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COMPARATIVE STUDY OF EFFECT OF VERAPAMIL ON SYSTOLIC AND DIASTOLIC BLOOD PRESSURE

Pharmacology

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ABSTRACT

Introduction- Essential hypertension is primarily due to increased total peripheral resistance. Verapamil, a CCB decreases BP by decreasing TPR.
Material & Method- 23 cases (12 male & 11 female) of age group 42 +/- 10 years, are selected from ambulatory patients with known hypertensive disorder. The Blood pressure was measured by indirect method with the help of sphygmomanometer and stethoscope after 20 minutes of complete bed rest.
Observation & Result- The analysis of data was done by software SPSS ver 26.0. Mean SBP before drug was 163.913+2.859 which reduced to 132.608+ 2.725 after verapamil SR 240mg OD for 6 week, md = 31.304(19.09%) SEM 0.368, p=0.0001 while Mean DBP reduced from 95.217+1.677 to 81.652+ 1.968.
Conclusion- there was more significant decrease in DBP as compared to SBP after oral verapamil SR 240mg for 6 weeks.

KEYWORDS

TPR, Verapamil, SBP, DBP

INTRODUCTION

Verapamil is chemically phenyl-alkyl-amine which is a calcium channel blocker, commonly used as first line antihypertensive drug. It lowers blood pressure by decreasing total peripheral resistance effecting cardiac output. Verapamil blocks voltage-dependent calcium channels. Calcium channels are present in the smooth muscle of blood vessels. By relaxing tone of smooth muscle, it dilate the blood vessels and decrease blood pressure. Concentration of intracellular Ca^{++} ions in smooth muscle cells and activity of myosin light-chain kinase influences the contraction of it. The vascular tone depends upon latch bridge mechanism in smooth muscle. Influx of Ca^{++} into muscle due to opening of voltage gated ca-channel increases cytosolic calcium. Calcium activates myosin light chain kinase that phosphorylates myosin light chain protein, that causes smooth muscle contraction resulting vasoconstriction and rise in blood pressure. Increase cytoplasmic Ca++ also open ryanodine receptor mediated calcium channels in sarcoplasmic reticulum releasing more calcium, known as calcium mediated calcium release or calcium Spark. Verapamil blocks this calcium channel in smooth muscle lining blood vessel thus inhibit its contraction and so decrease TPR & blood pressure.

Blood pressure is the lateral pressure exerted by the blood column on the arterial wall. Systolic blood pressure is maximum pressure recorded and diastolic blood pressure is the minimum pressure recorded in one cardiac cycle.

Systolic blood pressure depends mainly on cardiac output that is dependent on myocardial contractility and heart rate. Contraction of heart depends on intracellular conc. of Ca++ in cardiac muscle. Verapamil decreases the conc. of cytosolic Ca++ by blocking Ca++ channel so decreases force of contraction in cardiac muscle resulting in decrease Cardiac output so the systolic blood pressure. The diastolic blood pressure depends mostly on peripheral resistance which depends on diameter of blood vessel and viscosity of the blood. Vasoconstriction increases diastolic pressure while dilatation decrease it. As per Hagen Poiseuille equation,

$R = 8nl/\pi r4$

This equation shows slight change in diameter of blood vessel produces great changes in peripheral resistance. Verapamil acts on smooth muscle inhibiting its contraction effect the diameter of blood vessel and so the diastolic blood pressure. Duration of diastolic pressure in cardiac cycle is more than systolic pressure that shows dominance of diastolic pressure in perfusion of tissues and control of diastolic blood pressure is more significant in hypertensive patients.

MATERIAL & METHOD

For the present study, 23 cases (12 male & 11 female) of age group 42 +/- 10 years, are selected from ambulatory hypertensive patients visiting O.P.D. in tertiary centre and private nursing home of western Bihar. This study was done in May 2014 to July 2014 after approval from institutional ethical committee. A brief history and thorough clinical check-up was conducted and informed consent was taken from each patients before the study. The effect of slow release verapamil (240mg OD) for six weeks was observed on these patients. The Blood pressure was measured by indirect method with the help of sphygmomanometer and stethoscope after 20 minutes of complete bed rest. Riva-Roci cuff wrapped at middle third on arm and pressure is raised till no pulse is felt in radial artery that gives a rough systolic BP by palpatory method to rule out auscultatory gap. Then the blood pressure is measured by auscultatory method. Three readings were taken at interval of 5 minutes and mean value were recorded. Same procedure was followed after six weeks of continue dose of verapamil 240mg SR, OD.

RESULT

The results of observation are as follows:-

Paired Samples Statistics

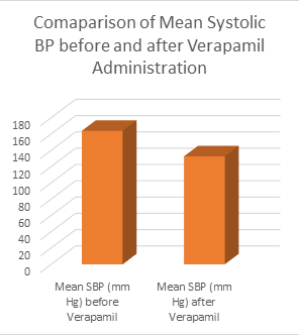
	Parameter	S.D.	N	SD	SEM
Pair 1	SBP (Before Drug)	163.913	23	2.85901	.59614
	SBP (After Drug)	132.608	23	2.72595	.56840
Pair 2	DBP before Drug	95.217	23	1.67757	.34980
	DBP after Drug	81.652	23	1.96813	.41038

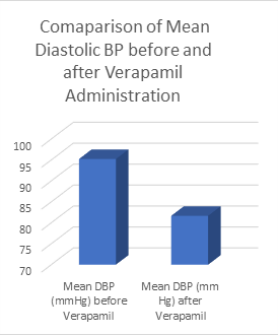
Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	SBP Before Drug & SBP After Drug	23	0.800	.000
Pair 2	DBP before Drug & DBP after Drug	23	0.299	.165

Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	t	df	Significance (2-tailed)
Pair 1	SBP (Before Drug) - SBP After Drug	31.30435	1.76930	.36893	84.853	22	.0001
Pair 2	DBP before Drug – DBP after Drug	13.56522	2.17059	.45260	29.972	22	.0001





After observing the data, it was found that mean systolic blood pressure before administrating verapamil in was 163.913±2.859. After treatment with verapamil SR 240mg OD for 6 week, SBP reduced to 132.608± 2.725. Difference of mean (md) SBP was 31.304 (19.09%) with SEM 0.368, p=0.0001(significant). In case of diastolic pressure it was observed that mean Diastolic blood pressure before administrating verapamil was 95.217±1.677 and after treatment with verapamil SR 240mg OD for 6 week, DBP reduced to 81.652± 1.968 and md was 13.565 (14.24%) with p=0.0001.

CONCLUSION

Six week oral sustained release Verapamil 240mg significantly decreases both systolic blood pressure and diastolic blood pressure in the moderate hypertensive patients. The effect of decreasing blood pressure is more towards diastolic blood pressure so it appears to be good antihypertensive drug for long term improvement of target organ.

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