure was in 1733 by Reverend Stephen Hales, by inserting a glass tube into an artery of a horse and observed the rise and fall of blood in the tube and concluded that this must be due to fluctuating Pressure in the arteries, and it was not suitable and an inappropriate technique for human and in clinical use.[51, 99]

In 1856, Faivre recorded human blood pressure for the first time during limb amputation, by use of kymograph with catheter inserted directly into artery. This kymograph council was of a unshaped manometer tube connected to a brass pipe cannula plugged directly into the artery. In 1881, Samuel Siegfried Karl Ritter Von Bach invented sphygmomanometer which consisted of water or mercury filled rubber ball to a manometer.

The year 1896 was a decisive year in the history of blood pressure. Scipione Riva Rocci developed his first mercury sphygmomanometer. This design was the forerunner of the modern mercury sphygmomanometer.[76, 99]

American Neurosurgeon, Harvey Cushing in 1901 decided to modify that design to be more adapted for clinical use and it resulted in the modern sphygmomanometer. In 1905, a landmark breaks through occurred when **Korotkoff** described the systolic and diastolic

sounds heard with a stethoscope. These findings led to the clinical recording of blood pressure throughout the world.[51, 44]

Hypertension had its origins as early as 2600 B.C., when the ancient Chinese could only suspect hypertension by the quality of one's pulse.[65, 9] At that time a hard pulse that could not be compressed was often treated with bleeding and leeches and they felt hypertension to be an essential natural adaptive reaction to pathology in either kidneys (white hypertension) or blood vessels (red hypertension), which was necessary to provide perfusion to vital organs. In fact, experts suggested that lowering elevated blood pressure might do more harm than food.[99]

Hypertension remained an untreated disease over the initial part of the 20th century. Throughout the middle part of the 20th century the treatment of hypertension was often ineffective. In 1950's they were able to lower blood pressure and reverse the changes of malignant hypertension.[9] The average normal blood pressure usually cited is 120/80 mm of Hg. An increase in blood pressure above the normal range is called hypertension.[15,9]

The 6th Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure, JNC-VI defined hypertension as "A resting systolic blood pressure (SBP) of 140 mm of Hg or greater and /or a diastolic blood pressure (DBP) of 90 mm of Hg (or) greater in adults who are not taking anti hypertensive medications."

Hypertension is an important public health challenge worldwide because of its prevalence and its role as a risk factor for cardiovascular disease. The estimated total number of adults with hypertension in 2000 was 972 million, of these 333 million were estimated to be in economically developed countries and 639 million in economically under developed countries. According to cardiovascular disease prevention and control it was estimated that 600 million people were affected in 2001 to 2002 year and by 2025, the number of people with hypertension would increase by about 60% to a total of 1.56 billion as the proportion.[50]

The 7thJoint National Committee, the American Society of Hypertension has realized the need to revise their definition of hypertension for its recognition and treatment. According to it hypertension is a complex cardiovascular disorder rather than just blood pressure values.[84, 110]

It characterizes the disease as a progressive cardiovascular syndrome with many causes that result in both functional and structural changes to the heart and vascular system and could progress to damage of the heart, kidneys, brain, vasculature and other organs, often leading to premature morbidity and death.[106]

Table 1: Various Definitions And Classifications of Hypertension.[84]

JNC VI	JNC 7	WG- ASH	SBP (mm of Hg)	DBP (mm of Hg)
Optimal	Normal	Normal	<120	<80
	Pre- hypertension	Hypertension	120-139	80-89
Normal		Stage 1	<130	<85
High normal			130-139	85-89
Hypertension				
Stage 1	Stage 1	Stage 1	140-159	90-99
	Stage 2	Stage 2	≥160	≥100
Stage 2		Stage 3	160-179	100-109
Stage 3			≥180	≥110

According to WHO and International Society of Hypertension guidelines that described the causes for hypertension are,

- Familial history through genetically predisposition.
- Environmental factors like age, gender, hormonal status and so on.
- Lifestyle influential risk factors that include excessive alcohol intake, obesity, low physical activity, stress and diet, smoking, high salt and cholesterol intake which are causes for hypertension.[14]

In India, 405 people are suffering with hypertension in every 1 lakh, population. According to the International Journal of Medical Sciences, the prevalence rate of hypertension in developing countries is different from that of developed countries. Day by day the prevalence of hypertension has been increasing because of life style patterns and other risk factors.[48]

High blood pressure typically has no symptoms at all. That is why it is popularly known as **"silent killer."** Although there are many coincidental symptoms that are widely believed to be associated with high blood pressure, many symptoms occur just as frequently in those with normal blood pressure.[104] If a person has high blood pressure that is severe or long upright and left untreated symptoms such as headache, nose bleed, breathlessness, tinnitus, sleepiness, insomnia, confusion, profuse sweating, fatigue, vomiting , low libido and blurred vision are noticed. The Best way to remain healthy is to have blood pressure checked at frequent intervals.[15]

Blood pressure is measured in millimeters of mercury (mm of Hg) corresponding to the height of a column of mercury that could be supported in a mercury sphygmomanometer, a device which until recently was the standard method of measuring blood pressure. Office blood pressure is the most accurate method for measuring blood pressure in the office which is to listen for korotkoff sounds in the brachial artery as cuff pressure is reduced.

There may be changes of blood pressure in different body postures. There are many causes in patients with postural blood pressure changes which are.

- Cardiac problems
- Inadequate vasoconstriction mechanisms.
- Insufficient autonomic effect on vascular constriction.

The following recommendations are important while assessing postural blood pressure changes.

1. Position the patient supine and flat for 10 minutes before taking the initial blood pressure and heart rate.
2. Check supine measurements before checking upright measurements.
3. Wait for 1 to 3 minutes after each postural change before measuring blood pressure and heart rate.
4. Be alert for any signs of patient distress.[15]

These postural blood pressure changes are sometimes caused by course of treatments and changes in life style pattern such as diet and stress, increased population and shrinking employment have been implicated.[43]

Education about recommendation for health maintenance and control of hypertension is important to prevent further complications like target organ damages. Mainly brain, eyes, heart and kidneys are damaged by hypertension. Health personnel could help to create awareness among people on hypertension control through lifestyle modifications to prevent complications in their life time. This is in turn helps to prevent the negative effect on the quality of life among people. Educating the person is equal to educating the family, thus health of the family itself could be promoted though education of the patient.[84]

MATERIALS AND METHODS

A Descriptive approach is found to be appropriate for the study. The purpose of descriptive studies is to observe, describe and document aspects of a situation as it naturally occurs. A Descriptive Correlational Design was adopted for the present study. The aim of descriptive correlational research is to describe the relationships among variables that exist in a situation.[58] The study was conducted at Cardiology OPD, Apollo, and Hyderabad. This setting was chosen on the basis of the investigator's feasibility, availability of adequate sample of hypertensive patients and the investigator was familiar in this setting. Population includes hypertensive patients attending Cardiology OPD at Apollo, both men and women who fall under inclusion criteria during the period of study at Apollo, Hyderabad. Hypertensive patients who fall under inclusion criteria during the period of the study were selected as the sample. Sample size consists of 110 hypertensive patients, who fall under inclusion criteria. Non probability convenience sampling technique was adopted for the study. The sample was selected based on the opinion of an investigator.

The structured questionnaire was developed by referring several Books, Journals, Review of literature, Newspapers, Website.

Section 1: Contains questions to collect the demographic data

- Personal data.
- Family history.
- Past history of illness.
- Habits.

Section-II: Contains Clinical Examination. It consists of measuring data under the following headings.

- Height
- Weight
- Body Mass Index
- Waist and Hip Ratio
- Measuring Brachial Artery Blood Pressure in different positions like sitting, upright and supine positions.
- Measuring Pedal Artery Blood Pressure in different positions like sitting, upright and supine positions.

SCORING KEY

- Scoring key was prepared for section-I by coding the demographic variables.
- Section-II blood pressure in various positions is classified by using 7th JNC classification.

Table 3: 7th JNC Classification of Hypertension.[84]

Classification	Systolic pressure	Diastolic pressure
Normal	<120mm of Hg	<80 mm of Hg
Pre hypertension	120-139 mm of Hg	80-89 mm of Hg
Stage-I	140-159 mm of Hg	90-99 mm of Hg
Stage –II	≥160 mm of Hg	≥100 mm of Hg

RESULTS AND DISCUSSION

Mean standard deviation of brachial and pedal artery Blood pressures among hypertensive patients and comparison of mean blood pressures in supine, fowlers and upright positions. N=110

S. No.	Blood pressure variables		Supine positions		Fowlersposition		Upright position		F-Value
			M	S.D	M	S.D	M	S.D	
1.	Brachial artery pressures	SBP	140.43	18.288	144.26	18.804	137.99	19.536	3.057*
		DBP	85.74	11.532	88.88	14.563	85.98	11.756	2.070 NS
2.	Pedal artery pressure	SBP	128.48	16.747	127.17	16.5889	122.81	16.486	3.487*
		DBP	81.11	10.312	81.13	11.057	78.76	9.598	1.883 NS

COMPARISON OF BRACHIAL AND PEDAL ARTERY BLOOD PRESSURE IN VARIOUS BODY POSITIONS

Brachial and Pedal artery blood pressures Comparison in various body positions among hypertensive patients

N=110

S. No.	Blood pressure variables		Brachial artery		Pedal Artery		t-Value
			M	S.D	M	S.D	
1.	Supine position	SBP	140.427	18.288	128.482	16.747	5.052**
		DBP	85.736	11.532	81.109	10.312	3.137**
2.	Fowlersposition	SBP	144.264	18.804	127.173	15.589	7.149**
		DBP	88.882	14.563	81.127	11.057	4.448**
3.	Upright position	SBP	137.991	19.536	122.809	16.486	6.229**
		DBP	85.982	11.756	78.764	9.598	4.988**

DISCUSSION

The purpose of the study is to assess the effect of body positions on blood pressure among hypertensive patient at Cardiology OPD, Apollo, Hyderabad. The study helps to determine that which of the body position which would be useful to get the correct measurement of

blood pressure among hypertensive patients. The discussion of the present study is based on the findings obtained from descriptive and inferential statistical analysis of collected data. It is presented in view of the objective of the study.

Blood pressure is the pressure exerted when the heart contracts, it pushes blood into the arteries, causing an increase in blood pressure, which is called systolic pressure. When the heart relaxes and refills with blood, the pressure in the arties are decreased, which is known as diastolic blood pressure. The blood pressure changes when the body position changes, upright causes 500 to 700ml of blood to pool in the legs, so there is less blood for the heart to pump. This results in a decrease in blood pressure. But the special cells in the body called baro receptors sense the decrease in blood pressure. They counteract by triggering the heart to beat faster and pump more blood in order to stabilize the blood pressure.[103]

The first objective of the study was to assess the effect of body position on blood pressure among hypertensive patients

The blood pressure was measured in hypertensive patients with the Sphygmomanometer. Ongoing assessment of blood pressures was done on first, second and third measurements with one minute gap before each measurement in various body positions like supine, fowlers and upright positions.

Eser, Imet et al.,[36] conducted a study on **the effect of different body positions on blood pressure** among 157 healthy young adults. The subjects were selected randomly. In all subjects, the blood pressures were measured subsequently in four positions. Fowlers blood pressures were taken from the left arm, was flexed at elbow level and supported at heart level on the chair. After 1 min upright, the BP was taken in upright position with arm supported at elbow level, after 1 min rest BP was taken in supine position. After 1 min again BP was taken in this last position, supine position with crossed legs. The Study findings revealed that blood pressures tended to drop in the upright position compared with the sitting, supine and supine with crossed legs. Systolic and diastolic pressure was highest in supine position when compared with the sitting, supine and supine with crossed legs. The difference between systolic blood pressures was statistically significant ($P<0.001$), but the difference between diastolic blood pressures was not statistically significant ($P>0.05$). The study suggested that when assessing BP it is important to take the position of the patient into consideration.

The present study findings revealed that there was a significant difference in SBP and DBP found in brachial and pedal arteries, which were statistically significant at P<0.01 level.

The comparison of blood pressures in various body positions disclosed that the highest SBP was found in fowlers position, followed by supine and upright positions in both brachial and pedal arteries. This was statistically significant at P<0.05 level. With regard to DBP, it was highest in fowlers position followed by supine and upright positions, which was not statistically significant. The null hypothesis (H_o1) which states that body posture does not significantly influence the blood pressures was rejected.

The second objective of the study was to determine the effect of selected demographic variables on blood pressures in various body positions.

Wizner B., Grodzicki T, et al,[89] had conducted a study on 485 subjects and the BP measurements were taken using semi automatic device (Digital BP UA-702), in the fowlers position after a rest of minimum 5 minutes. The subjects were divided into two groups according to presence or absence of a particular risk factor. In statistical analysis, Student's t-test, chi square and linear regression analysis were used. The mean age was 37.1+/-17.8 years and all subjects were well educated, and there were more women than men in the study group (57.5%Vs42.5%). 24.1% of participants had blood pressure values more than 140/90 mm of Hg. Multiple linear regression demonstrated that age, Body Mass Index, knowledge about hypertension significantly influenced the level of systolic blood pressure. The studies suggested that age, sex, especially the male gender, BMI, alcohol consumption significantly influence the blood pressures.

The study finding revealed that the demographic variables like age, religion, marital status, occupation, education, type of work, family history, dietary habit, habit of coffee consumption, alcohol consumption, past history of hypertension, habit of regular exercises had no effect on blood pressures in various body positions. Annual income, frequency of visiting doctor, smoking habit, number of cigarettes smoked each day, frequency in eating non vegetarian diet, duration of smoking, frequency in doing exercises had a statistically significant effect at P<0.05 level on blood pressures in various body positions.

CONCLUSION

The study findings revealed that the body postures would have a significant effect over the blood pressure, So while taking blood pressure measurement, body posture must be considered as also some of the demographic variables like sex, annual income, frequency in visiting the doctor, smoking habit, number of cigarettes smoked each day, frequency in taking non vegetarian diet, frequency in doing exercises also which have an effect on the blood pressure in various body positions.

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