AN EXPERIMENTAL STUDY ON EVALUATION OF ANTIHYPERTENSIVE ACTION OF HOMOEOPATHIC MEDICINE RAUWOLFIA SERPENTINA 30CH,6CH AND VERATRUM VIRIDE MOTHER TINCTURE AND 30CH IN HYPERTENSION INDUCED ALBINO RATS MODELS

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Abstract

Hypertension is a chronic, multifactorial cardiovascular disorder characterized by persistent elevation of arterial blood pressure and is a leading cause of morbidity and premature mortality worldwide. Although conventional antihypertensive drugs are effective, long-term pharmacotherapy is often associated with adverse effects, reduced compliance, and economic burden. Homoeopathic medicines derived from medicinal plants such as *Rauwolfia serpentina* and *Veratrum viride* have been traditionally used in the management of hypertension; however, experimental evidence validating their antihypertensive potential remains limited.

The present study was designed to experimentally evaluate and compare the antihypertensive activity of homoeopathic *Rauwolfia serpentina* (30CH and 6CH) and *Veratrum viride* (mother tincture and 30CH) with the standard antihypertensive drug **Benazepril** in cadmium chloride–induced hypertensive albino rats. Forty-two female Wistar albino rats were used and divided into seven groups. Hypertension was induced using cadmium chloride administered intraperitoneally for two weeks. Blood pressure was measured using the non-invasive tail-cuff method on days 1, 7, 14, 21, and 28.

The results demonstrated that cadmium chloride significantly increased systolic and diastolic blood pressure. Treatment with *Rauwolfia serpentina* and *Veratrum viride* produced a statistically significant reduction in blood pressure ($p < 0.05$) from day 7 onwards, with effects comparable to Benazepril by day 28. The findings support the antihypertensive potential of these homoeopathic medicines and provide experimental evidence for their role as complementary therapeutic agents in hypertension.

Keywords: Hypertension, Homoeopathy, *Rauwolfia serpentina*, *Veratrum viride*, Albino rats, Cadmium chloride

1. Introduction

Hypertension is a chronic medical condition in which the blood pressure in the arterial system remains persistently elevated. It is one of the most prevalent non-communicable diseases globally and a major risk factor for cardiovascular diseases, cerebrovascular accidents, renal failure, and premature mortality. According to global estimates, more than one billion adults suffer from hypertension, and the prevalence continues to rise, particularly in low- and middle-income countries.

Blood pressure is influenced by complex interactions between genetic, environmental, neurohormonal, and renal mechanisms. Persistent elevation of blood pressure leads to progressive damage to vital organs such as the heart, kidneys, brain, and eyes. Despite advances in pharmacotherapy, optimal control of hypertension remains a challenge due to side effects, polypharmacy, and poor adherence to long-term treatment.

Conventional antihypertensive drugs such as angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, calcium channel blockers, and diuretics are effective but are often associated with adverse effects including dizziness, cough, electrolyte imbalance, fatigue, and renal dysfunction. These limitations have increased interest in complementary and alternative systems of medicine, including homoeopathy.

Homoeopathy is a holistic system of medicine based on the principles of “similia similibus curentur” (like cures like) and minimum dose. Several homoeopathic medicines have been traditionally indicated in hypertension, particularly when constitutional symptoms are taken into account. Among these, *Rauwolfia serpentina* and *Veratrum viride* occupy an important place in homoeopathic materia medica.

2. Background and Rationale of the Study

The plant *Rauwolfia serpentina*, commonly known as Indian snakeroot or Sarpagandha, has been used in traditional medicine for centuries. Its root contains several alkaloids, including reserpine, ajmaline, and serpentine, which have well-documented effects on the cardiovascular and nervous systems. Reserpine was one of the earliest antihypertensive drugs used in modern medicine, although its use declined due to adverse effects.

Veratrum viride, commonly known as American hellebore, contains steroidal alkaloids such as veratridine and jervine, which influence vascular tone, heart rate, and blood pressure. In homoeopathic practice, *Veratrum viride* is indicated in conditions characterized by high arterial tension, slow and irregular pulse, and congestive states.

Despite extensive clinical usage in homoeopathy, scientific validation through controlled experimental studies is limited. In the era of evidence-based medicine, it is essential to scientifically evaluate the pharmacological effects of homoeopathic medicines using validated experimental models. Cadmium chloride–induced hypertension in rats is a well-established model that mimics oxidative stress, endothelial dysfunction, and increased vascular resistance observed in human hypertension.

Therefore, the present study was undertaken to experimentally evaluate the antihypertensive action of homoeopathic *Rauwolfia serpentina* and *Veratrum viride* in cadmium chloride–induced hypertensive albino rats and to compare their effects with a standard antihypertensive drug.

3. Aim and Objectives

Aim

To evaluate the antihypertensive activity of homoeopathic *Rauwolfia serpentina* and *Veratrum viride* in cadmium chloride–induced hypertensive albino rats.

Objectives

1. To induce hypertension in albino rats using cadmium chloride.
2. To assess the effect of *Rauwolfia serpentina* 30CH and 6CH on systolic and diastolic blood pressure.
3. To assess the effect of *Veratrum viride* mother tincture and 30CH on systolic and diastolic blood pressure.
4. To compare the antihypertensive effects of these homoeopathic medicines with the standard drug Benazepril.

4. Review of Literature

Several experimental and clinical studies have explored the antihypertensive potential of *Rauwolfia serpentina*. Studies using high-salt and DOCA-induced hypertensive rat models have demonstrated significant reductions in blood pressure following administration of *Rauwolfia serpentina* extracts and homoeopathic preparations.

Research on *Veratrum viride* alkaloids has shown that these compounds produce hypotensive effects through reflex mechanisms involving the vagus nerve and peripheral vasodilation. Experimental studies in spontaneously hypertensive rats have demonstrated rapid reductions in blood pressure following administration of veratrum alkaloids.

Cadmium-induced hypertension is associated with increased oxidative stress, altered calcium signaling, and enhanced vascular reactivity. Several studies have validated this model for evaluating antihypertensive agents, making it suitable for the present investigation.

5. Materials and Methods

5.1 Study Design

An experimental, controlled animal study.

5.2 Animals

Forty-two healthy female Wistar albino rats weighing 200–250 g were used. Animals were housed under standard laboratory conditions with controlled temperature (20 ± 2°C), 12-hour light/dark cycle, and free access to standard pellet diet and water.

5.3 Induction of Hypertension

Hypertension was induced by intraperitoneal administration of cadmium chloride (0.5–1.0 mg/kg) daily for two weeks. Blood pressure was measured before induction and after induction to confirm hypertension.

5.4 Grouping

The animals were divided into seven groups (n = 6 per group):

- Group I: Normal control
- Group II: Cadmium chloride–induced hypertensive control
- Group III: Cadmium chloride + Benazepril (5 mg/day, oral)
- Group IV: Cadmium chloride + *Rauwolfia serpentina* 30CH
- Group V: Cadmium chloride + *Rauwolfia serpentina* 6CH
- Group VI: Cadmium chloride + *Veratrum viride* 30CH
- Group VII: Cadmium chloride + *Veratrum viride* mother tincture

5.5 Outcome Assessment

Blood pressure was measured using the tail-cuff method on days 1, 7, 14, 21, and 28 after treatment initiation.

5.6 Statistical Analysis

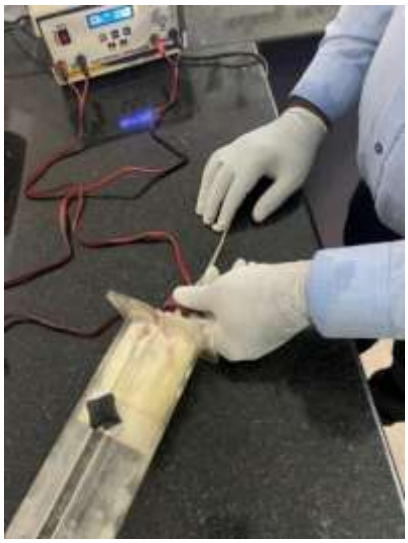
Data were expressed as mean ± standard deviation. One-way ANOVA followed by post-hoc analysis was used. A p-value < 0.05 was considered statistically significant

5.7 CAGING THE RAT INTO 7 GROUPS

5.8 WEIGHING THE RAT

5.9 PREPARATION OF BENAZEPRIL:

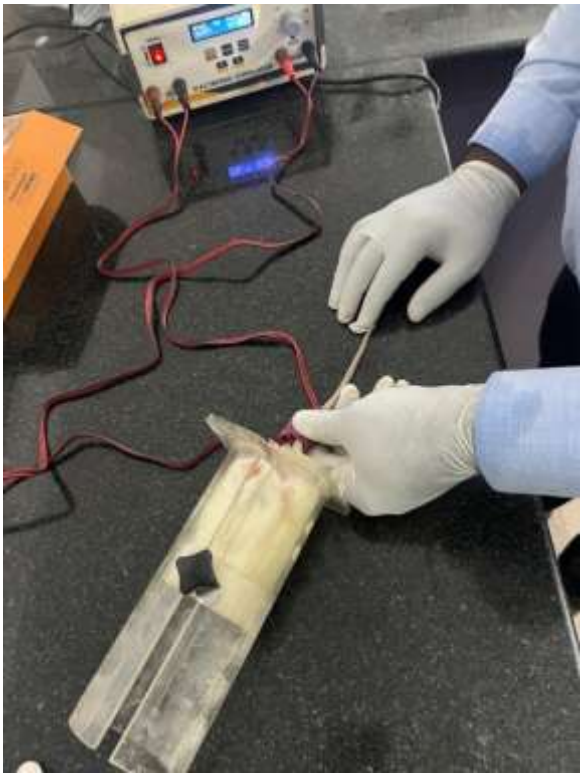
5.10 CHECKING BLOOD PRESSURE – TAIL CUFF METHOD



5.11 PREPARATION OF MEDICINE

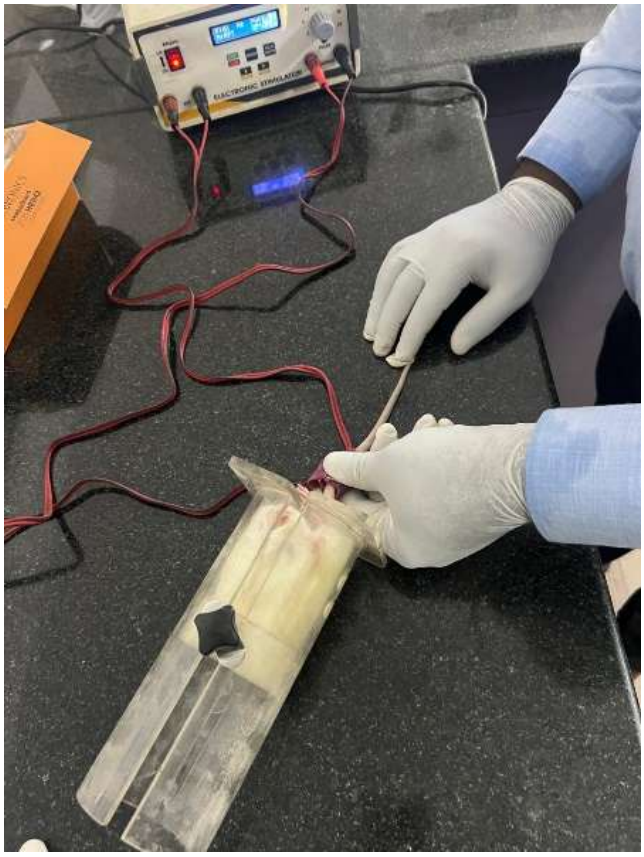
5.12 INJECTING CADMIUM CHLORIDE

5.13 CHECKING BLOOD PRESSURE AFTER INJECTING CADMIUM CHLORIDE



5.14 ADMINISTRING MEDICINE

5.15 CHECKING BLOOD PRESSURE AFTER ADMINISTRING MEDICINE



6. Results

Cadmium chloride administration resulted in a significant elevation of both systolic and diastolic blood pressure compared to the normal control group. Treatment with Benazepril significantly reduced blood pressure, validating the experimental model.

Homoeopathic treatment groups showed a gradual and significant reduction in blood pressure from day 7 onwards. By day 28, *Rauwolfia serpentina* 6CH and *Veratrum viride* mother tincture groups demonstrated blood pressure values close to normal controls, comparable to the standard drug group.

MEAN SYSTOLIC BLOOD PRESSURE

TABLE NO:1- MEAN SYSTOLIC BLOOD PRESSURE DAY-1

SL.NO	GROUP	MEAN SYSTOLIC BLOOD PRESSURE OF DAY-1
1.	GROUP- 1	119.67
2.	GROUP-2	123.33
3.	GROUP-3	120.33
4.	GROUP-4	125.33
5.	GROUP-5	125.67

6.	GROUP-6	126.67
7.	GROUP-7	122

CHART NO-1

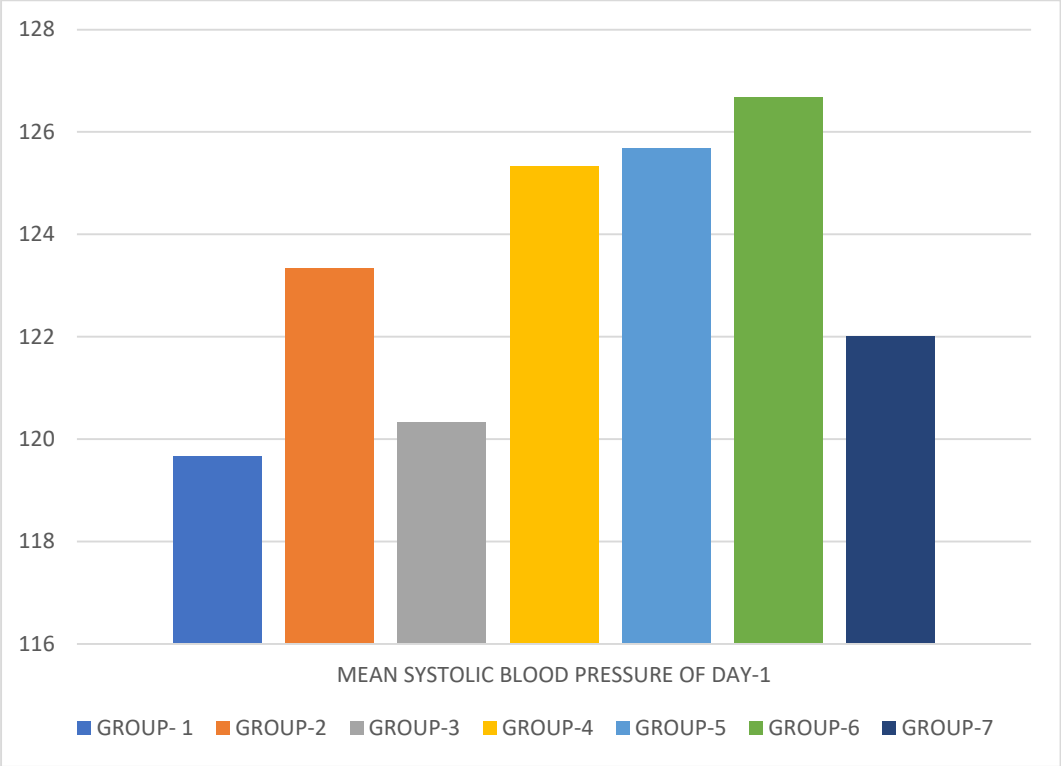


TABLE 2 - MEAN SYSTOLIC BLOOD PRESSURE DAY-7

SL.NO	GROUP	MEAN SYSTOLIC BLOOD PRESSURE OF DAY-7
1.	GROUP- 1	121.33
2.	GROUP-2	152.33
3.	GROUP-3	145
4.	GROUP-4	149
5.	GROUP-5	147.67
6.	GROUP-6	144.33
7.	GROUP-7	133.33

CHART NO.2

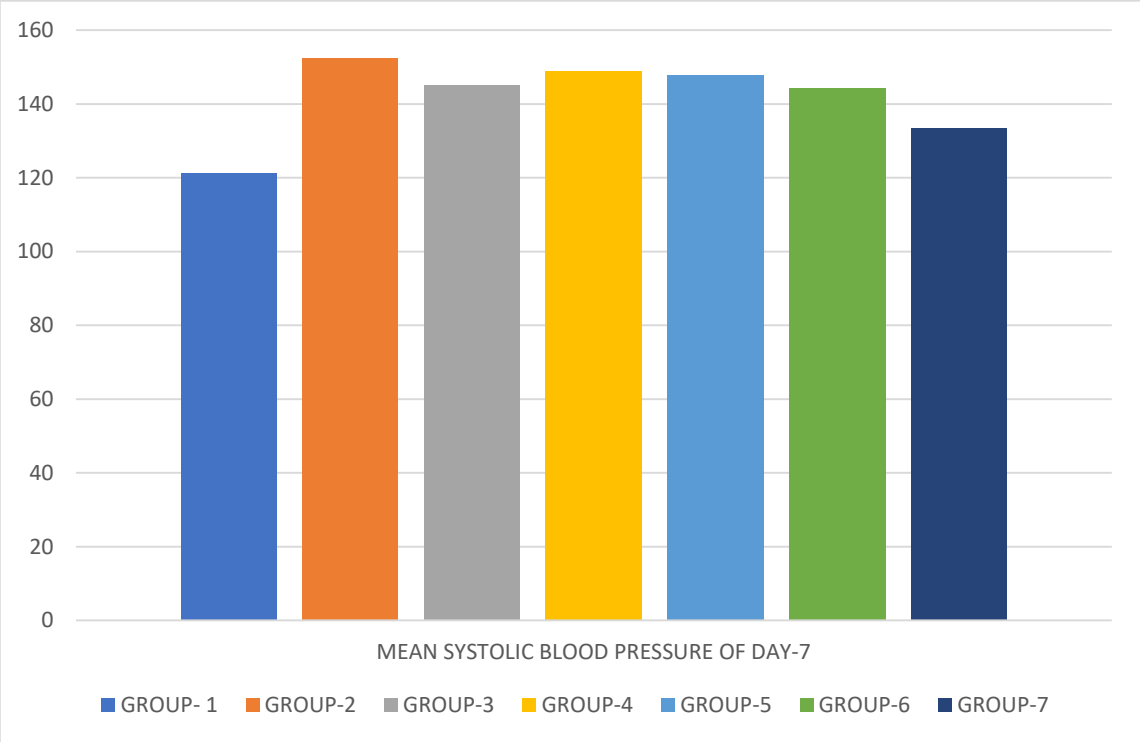


TABLE 3 - MEAN SYSTOLIC BLOOD PRESSURE DAY-14

SL.NO	GROUP	MEAN SYSTOLIC BLOOD PRESSURE OF DAY-14
1.	GROUP- 1	124.00
2.	GROUP-2	151.67
3.	GROUP-3	132.33
4.	GROUP-4	143.67
5.	GROUP-5	141.00
6.	GROUP-6	142.00
7.	GROUP-7	124.00

CHART NO.3

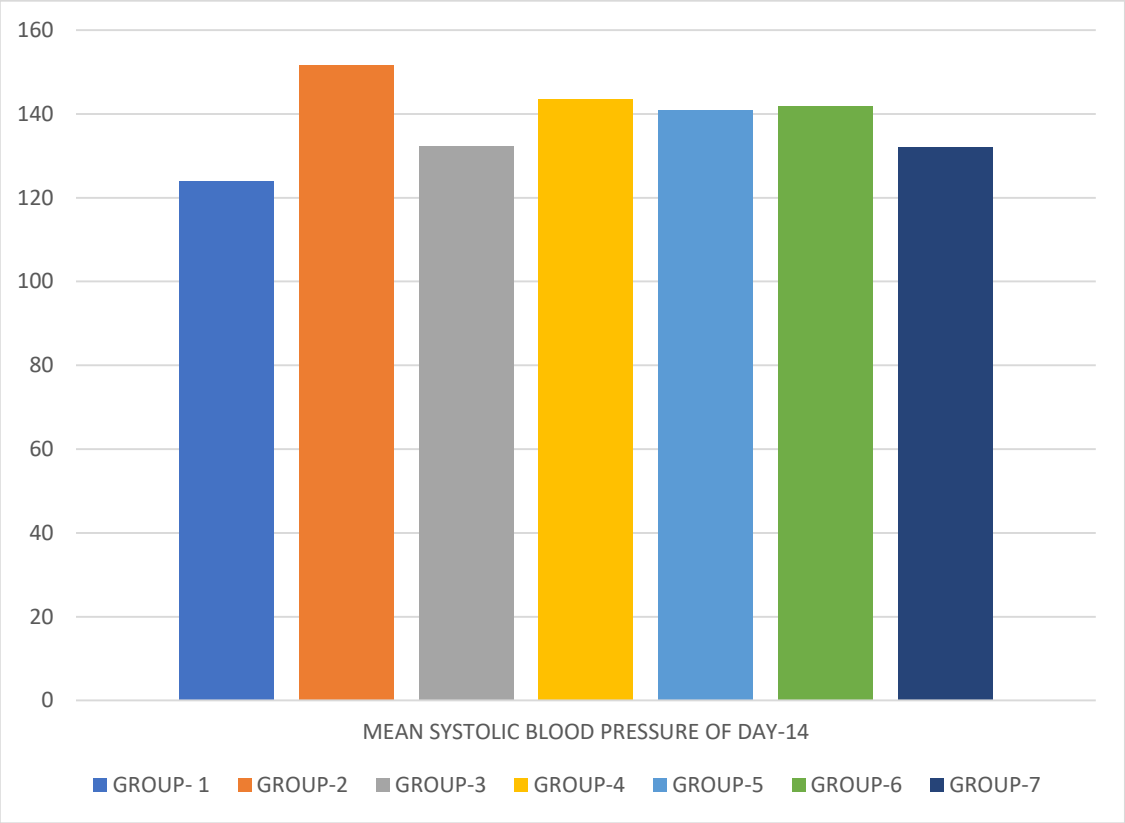


TABLE 4- MEAN SYSTOLIC BLOOD PRESSURE DAY-21

SL.NO	GROUP	MEAN SYSTOLIC BLOOD PRESSURE OF DAY-21
1.	GROUP- 1	123.67
2.	GROUP-2	152
3.	GROUP-3	130.67
4.	GROUP-4	143.33
5.	GROUP-5	138
6.	GROUP-6	139.67
7.	GROUP-7	132.67

CHART NO.4

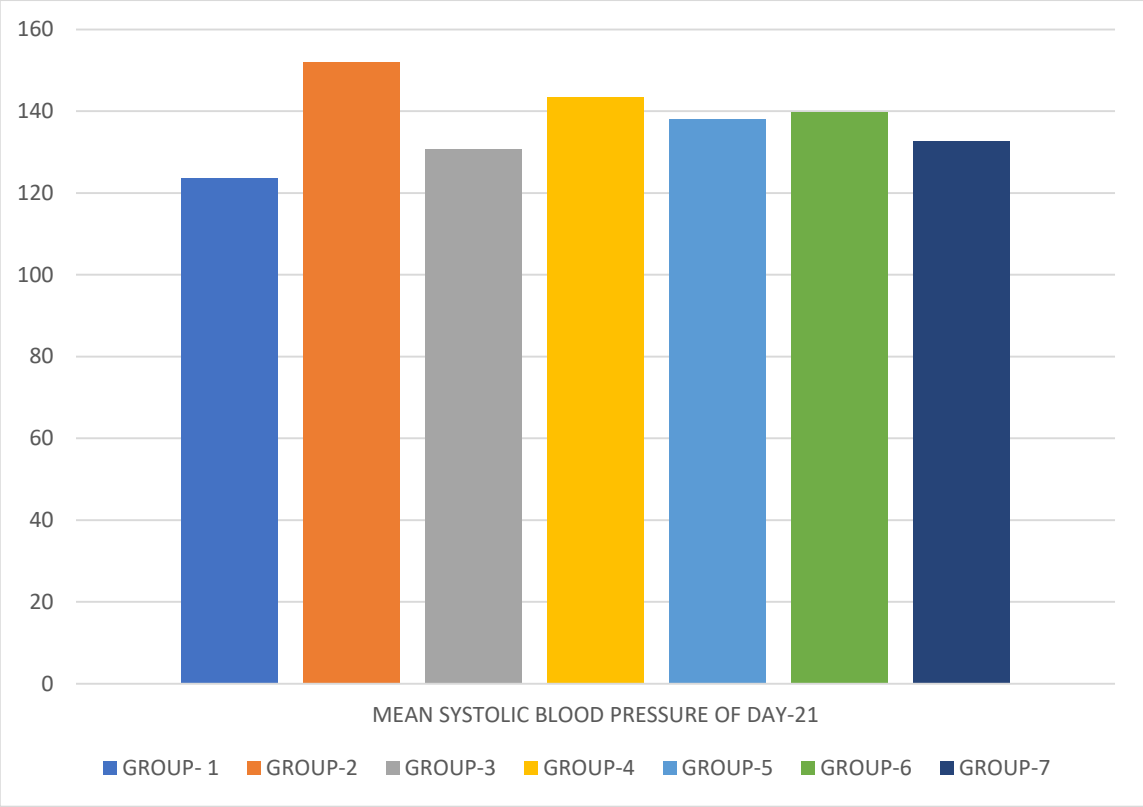


TABLE 5- MEAN SYSTOLIC BLOOD PRESSURE DAY-28

SL.NO	GROUP	MEAN SYSTOLIC BLOOD PRESSURE OF DAY-28
1.	GROUP- 1	121
2.	GROUP-2	152.33
3.	GROUP-3	121.33
4.	GROUP-4	141
5.	GROUP-5	128.67
6.	GROUP-6	135
7.	GROUP-7	122.67

CHART NO.5

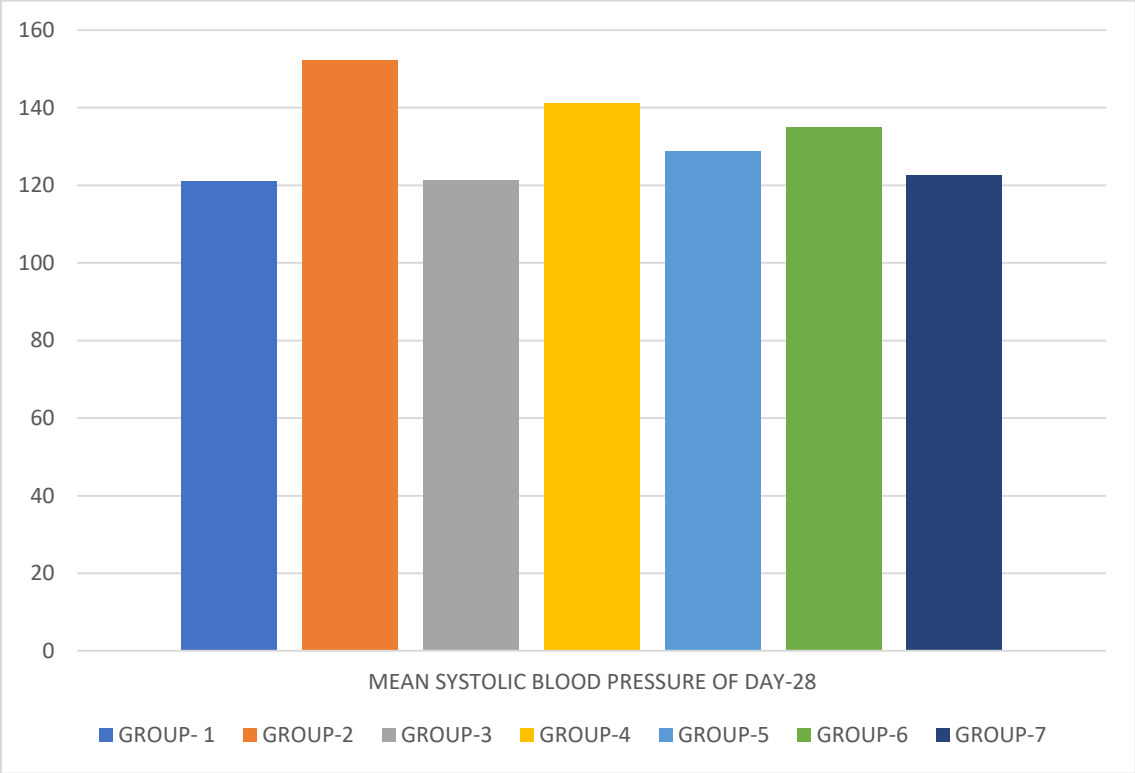


TABLE 6 - MEAN DIASTOLIC BLOOD PRESSURE DAY-1

SL.NO	GROUP	MEAN DIASTOLIC BLOOD PRESSURE OF DAY-1
1.	GROUP- 1	83.83
2.	GROUP-2	83.67
3.	GROUP-3	82.67
4.	GROUP-4	82.67
5.	GROUP-5	82.83
6.	GROUP-6	84.33
7.	GROUP-7	82.67

CHART 6

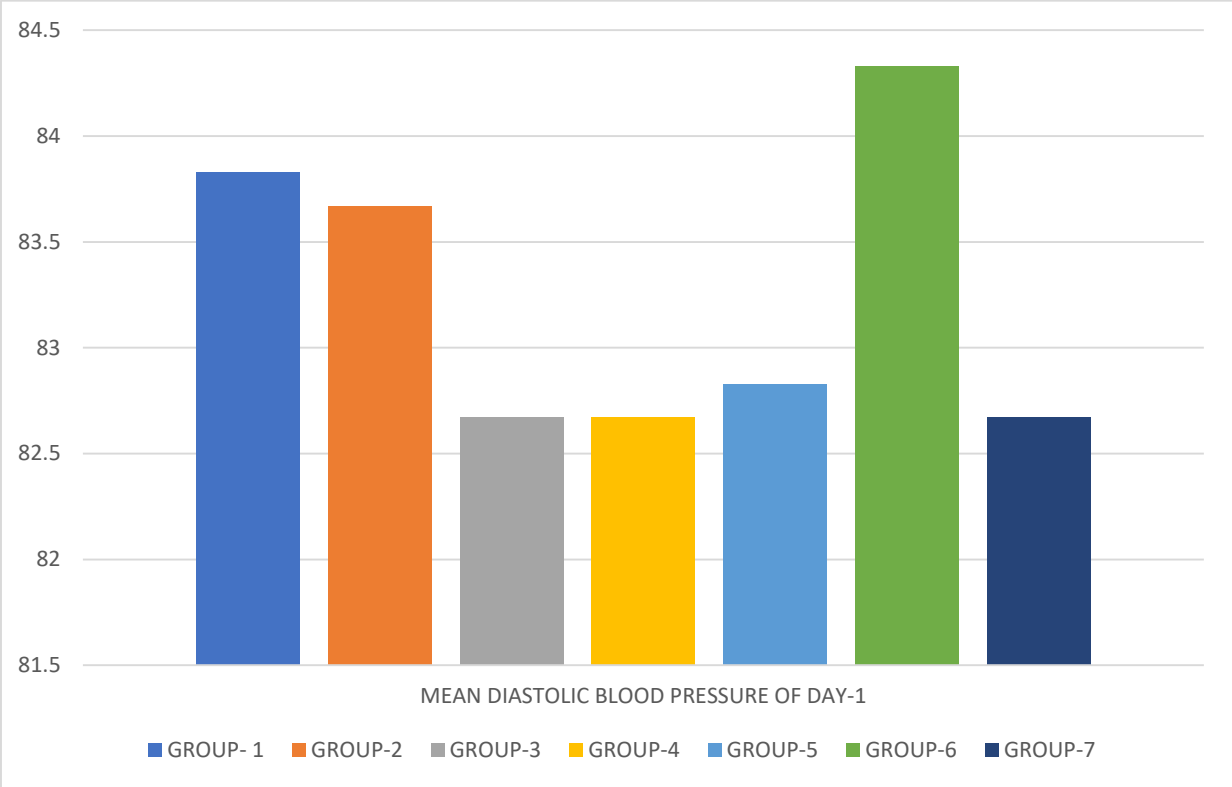


TABLE 7 - MEAN DIASTOLIC BLOOD PRESSURE DAY-7

SL.NO	GROUP	MEAN DIASTOLIC BLOOD PRESSURE OF DAY-7
1.	GROUP- 1	81.33
2.	GROUP-2	101
3.	GROUP-3	102.67
4.	GROUP-4	101.67
5.	GROUP-5	103
6.	GROUP-6	102
7.	GROUP-7	103.67

CHART 7

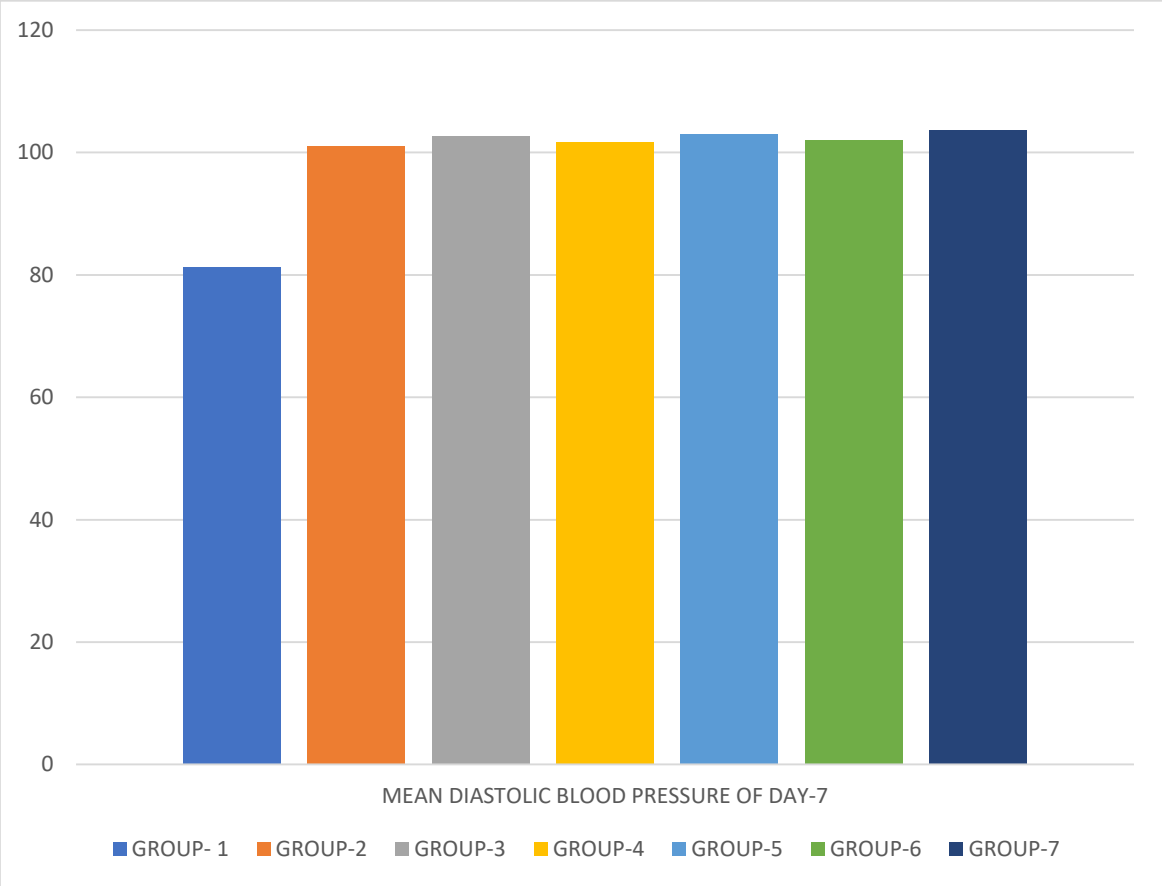


TABLE 8 - MEAN DIASTOLIC BLOOD PRESSURE DAY-14

SL.NO	GROUP	MEAN DIASTOLIC BLOOD PRESSURE OF DAY-14
1.	GROUP- 1	80.83
2.	GROUP-2	104.33
3.	GROUP-3	104.67
4.	GROUP-4	102.67
5.	GROUP-5	98.33
6.	GROUP-6	103
7.	GROUP-7	105

CHART 8

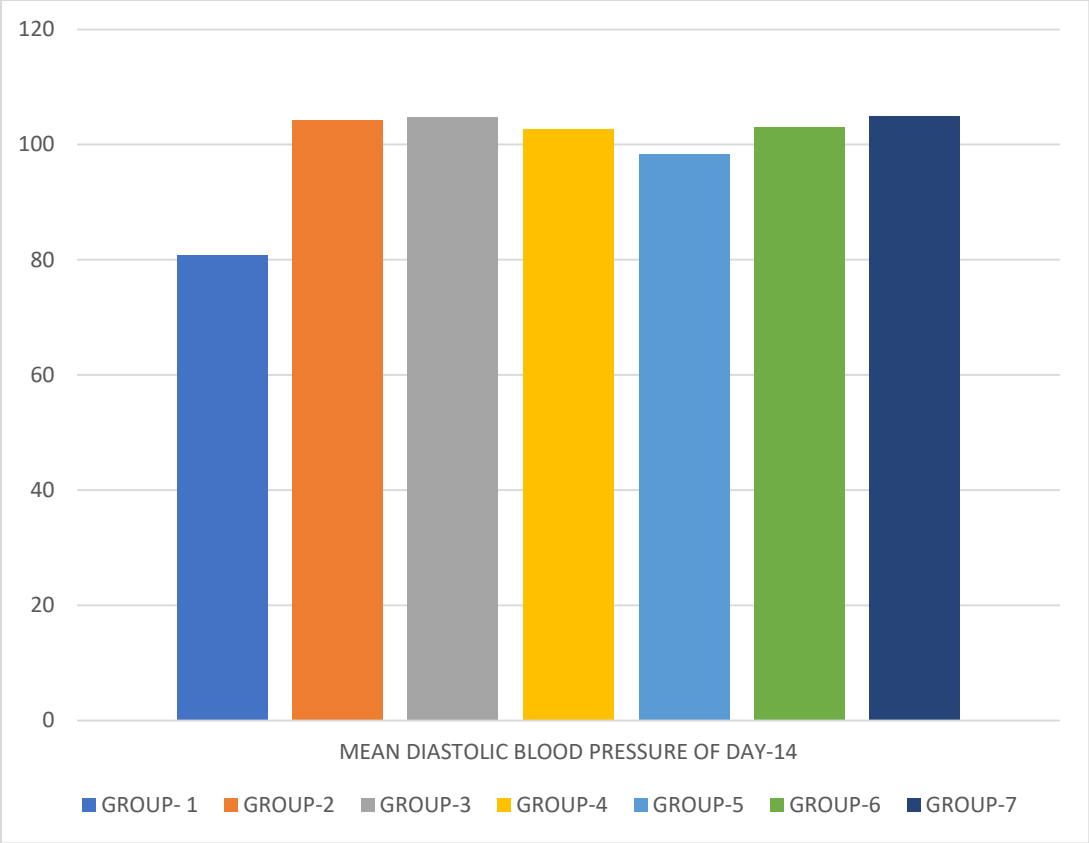


TABLE 9- MEAN DIASTOLIC BLOOD PRESSURE DAY-21

SL.NO	GROUP	MEAN DIASTOLIC BLOOD PRESSURE OF DAY-21
1.	GROUP- 1	81.5
2.	GROUP-2	105.33
3.	GROUP-3	85
4.	GROUP-4	93.33
5.	GROUP-5	95.67
6.	GROUP-6	95.33
7.	GROUP-7	98.5

CHART 9

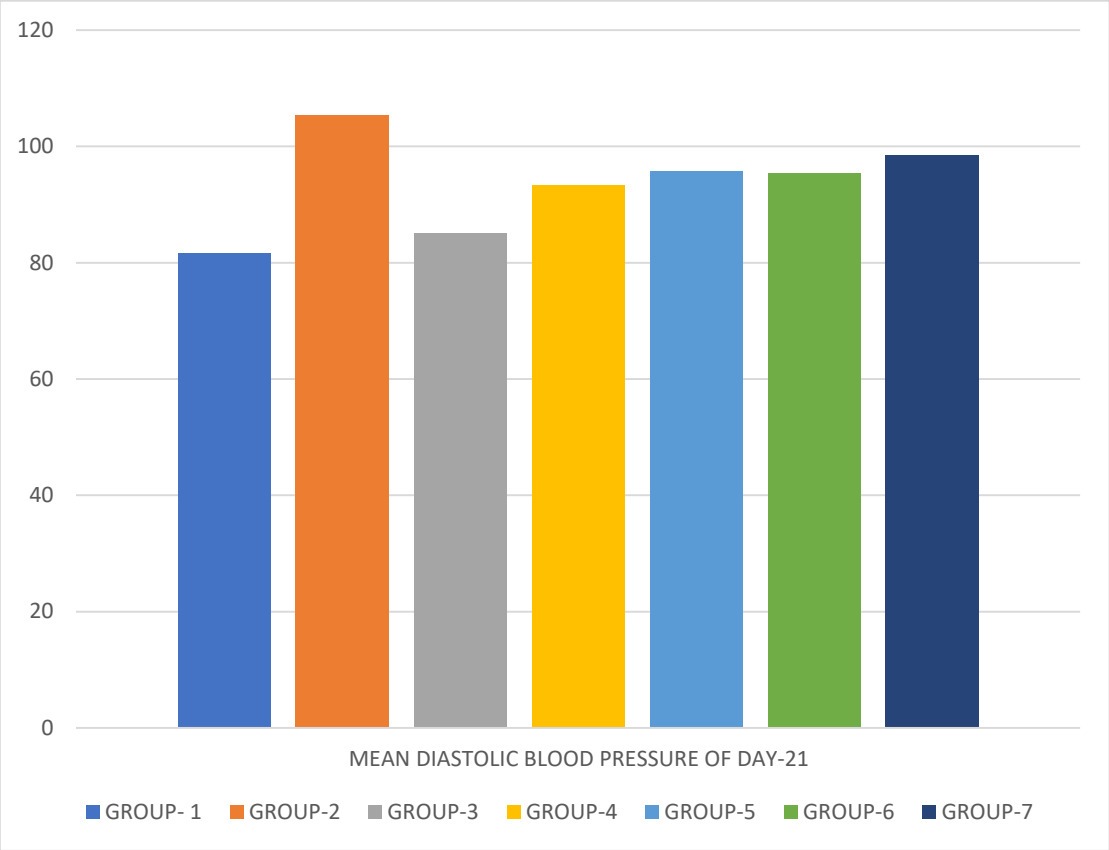


TABLE 10 - MEAN DIASTOLIC BLOOD PRESSURE DAY-28

SL.NO	GROUP	MEAN DIASTOLIC BLOOD PRESSURE OF DAY-28
1.	GROUP- 1	80.67
2.	GROUP-2	104
3.	GROUP-3	79.33
4.	GROUP-4	87
5.	GROUP-5	82
6.	GROUP-6	82.67
7.	GROUP-7	81.67

CHART 10

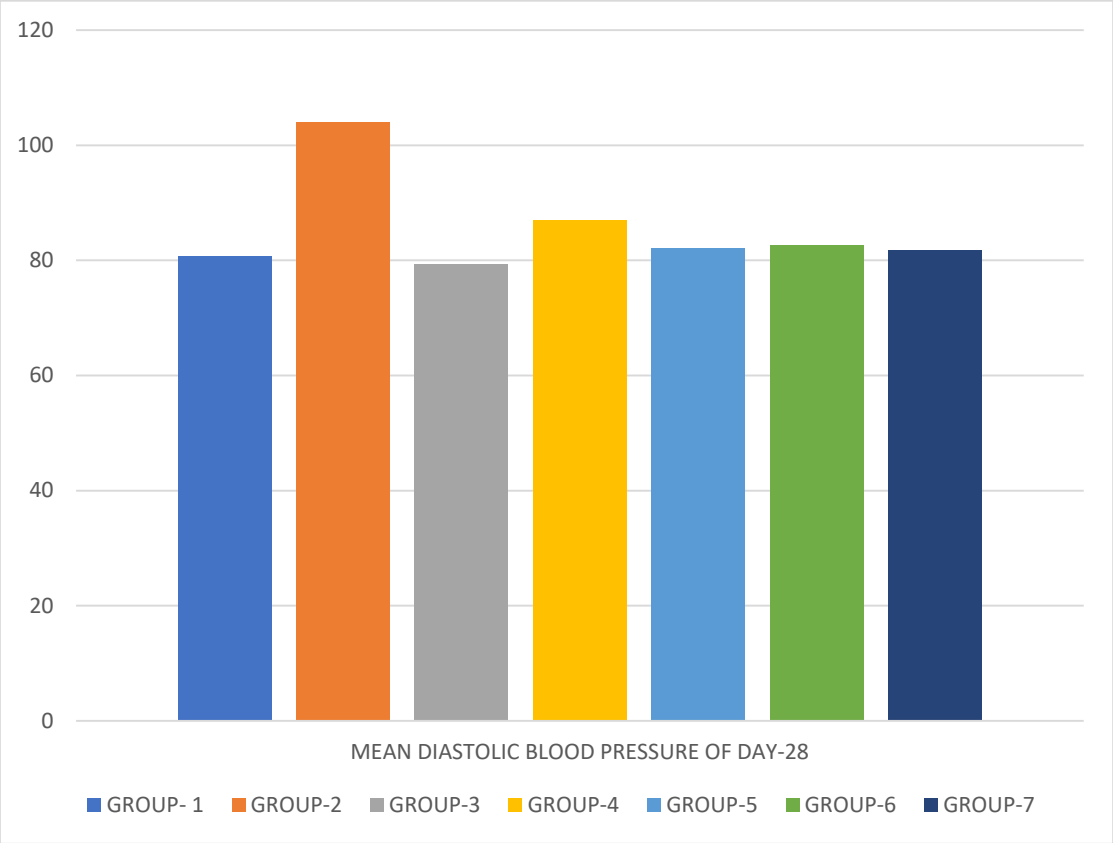


TABLE 11 - SYSTOLIC BLOOD PRESSURE COMPARISON BETWEEN AND WITHIN GROUPS

DAYS	BETWEEN GROUPS	WITHIN GROUPS
1	44.762	20.343
7	704.413	13.048
14	505.929	19.795
21	509.746	14.990
28	835.873	18.267

CHART 11

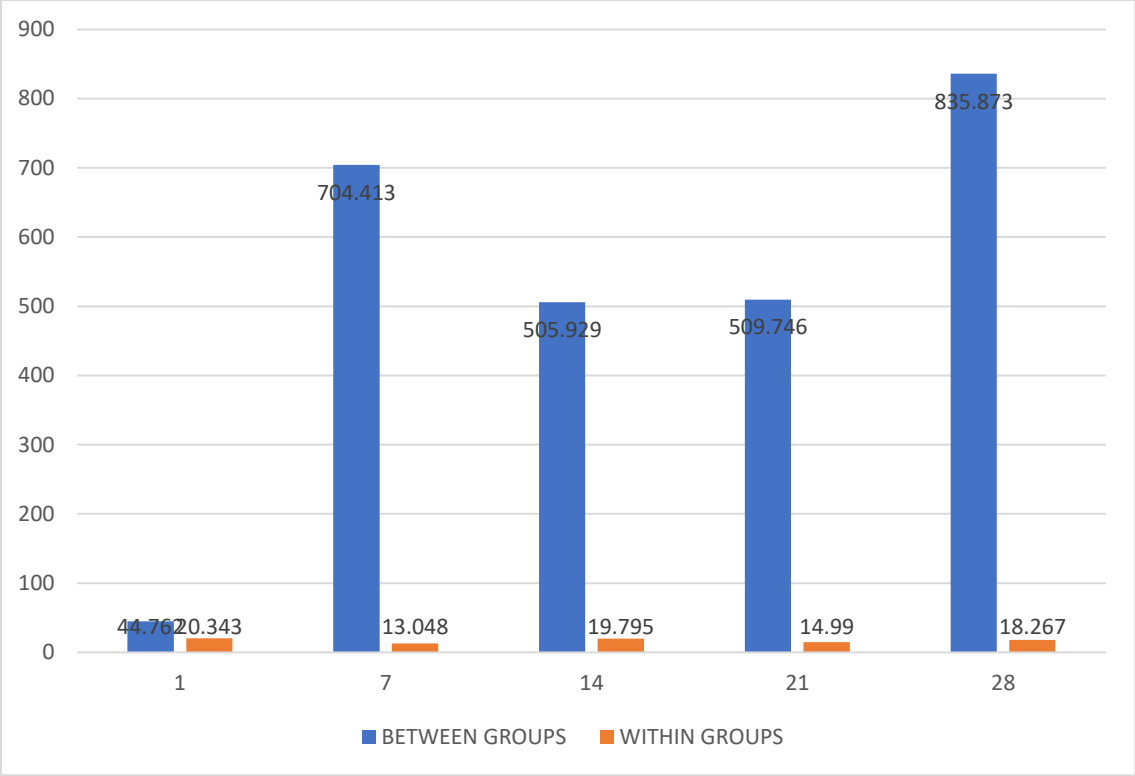
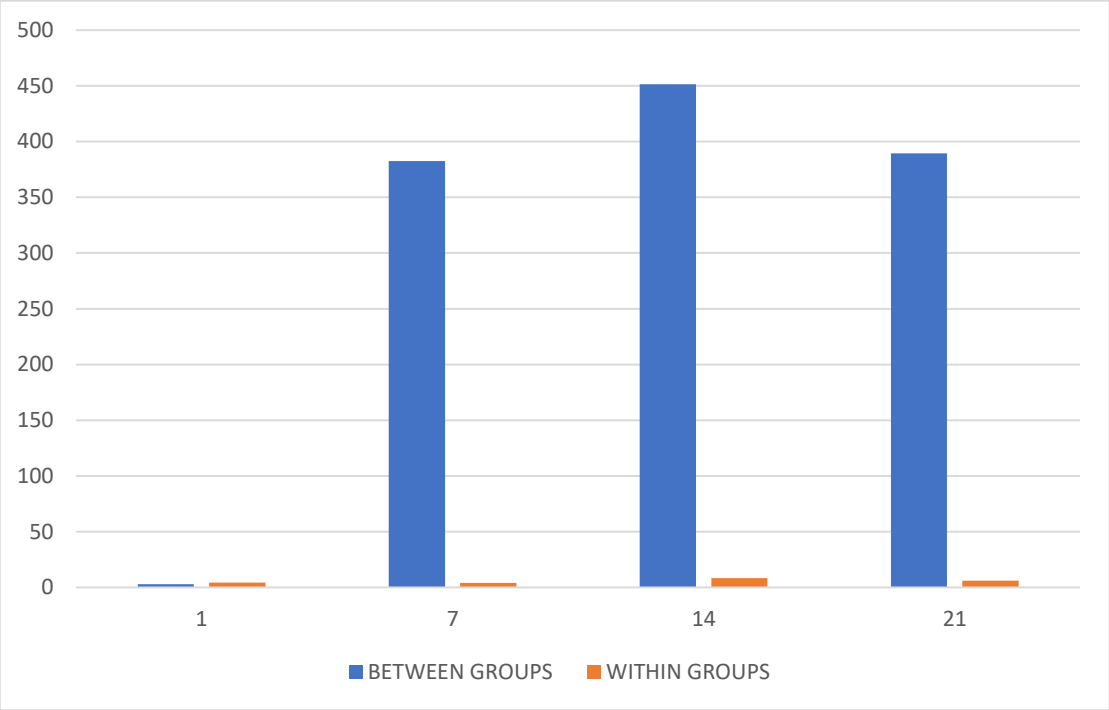


TABLE 12- DIASTOLIC BLOOD PRESSURE COMPARISON BETWEEN AND WITHIN GROUPS

DAYS	BETWEEN GROUPS	WITHIN GROUPS
1	2.881	4.352
7	382.667	3.924
14	451.611	8.462
21	389.357	6.010
28	440.667	6.724

CHART 12



7. Discussion

The present study demonstrates that homoeopathic *Rauwolfia serpentina* and *Veratrum viride* possess significant antihypertensive activity in cadmium chloride–induced hypertensive albino rats. The findings are consistent with traditional homoeopathic indications and earlier experimental observations.

The antihypertensive effect may be attributed to modulation of vascular tone, neurohormonal balance, and endothelial function. The results support the concept that homoeopathic medicines, even in high dilutions, can exert measurable biological effects under controlled experimental conditions.

8. Conclusion

The study concludes that homoeopathic *Rauwolfia serpentina* (30CH and 6CH) and *Veratrum viride* (mother tincture and 30CH) significantly reduce systolic and diastolic blood pressure in cadmium chloride–induced hypertensive albino rats. Their effects are comparable to the standard antihypertensive drug Benazepril, supporting their potential role as complementary therapeutic agents in hypertension.

9. Limitations and Future Scope

The study was limited to an animal model and short-term observation. Future studies involving biochemical markers, histopathological analysis, and controlled clinical trials are recommended to further validate these findings.

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