

A Comparative Observational Study of Blood Pressure Levels among Different Groups of Hypertensive Patients On The Basis Of Gender and Age

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Abstract

Background: Although literature suggests that the risk of cardiovascular mortality associated with mixed hypertension and isolated systolic hypertension is significantly higher than normotension, it is not the case with isolated diastolic hypertension. This difference in the effects of mixed hypertension, isolated systolic hypertension and isolated diastolic hypertension on the well-being of the patients stimulates interest in the potential factors affecting the levels of systolic and diastolic blood pressures in such patients.

Objective: To assess the effect of gender and age on the blood pressure levels in patients with mixed hypertension isolated systolic hypertension or isolated diastolic hypertension.

Material and Methods: After taking ethical approval from Urban Hospital, Karachi campus, a cross-sectional multicenter study was carried out among 174 patients aged 18 years or above with self-reported history of hypertension. After taking a brief medical history with the help of a structured questionnaire, the blood pressure of the patients was measured by using sphygmomanometer with stethoscope to assess hypertension level. The duration of study was 6 months.

Results: The study results revealed that among male patients those with isolated systolic hypertension had a statistically significantly lower mean systolic blood pressure than those with mixed hypertension ($p=0.047$) while among females patients those with isolated diastolic hypertension had lower mean diastolic blood pressure than those with mixed hypertension. Furthermore, among ≤ 40 years old patients those with isolated systolic hypertension had lower mean systolic blood pressure than those with mixed hypertension whereas among >40 years old patients those with isolated systolic or diastolic hypertension had lower mean systolic and diastolic blood pressures respectively than those with mixed hypertension.

Conclusion: The study results revealed that male patients with isolated systolic hypertension had a statistically significantly lower mean systolic blood pressure than those with mixed hypertension. Further evaluation of the role of gender and age in the control of blood pressure levels in above mentioned groups of hypertensive patients is recommended.

Keywords: Blood Pressure Level; Mixed Hypertension; Isolated Systolic Hypertension; Isolated Diastolic Hypertension; Gender; Age

Introduction

Hypertension has been reported to affect 26.4% of the world adult population in the year 2000 and this percentage is projected to increase by the year 2025 to 29.2% and out of a total of 972 million adults affected in the year 2000, 639 million were in economically developing countries.[1]According to World Health Organization estimates, hypertension affects about 40% of adults above 25 years of age and causes 7.5 million deaths annually, representing more than 12% of all deaths globally and it increases the risk of various medical conditions such as heart attack, stroke, kidney failure and blindness but despite being a serious health problem, it is preventable and treatable.[2] As per the latest guidelines of the Joint National Committee for hypertension management (JNC 8), both lifestyle modifications as well as blood lowering medications are recommended.[3]These guidelines suggest initiation of a pharmacologic treatment when blood pressure is 140/90 mmHg or higher in adults younger than 60 years, or 150/90 mm Hg or higher in adults 60 years and older. [4]

Though mixed hypertension and isolated systolic hypertension have been frequently defined as separate entities, isolated diastolic hypertension has not. While literature suggests that the risk of cardiovascular mortality associated with mixed hypertension and isolated systolic hypertension is significantly higher than normotension, it is not the case with isolated diastolic hypertension. [5]It also reports that all-cause mortality rates in males aged above 50 years were highest in those with isolated systolic hypertension as compared to those with isolated diastolic hypertension and normal blood pressure. [6]

This difference in the effects of mixed hypertension, isolated systolic hypertension and isolated diastolic hypertension on the well-being of the patients stimulates interest in the potential factors affecting the levels of systolic and diastolic blood pressures in such patients. This study was therefore conducted with the objective of assessing the effect of gender and age on the blood pressure levels in patients with mixed hypertension, isolated systolic hypertension or isolated diastolic hypertension.

Patients and Methods

After taking ethical approval from urban hospital, Karachi campus, a cross-sectional multicenter study was carried out among patients with self-reported history of hypertension. By using convenient sampling technique, a total of 174 patients aged 18 years or above were included in the study. Patients were divided in three groups according to their blood pressure levels, those with mixed hypertension, those with isolated systolic hypertension, and those with isolated diastolic hypertension. Mixed hypertension was defined as per the guidelines of the seventh report of the Joint National Committee (JNC 7) though patients with both stage I and stage II hypertension were considered to have mixed hypertension. [7] Isolated systolic hypertension (systolic blood pressure ≥ 140 mmHg and diastolic blood pressure < 90 mmHg) and isolated diastolic hypertension (systolic blood pressure < 140 mmHg and diastolic blood pressure ≥ 90 mmHg) were defined as per the criteria used by Franklin SS

et al., in 2001 and Midha T et al., in 2012.[8,9]

After taking a brief medical history with the help of a structured questionnaire, the blood pressure of the patients was measured by using sphygmomanometer with stethoscope to assess hypertension level. Patients with history of cardiac events, neurological disorders, cluster headache, diabetes, gastrointestinal disease, visual problems, epistaxis and morbid obesity were excluded from the study. Those patients who were not on anti-hypertensive medication were also excluded from the study.

SPSS version 20 was used to code, enter and analyze the collected data. After checking for normality, inferential analysis was performed using Kruskal Wallis test. The significance level was set at 0.05. The duration of study was 6 months.

Results

Out of total 174 patients included in the study, 22 were found to have normal levels of both systolic and diastolic blood pressures and thus were excluded from final analysis, leaving a total of 152 patients.

The stratified analysis on the basis of gender to compare blood pressure among patients with mixed hypertension, isolated systolic hypertension and isolated diastolic hypertension revealed that among male patients there was a statistically significant difference between the mean systolic blood pressure of those with isolated systolic hypertension and those with mixed hypertension where the former had lower mean systolic blood pressure than the later (142.86 ± 7.55 mm hg vs. 151.97 ± 10.04 mm hg, $p=0.047$). The mean diastolic blood pressure among male patients or mean systolic and diastolic blood pressures among female patients were not statistically significantly different between those with mixed hypertension and those with isolated systolic or diastolic hypertension. Among females patients the mean diastolic blood pressure of those with isolated diastolic hypertension was found to be lower than mean diastolic blood pressure of those with mixed hypertension but the difference was statistically non-significant ($p=0.429$) [Table 1].

The stratified analysis on the basis of age to compare blood pressure among patients with mixed hypertension, isolated systolic hypertension and isolated diastolic hypertension revealed that the mean systolic and diastolic blood pressures among both ≤ 40 years and > 40 years old patients were not statistically significantly different between those with mixed hypertension and those with isolated systolic or diastolic hypertension. Among ≤ 40 years old patients the mean systolic blood pressure of those with isolated systolic hypertension was found to be lower than mean systolic blood pressure of those with mixed hypertension but the difference was statistically non-significant ($p=0.37$). Among > 40 years old patients both the mean systolic and diastolic blood pressures of those with isolated systolic or diastolic hypertension respectively were found to be lower than mean systolic and diastolic blood pressures of those with mixed hypertension but the differences were statistically non-significant ($p=0.305$ and $p=0.541$ respectively) [Table 2].

Table 1: Blood Pressure Comparison among Patients with Mixed Hypertension, Isolated Systolic Hypertension and Isolated Diastolic Hypertension: Gender wise Stratified Analysis

Males			
Variables		Mean±S.D	p*
Systolic Blood Pressure (mm Hg)	Mixed Hypertension ¹	151.97±10.04	0.047
	Isolated Hypertension ²	142.86±7.55	
Diastolic Blood Pressure (mm Hg)	Mixed Hypertension ¹	95.43±5.49	>0.999
	Isolated Hypertension ³	97.50±15.00	
Females			
Variables		Mean±S.D	p*
Systolic Blood Pressure (mm Hg)	Mixed Hypertension ⁴	152.26±13.18	>0.999
	Isolated Hypertension ³	152.50±15.00	
Diastolic Blood Pressure (mm Hg)	Mixed Hypertension ⁴	95.05±4.51	0.429
	Isolated Hypertension ⁵	90.00±0.00	
*Kruskal Wallis Test			
¹ n=70			
² n=7			
³ n=4			
⁴ n=65			
⁵ n=2			

Table 2: Blood Pressure Comparison among Patients with Mixed Hypertension, Isolated Systolic Hypertension and Isolated Diastolic Hypertension: Age wise Stratified Analysis

≤40 Years			
Variables		Mean±S.D	p*
Systolic Blood Pressure (mm Hg)	Mixed Hypertension ¹	150.06±12.43	0.37
	Isolated Hypertension ²	140.00±0.00	
Diastolic Blood Pressure (mm Hg)	Mixed Hypertension ¹	94.00±3.36	...
	Isolated Hypertension ³	...	
>40 Years			
Variables		Mean±S.D	p*
Systolic Blood Pressure (mm Hg)	Mixed Hypertension ⁴	154.19±10.40	0.305
	Isolated Hypertension ⁵	147.00±11.59	
Diastolic Blood Pressure (mm Hg)	Mixed Hypertension ⁴	96.51±6.05	0.541
	Isolated Hypertension ⁶	95.00±12.24	
*Kruskal Wallis Test			
¹ n=68			
² n=1			
³ n=0			
⁴ n=67			
⁵ n=10			
⁶ n=6			

Discussion

The study results revealed that among male patients those with isolated systolic hypertension had a statistically significantly lower mean systolic blood pressure than those with mixed hypertension while among females patients those with isolated diastolic hypertension had lower mean diastolic blood pressure than those with mixed hypertension though the difference was statistically non-significant.

The study results further revealed that among ≤ 40 years old patients those with isolated systolic hypertension had lower mean systolic blood pressure than those with mixed hypertension though the difference was statistically non-significant whereas among >40 years old patients those with isolated systolic or diastolic hypertension had lower mean systolic and diastolic blood pressures respectively than those with mixed hypertension though the differences were again statistically non-significant.

The study results clearly point out towards one expected conclusion that the blood pressure levels are poised to be lower if any of the systolic or diastolic blood pressure is within normal limits after taking anti-hypertensive medication than if none of them is within normal limits. This is because if an antihypertensive medication is effectively lowering blood pressure, it will do so for both systolic and diastolic blood pressures and not for only one of them.

Moreover, and unexpectedly, this trend was found to be more pronounced among males with isolated systolic hypertension. This warrants further evaluation as though it has been shown that females have a higher prevalence of blood pressure than males, they are not known to have higher blood pressure levels than males, either with or without anti-hypertensive medication, which may lead to less effective blood pressure control than males. [10] Literature rather reports contrary findings, as a study by Ong KL et al., in 2008 showed that blood pressure control in females was not significantly inferior as compared with males. [11] A study by Wiinberg N et al., in 1995 also showed males to have significantly higher systolic blood pressure than females. [12] A review article by Reckelhoff JF in 2001 also found males to have higher blood pressure levels than females. [13]

With regard to the study finding that in any of the two age groups i.e. ≤ 40 years or >40 years patients with isolated hypertension tend to had lower mean blood pressure levels than patients with mixed hypertension, no comparison could be made as search did not reveal any relevant published literature.

Limitation and Recommendation

Due to resource constraint, this study was conducted with a moderate sample size but it is acknowledged that the use of a larger sample size would have resulted in more precise and illuminating estimates of the associations evaluated by this study. In light of the study findings, it is recommended that the role of gender and age in the control of blood pressure levels in different groups of hypertensive patients warrants further examination as it can have significant implication on the approach towards management of hypertension in such patients.

Conclusion

The study results revealed that among male patients those with isolated systolic hypertension had a statistically significantly lower mean systolic blood pressure than those with mixed hypertension. No significant differences between systolic and diastolic blood pressures were observed in patients with mixed hypertension, isolated systolic hypertension and isolated diastolic hypertension among females or with respect to their ages. Further evaluation of the role of gender and age in the control of blood pressure levels in above mentioned groups of hypertensive patients is recommended.

Conflicts of Interest

All authors have none to declare.

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