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A randomized comparative interventional study to assess the efficacy of individualized homoeopathic medicine and *Terminalia arjuna* in cases of primary hypertension

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Abstract
Background: Hypertension is considered to be silent killer as it is largely asymptomatic and patient may have elevated blood pressure for a long time. Hypertension is a grave medical condition, elevating the risks of heart, brain, kidney, and other diseases. Approximately 1.28 billion adults aged 30-79 worldwide grapple with hypertension, with the majority (two-thirds) residing in low- and middle-income countries. Alarmingly, an estimated 46% of adults with hypertension are unaware of their condition. Diagnosis and treatment rates remain low, with less than half (42%) of adults with hypertension being identified and treated.
Objective
- To assess the extent of improvement in cases of primary hypertension receiving individualized homoeopathic medicines.
- To assess the extent of improvement in cases of primary hypertension receiving predefined Homoeopathic medicine *Terminalia arjuna*.
- To compare between extent of improvement in both the cases.

Study Design: Comparative interventional study.
Methods: In each group, 45 cases of Primary hypertension were selected on the basis of inclusion and exclusion criteria. Patients in Group A were prescribed individualized homoeopathic medicine while those in Group B received predefined homoeopathic medicine *Terminalia arjuna*. Assessment and reassessments were done by measuring difference in mean arterial pressure before and after treatment.
Results: Primary hypertension was found to be more common in age group between 50 – 60 years, middle socio-economic and rural population. After treatment in Group A, the overall improvement percentage was 84% in which 26% showed marked improvement; 33.33% showed moderate improvement; and 24.44% showed mild improvement observed through decrease in mean arterial pressure. In group B, the improvement percentage was 68%, in which 22% showed marked improvement, 15% showed moderate improvement and 31% showed mild showed improvement observed through decrease in mean arterial pressure. A Paired samples t-test was conducted in both groups to compare pre and post mean arterial pressure. In Group A significant difference in mean arterial pressure was observed post treatment (M=105.71, SD=4.284), compared to pre-treatment (M=123.79, SD=6.434). Group B receiving predefined medicine *Terminalia arjuna*, decrease in mean arterial pressure post treatment (M=107.07, SD=3.984), compared to pre-treatment (M=121.38, SD=6.629), also showed significant difference. Thus, statistical result showed that there was significant difference in pre and post mean arterial pressure in both groups. This suggests that homoeopathic medicines were very effective in the treatment of Primary hypertension. An independent t-test war carried out to compare post treatment decrease in mean arterial pressure in both groups showed that extent of improvement was better in constitutional medicines group than second group in which *Terminalia arjuna* was given.
Conclusion: In this study, it was found that there is statistically significant difference in mean arterial pressure before and after treatment in patients of Primary hypertension. Role of *Terminalia arjuna* was enquired and found to be effective in lowering blood pressure. Thus, homoeopathic medicine can be safely employed in management of Primary hypertension.

Keywords: Subclinical hypothyroidism (SCH), thyroid-stimulating hormone, neck swelling, nat. MUR, individualisation, homoeopathy

Introduction
Hypertension is a condition characterized by persistent elevated pressure in the blood vessels. Defining hypertension is challenging, given the continuous distribution of blood pressure in a population.

Clinically, hypertension is often defined as the level at which therapeutic intervention reduces blood pressure-related morbidity and mortality. In adults, systolic pressure above 140 mm Hg and diastolic pressure above 90 mmHg on three separate readings recorded over several weeks is considered hypertensive.

Hypertension can be classified into

1. Primary or essential hypertension (90-95%) where no cause is identifiable.
2. Secondary hypertension (5-10%) where there is an underlying cause.

In 2019, high systolic blood pressure emerged as the leading Level 2 risk factor globally, causing 10.8 million deaths (19.2% of total deaths) [1]. Among females, the top five risk factors were high SBP, dietary risks, high FPG, air pollution, and high BMI, contributing significantly to female mortality rates in 2019 [1, 2]. In 2019, tobacco use, including smoking, second-hand exposure, and chewing, stood as the primary Level 2 risk factor for global male deaths, causing 6.56 million deaths (21.4% of all male deaths). Following closely was high systolic blood pressure (SBP), responsible for 5.60 million male deaths (18.2%). Combining both sexes, high SBP emerged as the leading Level 2 risk factor, contributing to 10.8 million deaths (19.2% of all deaths), followed by tobacco, which accounted for 8.71 million deaths (15.4% of all deaths) [2, 3]. The Global Burden of Disease (GBD) study identified the top three risk factors for global disease burden in 2019 as high blood pressure, high fasting plasma glucose, and high body mass index, marking a significant shift from 1990 when childhood undernutrition held the top rank [3]. High hypertension prevalence is observed among Indians, especially in young adults (20-44 years), with one in three participants affected. In India, there are approximately 234 million adults with hypertension among the 762 million aged 18 and above, surpassing the prevalence in a comparable U.S. population (22.4% vs. 10.5%, respectively) [4]. Globally, around 17.6% of hypertensive patients reside in India, indicating a potential surge in cardiovascular diseases. Notably, one-third of urban Indian adults and nearly one-fourth of rural adults are hypertensive. Regional variations exist in rural areas, while urban areas show consistent hypertension prevalence. Awareness and treatment rates differ, with only a quarter of rural Indians with hypertension being aware and treated, compared to higher rates in urban areas.

Only one-tenth of rural Indians and one fifth of urban Indians with high blood pressure have their blood pressure under control [5].

In light of these findings, urgent measures to enhance health education and health promotion, particularly focusing on modifiable risk factors and awareness of blood pressure, need to be implemented on a large scale by policymakers. In spite of existing measures, the cases of hypertension are on the rise and current treatment protocol seems to be largely insufficient in preventing and managing hypertension in general public. Also prolong use of medication disposes patient to burden of stress and various side effects. As aetiology of primary hypertension is not known, a homoeopathic treatment which evaluate patient on physical, mental and emotional plane, being safe and generally not associated with any side effects is a need of hour. The present study will explore the role of individualised homoeopathic medicine and predefined medicine *Terminalia arjuna* and substantiating their use in management of primary hypertension.

5. Materials and methods Study Setting

The present study was conducted on patients who attended the OPD/IPD at Dr. Girendra Pal Homoeopathic Hospital and Research Centre, Saipura, Sanganer, Jaipur, Rajasthan.

Study Duration

The study was undertaken for a duration of 12 months, from Feb 2021 to Feb 2022. During the first nine months, 90 cases were registered and each case was followed up for a minimum of 3 months, each follow up at 15 days interval.

Selection of Samples

A total of ninety (90) cases were included in the study, encompassing both sexes and individuals aged 30 and above meeting the specified inclusion and exclusion criteria. The selection of cases was done by simple random table method.

Sample size for the present study was calculated by using the following formula:

$K = n2/n1 = 1$

$n1 = (\sigma 12 + \sigma 22/K)\ (z1-\alpha/2 + z\ 1-\beta\ )2/\ \Delta 2$ n1 = (18.32+18.32/1) (1.96+0.84)/11.342 n1 = 41

$n2 = K * n1 = 41$

$\Delta = |\mu 2-\mu 1|$ = absolute difference between two means $\sigma 1$, $\sigma 2$ = variance of mean #1 and #2

n1 = sample size for group #1 n2 = sample size for group #2

α = probability of type I error (usually 0.05) β = probability of type II error (usually 0.2) z = critical Z value for a given α or β

k = ratio of sample size for group #2 to group #11.

45 patients will be selected in each group.

Experimental Group – Medicinal intervention is given in these two groups

1. Group A- Receiving individualized homeopathic medicine.
2. Group B- Receiving predefined homeopathic medicine *Terminalia arjuna*.

Inclusion / exclusion criteria

Inclusion criteria

1. Patients
2. Experiencing essential hypertension involves different stages: Stage I hypertensives have systolic blood pressure (SBP) ranging from 140 to 159 mm Hg and diastolic blood pressure (DBP) ranging from 90 to 99 mm Hg; Stage II hypertensives exhibit SBP between 160- and 179-mm Hg and DBP between 100- and 109-mm Hg; Stage 3 hypertension is characterized by SBP exceeding 180 mm Hg and DBP surpassing 110 mm Hg.
3. Aged 30-80 years.
4. of both sexes
5. the individual's history, examination, and routine investigations provided no apparent evidence of secondary causes and
6. Providing written informed consent

Exclusion criteria

Excluded cases were those that met certain criteria.

1. The diagnosis or historical findings lacked clarity or certainty
2. Suspicion of a secondary cause for hypertension arose from the physical examination or routine investigations.
3. Provisional or confirmatory diagnoses of secondary hypertension were assigned to the cases.
4. Continued anti-hypertensive therapy was administered for a minimum of six months.
5. The cases were characterized by malignant hypertension, with systolic blood pressure (SBP) exceeding 200 mm Hg and diastolic blood pressure (DBP) surpassing 140 mm Hg
6. Patients were experiencing isolated systolic hypertension, characterized by systolic blood pressure (SBP) equal to or greater than 140 mm Hg and/or diastolic blood pressure (DBP) less than 90 mm Hg, a condition predominantly observed in elderly patients.
7. Immunocompromised individuals were among the patient population
8. Cases diagnosed with developmental defects or congenital abnormalities.
9. Patients who were pregnant, breastfeeding, or had a likelihood of pregnancy were excluded and
10. Patients with a documented history of drug and/or alcohol abuse were considered in the evaluation.
11. Cases that refused to provide consent for the study.
12. The cases which require emergency care / rescue treatment.

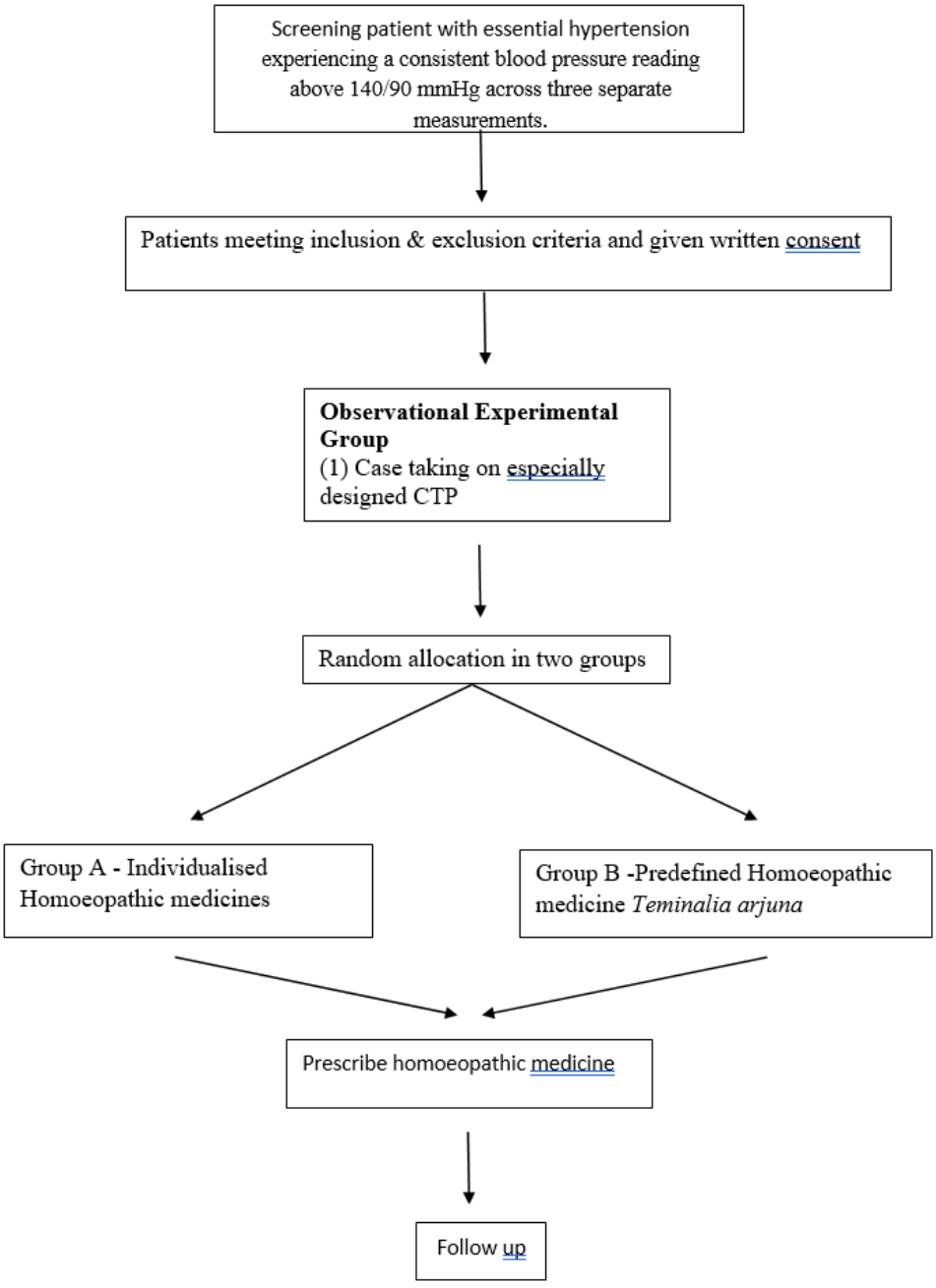
Drop out

- Poor compliance of the patient.
- Not proper follow up, or medicines were not take as directed by physician.

Study Design

Comparative interventional study

Brief of procedure



Intervention

- Group A: Constitutional medicines were prescribed after forming the totality of symptoms and taking the help of repertory and Materia Medica.
- Group B: Predefined medicine *Terminalia arjuna* was given.
- Potency- According to susceptibility of patient from 30 C,200 C,1M,10M.
- The administration of medicines' duration and repetition adhered to the Hahnemannian guidelines as outlined in the 5th edition of the Organon of Medicine.
- Route of administration- oral.
- Dispensing- medicines were dispensed in globule form (size 60) From dispensary of hospital attached to college Dr. Girendra Pal Homoeopathic Medical College, Hospital & Research Centre, Jaipur.
- Manufacturer- Medicine was procured from GMP Certified Pharmacy.

Selection of tools

- A specifically designed Case Taking Proforma (Appendix I) will be completed at the initiation of the research study, and follow-ups will be conducted at 7 days post-intervention
- Patient consent form
- Individualised homoeopathic medicine
- Specific homoeopathic medicine *Terminalia arjuna*

Data Collection

All the Data of the study was maintained in soft and hard copy after proper follow-ups. A complete history, examination and prescription were done.

- Case taking proforma: All the data of each case was filled on special designed case taking proforma which was approved by the guide for the study.
- Case taking: Detailed case taking for each selected case was conducted using a specially designed proforma, aligning with homeopathic principles.
- Diagnostic criteria: The diagnosis was established through clinical examination.
- Follow-ups: All cases underwent re-examination at intervals of 7-15 days, and data were recorded for a minimum of 6 follow-ups.
- Record: All necessary study data was documented on an approved master chart in the appropriate Excel format.
- Auxiliary measures included advising patients to follow the DASH diet, engage in regular exercises, and maintain low sodium intake.

Data Analysis

Outcome Assessment: Data analysis was done in Microsoft Excel Sheet on the basis of mean arterial pressure, before treatment and after treatment. Following procedures were adopted to get the result in percentage of the treatment.

Improvement

- **Marked** - > 25 mmHg
- **Moderate** – 16-20 mmHg
- **Mild** – 10-15 mmHg
- **No significant improvement** - < 10 mmHg
- **Status quo** – When there is no change in mean arterial pressure.
- **Worse** – Increase in mean arterial pressure
- **Drop out**– Irregular follow ups.

Statistical techniques

- The statistical analysis for pre and post-treatment scores within the group will involve the application of a paired t-test to determine the results of the study.
- Independent t-test will be used for outcome measures and comparisons between two groups.
- Before treatment: [mean ± SEM]
- After treatment: [mean ± SEM]

Data was analysed using SPSS software.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of Homoeopathy University, Jaipur.

Consent, confidentiality, privacy, and safety of the participants was maintained throughout the study.

- Prior to commencement of the treatment patient was informed about the study and its outcome.
- Explanation of the research study will be provided in Patient Information Sheet.
- Institutional Ethics Committee (IEC) ethical clearance was obtained.

Observation and Results

The study was conducted on patients who attended the OPD/IPD at Dr. Girendra Pal Homoeopathic Hospital and Research Centre, Saipura, Sanganer, Jaipur, Rajasthan. Ninety cases (45 in each group) were initially selected based on inclusion and exclusion criteria, but 8 cases were later dropped due to irregular follow-ups.

Distribution of Cases of Primary Hypertension According To “Sex”

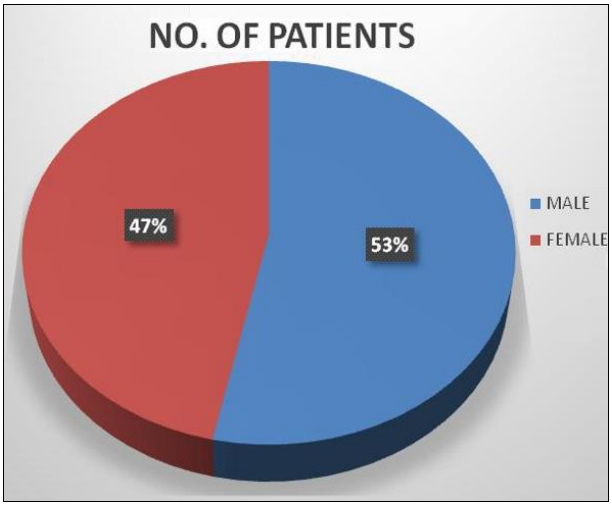


Fig 2: Graphical representation of distribution of cases of primary hypertension according to “Sex”

The above observation shows that out of the maximum number of reporting cases inclusive of both males and females suffering from primary hypertension of varied grades, male preponderance is evident. Out of sample size of 90 patients, 48 (53%) were males and 42 (47) were females.

Distribution of Cases of Primary Hypertension According To "Age Group"

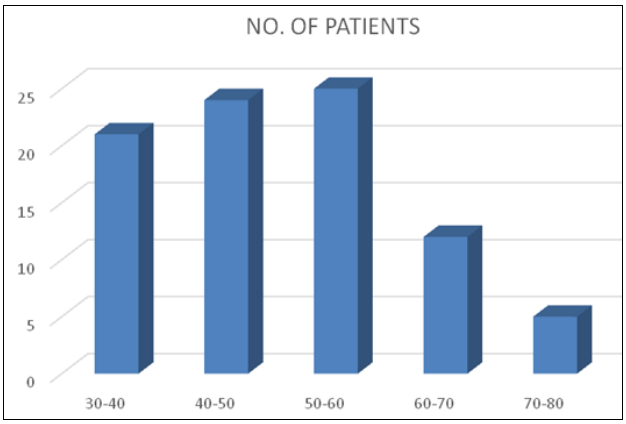


Fig 3: Graphical representation of distribution of cases of primary hypertension according to "Age group"

In this study, it was observed that maximum number of reporting cases were in the age group 50- 60 years i.e., 25 cases (27.77%) followed by 24 patients (26.66%) in age group of 40-50; 21 patients (23.33%) in age group of 30-40; 12 patients (13%) in age group of 60-70; 5 patients (5.55%) in age group of 70 and above. The reported patient ages ranged from a minimum of 31 years to a maximum of 70 years.

Distribution of Cases of Primary Hypertension According to "Area of Residence"

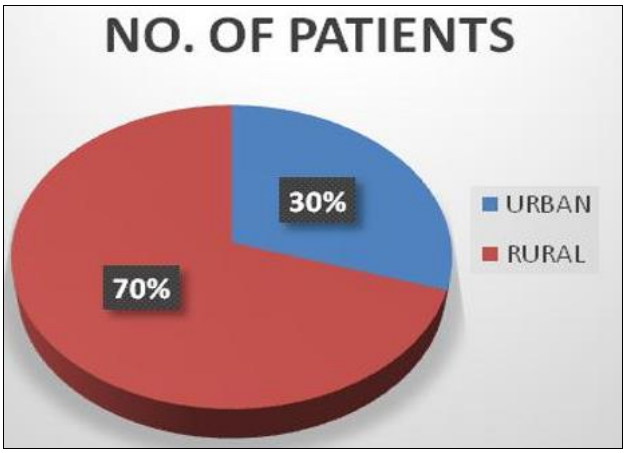


Fig 4: Graphical representation of distribution of cases of primary hypertension according to "Area of residence"

The present study showed greater prevalence of primary hypertension in Rural population than Urban as study was conducted mainly in rural area. The maximum patients reported were of Rural population comprising 63 (70%) whereas Urban population comprised 27 (30%) of the total sample size.

Distribution of cases of primary hypertension according to "socio- economic status"

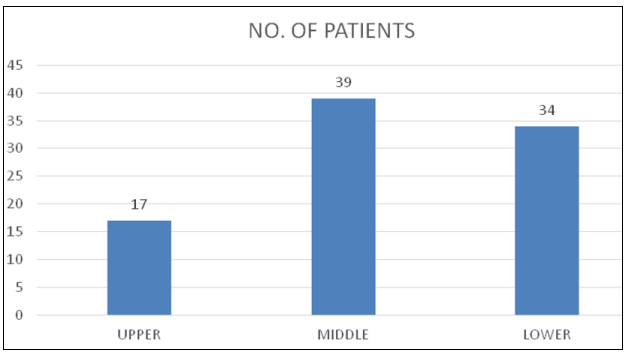


Fig 5: Graphical representation of distribution of cases of primary hypertension according to "Socio-economic status"

In this study maximum incidence of Primary hypertension were observed in middle- and lower-class society i.e., 39 cases (43.33%) and 34 cases (37.77%) of the total patient and minimum incidences were observed in upper class i.e., 17 cases (18%).

Distribution of Cases of Primary Hypertension According to "Grade"

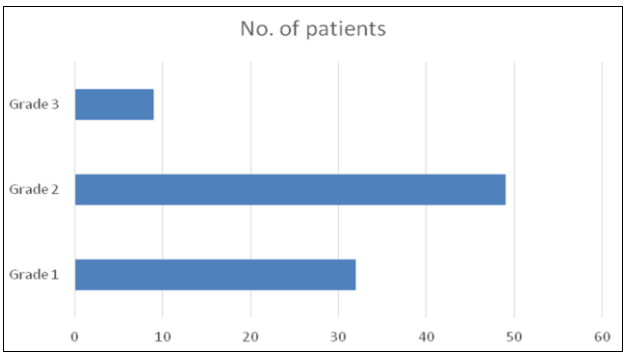


Fig 6: Graphical representation of distribution of cases of primary hypertension according to "Severity"

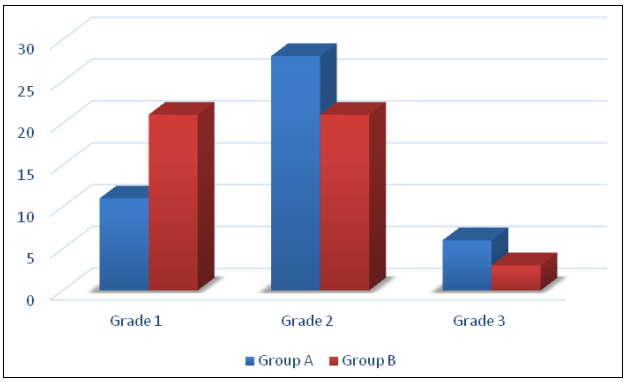


Fig 7: Graphical representation of distribution of cases of primary hypertension in both groups according to Grade

Out of 90 cases, 32 cases fall in the category of Grade I hypertension, 49 cases were in category of Grade 2 hypertension and 9 cases were in Grade 3 hypertension category. In 32 cases belonging to grade 1 hypertension, 11 were in Group A and 21 in Group B; in 49 cases of Grade 2 hypertension, 28 were in Group A and 21 in Group B; and in 9 cases of Grade 3 Hypertension, 6 were in Group A and 3 were in Group B.

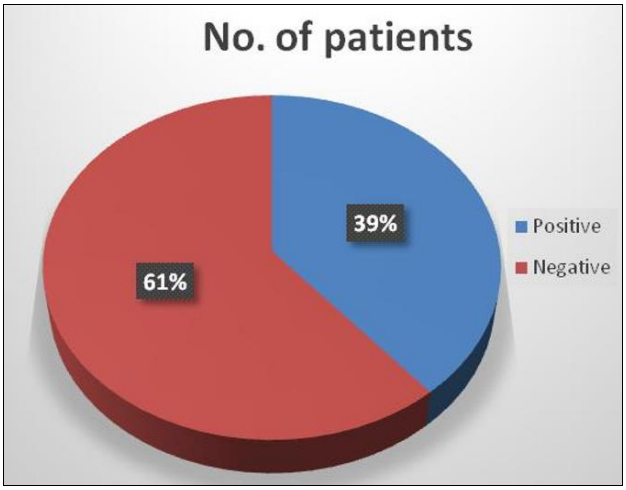


Fig 8: Graphical representation of distribution of cases of primary hypertension according to "Family history"

Distribution of Cases of Primary Hypertension According to "Family History": As shown in above chart, out of 90 cases, maximum cases i.e., 55 cases had negative history of primary hypertension and 34 cases had positive history of primary hypertension in family.

Comparative Distribution of Cases of Primary Hypertension According to "Status of Patient In Both Groups": In constitutional group, the overall improvement percentage was 84% in which 26% showed marked improvement; 33.33% showed moderate improvement; and 24.44% showed mild improvement which was observed from decrease in mean arterial pressure. In group B, the improvement percentage was 68%, in which 22% showed marked improvement, 15% showed moderate improvement and 31% mild showed improvement which was observed from decrease in mean arterial pressure.

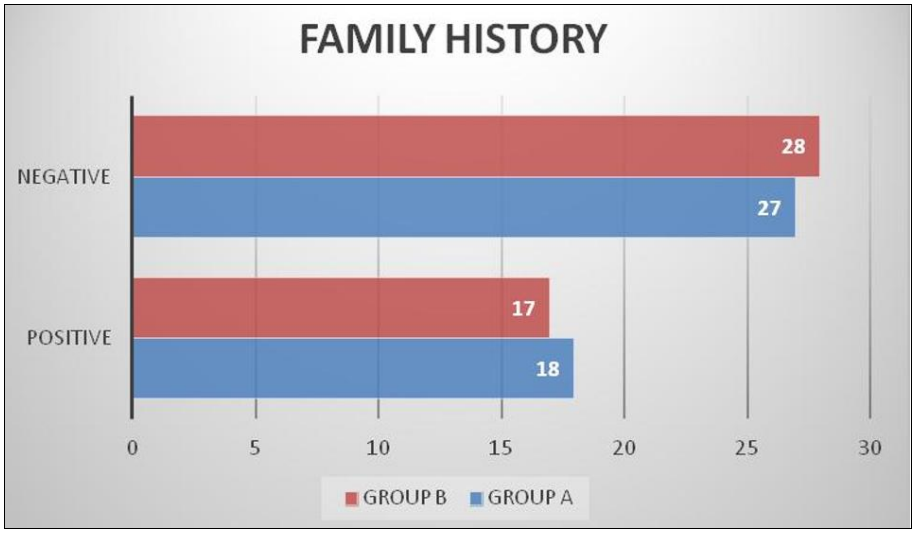


Fig 9: Graphical representation of distribution of cases of primary hypertension according to Family history in both groups

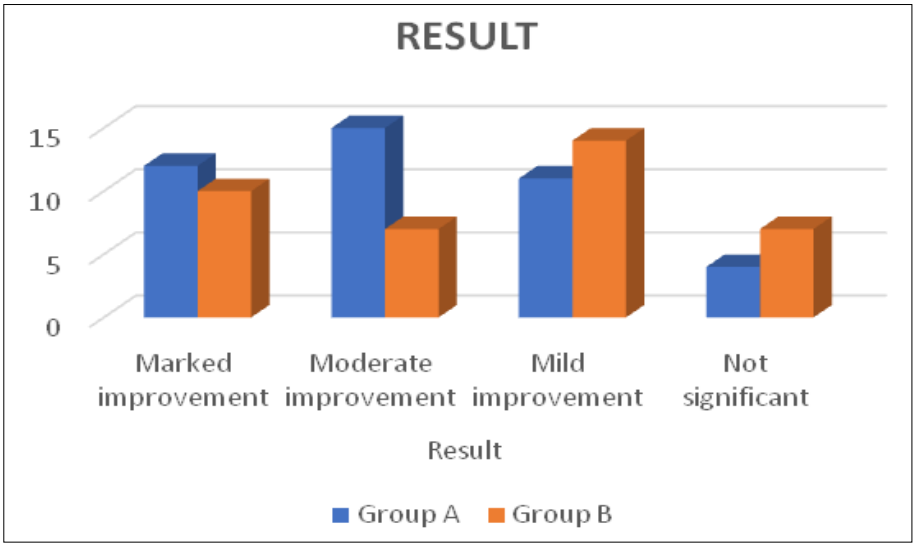


Fig 10: Graphical comparative distribution of cases of primary hypertension according to "status of patient in both groups"

Distribution of Cases of Primary Hypertension According to "Constitutional Medicine Used for Treatment in Group A"

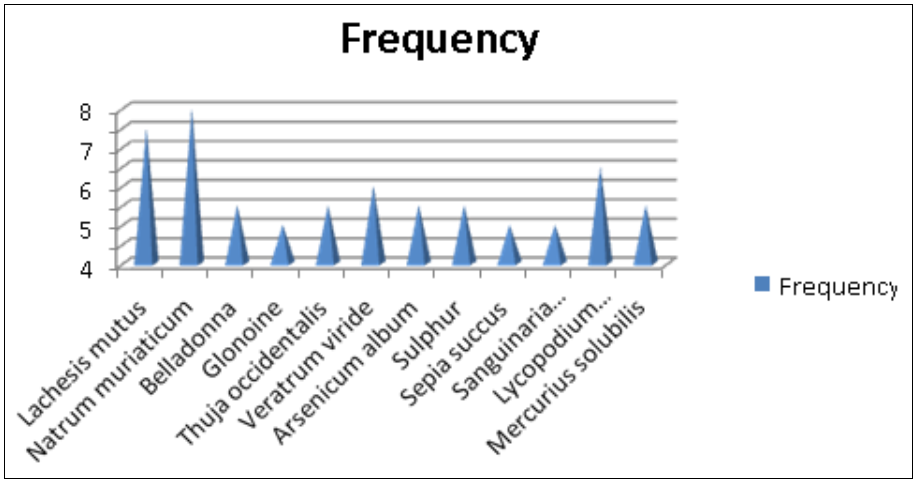


Fig 11: Graphical representation of 45 cases of primary hypertension according to frequency of medicines given in Group

In this study *Natrium muriaticum* (7 times) was prescribed most of the time in constitutional group followed by *Lachesis mutus* (8 times), *Lycopodium clavatum* (5 times), *Verartrum viride* (4 times); Belladonna, *Arsenicum album*, *Thuja occidentalis* and *Mercurius solubilis* each 3 times; Glonoine, sepia succus and *Sanguinaria canadensis* each 2 times out of 45 patients and in second group *Terminalia arjuna* was given.

Statistical analysis hypothesis

- **Null Hypothesis (H0):** Individualized homoeopathic medicines and *Terminalia arjuna* are equally effective in treatment of primary hypertension.
- **Alternate hypothesis (H1):** Individualized homoeopathic medicines are more effective in cases of primary hypertension than *Terminalia arjuna*.
- **Alternate hypothesis (H2):** *Terminalia arjuna* is more effective than individualized homoeopathic medicines in cases of primary hypertension.
- **Alternate hypothesis (H3):** *Terminalia arjuna* is not effective in cases of primary hypertension.

To accomplish the goal, Paired t-test was applied to calculate difference before and after treatment in mean arterial pressure.

$$t = \frac{\sum d}{\sqrt{\frac{n(\sum d^2) - (\sum d)^2}{n-1}}}$$

Where, Σd is the sum of the differences of mean arterial pressure.

Application of t-test in Group A

Table 3: Paired sample statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	MAP_PRE_A	123.79	42	6.434	0.993
	MAP_POST_A	105.71	42	4.284	0.661

Table 4: Paired sample correlations

Paired Samples Correlations					
		N	Correlation	Significance	
				One-Sided p	Two- Sided p
Pair 1	MAP_PRE_A & MAP_POST_A	42	0.270	0.042	0.083

Table 5: Paired samples test

Paired Samples Test										
		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	MAP_PRE_A -MAP_POST_A	18.071	6.697	1.033	15.985	20.158	17.488	41	0.000	0.000

A Paired samples t- test was conducted to compare pre and post mean arterial pressure of primary hypertension in 42 patients, treated by homoeopathic medicines using constitutional approach. Above data showed that there was a significant difference in mean arterial pressure (M=105.71, SD=4.284), compared to pre-treatment (M=123.79, SD=6.434), indicate better in mean arterial pressure after treatment with Constitutional Homoeopathic medicine, difference of mean = 18.071, t (42) = 17.488, p < .001. This result suggests that patients of primary hypertension were improved significantly after receiving constitutional homoeopathic medicines.

Table 6: Paired sample statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	MAP Pre B	121.38	42	6.629	1.023
	MAP Post B	107.07	42	3.984	0.615

Table 7: Paired Samples Correlations

Paired Samples Correlations					
		N	Correlation	Significance	
				One-Sided p	Two-Sided p
Pair 1	Map Pre B & Map Post B	42	0.268	0.043	0.087

Table 8: Paired Samples Test

Paired Samples Test										
		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	Map Pre B - Map Post B	14.310	6.759	1.043	12.203	16.416	13.721	41	0.000	0.000

Application of t – test in Group B: A Paired samples t-test was conducted to compare pre and post mean arterial pressure of primary hypertension in 42 patients, treated by homoeopathic medicines using constitutional approach.

Above data showed that there was a significant difference in mean arterial pressure (M=107.07, SD=3.984), compared to pre-treatment (M=121.38, SD=6.629), indicate better in mean arterial pressure after treatment with Constitutional Homoeopathic medicine, difference of mean = 14.310, t (42) = 13.721, p < .001. This result suggests that patients of primary hypertension were improved significantly after receiving specific medicine *Terminalia arjuna*.

Application of independent t-test in both groups Independent t test for comparison

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_{\bar{\Delta}}}$$

where

$$s_{\bar{\Delta}} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

Where,

X_1= Mean of first set of values X_2= Mean of second set of values

S_1 = Standard deviation of first set of values

S_2 = Standard deviation of second set of values n_1 = Total number of values in first set

n_2 = Total number of values in the second set.

Table 9: Group statistics

Group Statistics					
GROUP		**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
MAP_PRE	Group A	42	123.79	6.434	0.993
	Group B	42	121.38	6.629	1.023
MAP_POST	Group A	42	105.71	4.284	0.661
	Group B	42	107.07	3.984	0.615

Table 10: Independent Samples Test pre-MAP and post MAP

Independent Samples Test												
Levene's Test for Equality of Variances				**t-test for Equality of Means**								
F		**Sig.**	**T**	**df**	**Significance**		**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**			
					One	**Tw**			**Low**		**Upp**	
							- Sided p	**o- Sided p**			**er**	**er**
Map-Pre	Equal variances assumed	0.001		0.974	1.687	82	0.048	0.095	2.405	1.425	- 0.431	5.240
	Equal variances not assumed				1.687	81.926	0.048	0.095	2.405	1.425	- 0.431	5.240
Map-Post	Equal variances assumed	0.026		0.873	- 1.503	82	0.068	0.137	-1.357	0.903	- 3.153	0.439
	Equal variances not assumed				- 1.503	81.571	0.068	0.137	-1.357	0.903	- 3.153	0.439

An Independent t-test (Table 9 to 10) was conducted to assess the extent of improvement in both groups and to compare the results of two approaches. There is statistically significant difference in the post mean arterial pressure of Group A (M=105, SD=4.284) and in Group B (M=107, SD=3.984) conditions; where t = -1.503, p = 0.137. These results suggest that Individualized homoeopathic medicines is more effective in the management of primary hypertension. Hence Null Hypothesis is rejected and Alternative Hypothesis (H1) is accepted.

Discussions

Observations made during the study are discussed below-

Age Incidence

In this study, it was observed that maximum number of reporting cases were in the age group 50- 60 years i.e., 25 cases (27.77%) followed by 24 patients (26.66%) in age group of 40-50;21.

patients (23.33%) in age group of 30-40; 12 patients (13%) in age group of 60-70; 5 patients (5.55%) in age group of 70 and above. The reported patient ages ranged from a minimum of 31 years to a maximum of 70 years. It was true that hypertension cases increase in old adults [33].

Sex Incidence

In this study, it was observed that maximum cases of primary hypertension were in male patients 48 (53.33%) while in female there were 42 (46.66%) of cases. Hypertension awareness is more prominent among women than men, and the prevalence of hypertension is higher in men than women until after menopause [34].

Area of Residence

The present study showed greater prevalence of primary hypertension in Rural population than Urban as study was conducted mainly in rural area. The maximum patients reported were of Rural population comprising 63 (70%) whereas Urban population comprised 27 (30%) of the total sample size. it can be said that hypertension is more among rural than urban dwellers [35].

Socio-Economic Status

In this study maximum incidence of Primary hypertension were observed in middle- and lower- class society i.e., 39 cases (43.33%) and 34 cases (37.77%) of the total patient and minimum incidences were observed in upper class i.e., 17 cases (18%). An overall increased risk of hypertension among the lowest socio-economic status was found. The associations were significant in high-income countries, and the increased risk of hypertension for the lowest categories of all socioeconomic status indicators was most evident for women, whereas men revealed less consistent associations. [36, 37].

Family History

Out of 90 cases, maximum cases i.e., 55 cases had negative history of primary hypertension and 34 cases had positive

history of primary hypertension in family. Most of the patients had negative family history of Primary hypertension (61.11%). Family history is a positive risk factors among hypertensive patients [38, 39].

Grade of Hypertension

Out of 90 cases, 32 cases fall in the category of Grade I hypertension, 49 cases were in category of Grade 2 hypertension and 9 cases were in Grade 3 hypertension category. In 32 cases belonging to grade 1 hypertension, 11 were in Group A and 21 in Group B; in 49 cases of Grade 2 hypertension, 28 were in Group A and 21 in Group B; and in 9 cases of Grade 3 Hypertension, 6 were in Group A and 3 were in Group B.

Frequently indicated medicine in groups

In this study *Natrium muriaticum* (7 times) was prescribed most of the time in constitutional group followed by *Lachesis mutus* (8 times), *Lycopodium clavatum* (5 times), *Verartrum viride* (4 times); *Belladonna, Arsenicum album, Thuja occidentalis* and *Mercurius solubilis* each 3 times; *Glonoine, Sepia succus* and *Sanguinaria canadensis* each 2 times out of 45 patients and in second group *Terminalia arjuna* was given. Literature of homoeopathic Materia Medica also suggest that these medicines have potent effect on reducing blood pressure [40, 41]. From this study it was also subjected that *Terminalia arjuna* can also be given in management of primary hypertension.

Results Obtained From Decrease in Mean Arterial Pressure

In constitutional group, the overall improvement percentage was 84% in which 26% showed marked improvement; 33.33% showed moderate improvement; and 24.44% showed mild improvement which was observed from decrease in mean arterial pressure. In group B, the improvement percentage was 68%, in which 22% showed marked improvement, 15% showed moderate improvement and 31% mild showed improvement which was observed from decrease in mean arterial pressure. Thus, constitutional medicines as well as specific medicine *Terminalia arjuna* were effective in treatment of primary hypertension but constitutional approach showed better result in this study.

Result Obtained from Statistical analysis

In this study, a pair t-test was done to know the difference between pre and post mean arterial pressure and independent t-test war carried out to compare post decrease in mean arterial pressure in both groups. Thus, statistical result showed that there was significant difference in pre and post mean arterial pressure in both groups. This suggests that homoeopathic medicines were very effective in the treatment of Primary hypertension. An independent t-test was conducted which showed that extent of improvement was better in constitutional medicines group than second group in which *Terminalia arjuna* was given.

Conclusion

Homoeopathic medicines have the potential to limit the progress of the disease without any adverse systemic effects and can be safely employed as a comprehensive healthcare therapeutic.

The study of "A randomized comparative interventional study to assess the efficacy of individualized homoeopathic medicine and *Terminalia arjuna* in cases of primary hypertension" has led to various observations in epidemiology, clinical aspects, and therapeutic outcomes. Constitutional homoeopathic medicines were prescribed following a detailed case-taking and case-processing procedure. The study's results allow the conclusion that individuals with primary hypertension experienced effective improvement through both constitutional medicines and *Terminalia arjuna*.

After conducting this study, it is recommended that a randomized controlled trial with a larger sample size and an extended study duration would be beneficial.

Conflict of Interest

Not available

Financial Support

Not available

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