Effectiveness of Lemon Juice in Reduction of Blood Pressure among People with Essential Hypertension in Peelamedu, Coimbator

Rinu David

Abstract

Hypertension is the leading risk factor for mortality. There is growing evidence that non pharmacological interventions like Diet Therapy, Music, Yoga, Breathing and other relaxation techniques lower high blood pressure. *Objectives of the Study:*1. Identify the prevalence of hypertension in the selected urban area. 2. Assessment of contributing factors for hypertension.3. Assessment of blood pressure among hypertensive clients. 4. Determine the effect of lemon juice in reduction of blood pressure among hypertensive clients. *Methods:* The research design adopted was pre-test post-test design with comparison group-a type of quasi experimental design. The sample size was 30 which included 15 for experimental and 15 for comparison group. Results: In the experimental group, the mean systolic blood pressure was 145.8 mmHg on the 1st day, 135.8 mmHg on the 30th day and reduction of blood pressure was 10 mm Hg. In the comparison group, the mean systolic blood pressure was 145.6 mmHg on the 1st day, 146 mmHg on the 30th day and mean difference was 0.66mmHg.The paired 't' test value of systolic and diastolic blood pressure in the experimental group (t=17.8, 8.4) was greater than the table value at p=0.001 level. This showed that there was a significant reduction in blood pressure among the experimental group. The paired 't' test value of systolic and diastolic blood pressure in the comparison group (t=2.7, 3.7) was less than the table value at p=0.001 level. This showed that there was no significant difference in blood pressure among the comparison group. The independent 't' test value of systolic, diastolic (t=4.5, 4.6) was greater than the table value of p=0.001 level. This showed that there was a significant result

Keywords: Hypertension; Effectiveness; Lemon Juice; Blood Pressure.

India is experiencing a rapid health transition with large and rising burden of chronic non-communicable diseases especially Hypertension, Diabetes Mellitus, Cancer, Stroke and Chronic lung diseases (Park, 2009).

Hypertension is an important medical and public health issue. It exists worldwide at epidemic rates affecting an estimated 1 billion people. Two third of hypertensive patients do not have their blood pressure controlled. Individuals who remain undiagnosed and untreated for hypertension present the greatest challenge and opportunity for health

A study reviewed in CSIRO report showed a diet high in citrus fruit provide a statistically significant effect in lowering blood pressure, protecting against some types of cancers, against stroke, cardiac arrhythmias. The flavonoid found in citrus fruit identified as having protective cardiovascular effects (Common Wealth Scientific and Industrial Research Organization, 2004) Lemon is an inexpensive, easily available citrus fruit, popular for its culinary and medicinal uses. It contains large amount of vitamin C and potassium which necessarily helps in lowering the blood pressure.

Need for the Study

Hypertension is called as silent killer, because it

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does not have any symptoms and most of the people do not know they are suffering from it.

In India, the prevalence rate of hypertension was done in the 10 regions between the age group of 28-69. Among them 28% were suffering with hypertension and the prevalence rate increased about 30% in urban population and 10% among rural inhabitants (Hezarika, et al, 2009).

In Tamil Nadu, Chennai stands prior in the prevalence of hypertension. One fifth of the urban population that is 20% of the adults was suffering with high blood pressure (Deepak, K., 2009).

A Survey was done in Coimbatore to assess the prevalence of blood pressure and result indicated 11.3 lakh individuals are suffering with hypertension (Mohan, 2010).

Hypertension is a risk factor and is three times more prevalent in urban areas as compared to rural; this may be because of different lifestyles in two populations. Prevention of hypertension provides an attractive alternative to the costly cycle of managing hypertension and its complications. Current recommendations for primary prevention are based on lifestyle modifications that have been shown to prevent or delay the expected rise in blood pressure in susceptible people (Lewis, et al.,2009).

Hypertension management was very challenging due to the life dependent on regular medication which is very expensive and visit to doctors for regular check up. The most commonly, naturally, easily available rich source of Vitamin C is the lemon.

There are some natural ways to control hypertension. The best way is to control through the diet. Dietary modification requires active participation of individuals. Dietary factors have an important influence on blood pressure regulation in individuals with changing life styles (Manmohan, 2009).

Lemon is rich in Vitamin C and Bioflavonoids. Bioflavonoids are the bioessential for preventing capillary fragility, therefore people with high blood pressure need to take them since they are in risk of rupture of blood vessels. This natural cure helps in lowering blood pressure by decreasing the cholesterol level and by maintaining the body immune system. Vitamin C is the cement of the artery wall and optimum amount of Vitamin C stabilizes the arteries. Vitamin C encouraged the conversion of cholesterol into bile acids, which are then eliminated from the body in the feces.

Lemon juice has an antioxidant, antimetabolite and numerous other functions which have an effect on high blood pressure. Therefore the present situation demands a study on effectiveness of lemon juice in reduction of blood pressure among hypertensive clients.

Statement of the Problem

Effectiveness of lemon juice in reduction of blood pressure among people with essential hypertension in Peelamedu, Coimbatore.

Objectives

- Identify the prevalence of hypertension in the selected urban area.
- Assessment of contributing factors for hypertension
- Assessment of blood pressure among hypertensive clients
- Determine the effect of lemon juice in reduction of blood pressure among hypertensive clients.

Assumption

Lemon juice helps in reduction of blood pressure in hypertensive clients

Hypothesis

There will be a significant reduction in blood pressure after administration of lemon juice.

Operational Definitions

- *Effectiveness*

It refers to the extent to which the administration of lemon juice has achieved the desired effect in reduction of blood pressure
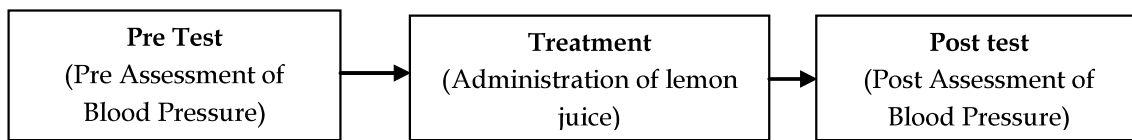
- *Essential Hypertension*

It refers to persistent elevation of systolic blood pressure above 140mmHg and diastolic above 90 mmHg from an undefined cause among the people.

- *Pre Hypertension Stage:* Systolic blood pressure is 120-139 mmHg and diastolic blood pressure is 80-89 mmHg.

- *Stage 1 Hypertension*: Systolic blood pressure is 140-159 mmHg and diastolic blood pressure is 90-99 mmHg.

• *Stage II Hypertension*: Systolic blood pressure is more than 160 mmHg and diastolic blood pressure is more than 100 mmHg.The present study is designed to determine the effectiveness of lemon juice in reduction of blood pressure among hypertensive clients. This chapter includes the research design, setting, population and sampling, sample size determination, criteria for selection of samples, instruments and tools for measuring variables, techniques of data collection, methods of data analysis and the report of pilot study and the changes incorporated for the main study.

Experimental Group

Methodology

Pretest and Post Test Design with A Comparison Group

Pre test and post test design with a comparison group is a type of Quazi experimental design. It is developed to explain relationships and examine causality between selected dependent and independent variable (Burns, N. 2007). In this study this research design was selected to explain the relationship and causality between lemon juice and reduction of systolic and diastolic blood pressure.

| Pre Test (Pre Assessment of Blood Pressure) | → | Treatment (Administration of lemon juice) | → | Post test (Post Assessment of Blood Pressure) |

Comparison Group

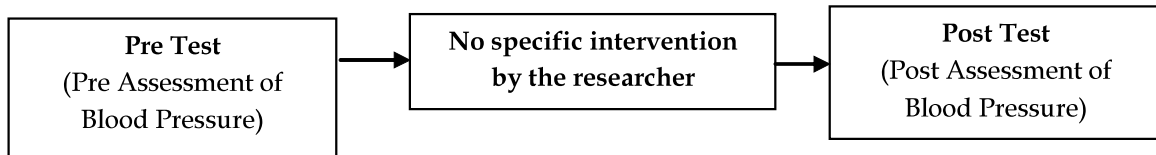| Pre Test (Pre Assessment of Blood Pressure) | → | No specific intervention by the researcher | → | Post Test (Post Assessment of Blood Pressure) |

Fig. 1: Pre test and post test design with a comparison group

Prevalence of hypertension was assessed for the entire population above 40 years through survey. Baseline information and contributing factors for hypertension was collected from the samples. Pre assessment of blood pressure was done among the both experimental and comparison group. Lemon juice was administered for 30 days among experimental group where as no specific intervention by the researcher for the comparison group. Post assessment blood pressure was done among experimental and comparison group once in 7 days to analyze the variation in blood pressure.

Settings

The study was conducted in non slum residential urban area namely Ellaithottam street. This urban area is situated around 1km away from PSG hospitals and this area consists of 65 families, which includes 112 males and 120 females.

Population and Sampling

Population of the study was 80 adults above 40

years residing in Ellaithottam Street. Survey was done to identify hypertensive clients. The survey results indicated that 35 had hypertension. Among them two were suffering with diabetes mellitus and three were on calcium channel blockers. Through inclusion and exclusion criteria 30 hypertensive clients were selected for the study. From the 30 samples, 15 clients were included for experimental group and 15 were selected for comparison group.

Criteria for Selection of Samples

Inclusion Criteria

Clients with the diagnosis of essential hypertension.

Exclusion Criteria

• Clients with hypertension secondary to other pathology that is endocrine disorders and renal pathology.

• Client with peptic ulcers.

• Clients who are on calcium channel blockers.

Variables of the Study

• *Independent Variable:* The independent variable is the administration of lemon juice

• *Dependent Variable*: Dependent variable in this study refers to systolic and diastolic blood pressure.

Instruments and Tools for Data Collection

The tool used for data collection was questionnaire, to collect the baseline information, contributing factors and information related to hypertension. Sphygmomanometer was used to assess blood pressure.

• Questionnaire to Assess the Prevalence of Hypertension and Base Line Information

The questionnaire framed had 4 sections. Contents included in this section were: The section I included the demographic profile, section II included the contributing factors for hypertension, section III included information related to hypertension, section IV included blood pressure recording sheet.

• Sphygmomanometer

It is the standard instrument used to measure blood pressure. It composed of an inflatable cuff and a mercury to measure the pressure The lowest level in the scale is 0 and the highest level is 300 mmHg.

Techniques of Data Collection

Population of the study was 80 adults above 40 years. The prevalence of hypertension was assessed among 80 adults. Data was collected with the help of the questionnaire, observation and from medical records. In the first two days survey was done for the entire population above 40 years, data was collected by distribution of questionnaire section I and II, section III was given to hypertensive clients alone. As per exclusion and inclusion criteria samples were selected for the study. After the explanation of intervention, informed consent was obtained from hypertensive clients. Pre assessment of blood pressure was done among experimental group and comparison group. After the initial assessment, 250 ml of Lemon juice was administered to experimental group whereas routine care was provided for the comparison group. Continous blood pressure monitoring was done at 7 days interval for a period of 30 days.

Intervention

• *Preparation of Lemon Juice*

Add 2 table spoon of lemon juice into 220ml of warm water. No sugar or salt was added.

• *Administration of Lemon Juice*

Lemon juice was administrated to the samples 30 minutes prior to breakfast. It is given once in a day for a period of 30.

Method of Data Analysis

Both the descriptive and inferential statistics were used to analyze the data. Data is presented in tables. Statistical analysis of 't'test is applied to test the effectiveness of lemon juice in reduction of blood pressure between experimental and comparison group.

Data Analysis and Interpretation

Data analysis is the systematic organization and synthesis of research data and testing of research hypothesis using those data. Interpretation is the process of making sense of the result of a study and examining their implication (Denise P.F.2004) .

In this study effectiveness of lemon juice in reduction of blood pressure was assessed. The data was collected, assembled, analysed and tested individually and described. The findings based on the statistical analysis are presented in this topic.

1. Baseline Data of Essential Hypertensive Clients

Age: Among the 30 samples selected the age of essential hypertensive clients ranged between 40 yrs and above.2 clients were in the age group between 40-50 years and 12 clients were in the age group between 51-60 years and 16 clients were in the age group >61 years (Table 1 & figure 1).

Gender and Marital Status: Among the 30 samples majority of them ie 23 were females and only 7 were males (Table 1) In case of the marital status 19 were married and 11 were widows (Table 1 & Figure 3).

Educational Qualification:14 clients were uneducated,8 had primary school education,7 clients

had high school education and only one client had higher secondary education (Table 1 &Figure 4).

Occupational Status: Among the 30 samples, majority of them ie 23 were unemployed and only 7 clients were employed (Table 1 & Figure 5).

Family Income: 11 clients had family income <5000, another 11 clients had family income between 5000-7500 and only 8 clients had family income >7500. (Table 5)

Family History of Hypertension: 7 clients in the experimental group and 5clients in the comparison group had a family history of hypertension (Table 2 & Figure 6).

2. Factors Contributing to Hypertension

Life Style Factors

- *History of Exercises:* Six clients each in the experimental and comparison group were practicing exercises. All the clients who were practicing exercises in experimental group and comparison group were going for walking (Table 3, Figure 7).

- *Duration of Exercises*: Two clients in the experimental group and 2 clients in the comparison group practiced exercise for a duration of more than 20 minutes. Three clients in the experimental group practiced exercise for a period of 20-40 minutes where as only one client in the experimental group and 4 clients in the comparison group practiced exercise for a duration of 40-60 minutes.

- *History of Regularity of Exercises*: Among the experimental group 4 clients practiced exercise daily, whereas one client done the exercise once in a week and another client done it twice in a

week only (Table 3).

- *Habits*: Data regarding the habit revealed that, among the experimental group 6 clients were tobacco chewers, one takes alcohol, no one reported habit of smoking and 8 clients had none of these habits where as among the comparison group 5 were tobacco chewers, 2 clients were alcoholic, 2 had the habit of smoking and 6 clients had none of these habits (Table 4, Figure 8).

- *Amount and Frequency*: Regarding the amount of alcohol intake, both the groups reported the same quantity that is 30 ml and frequency of intake was occasional. About the habit of smoking, none had the habit of smoking in the experimental group where as in the comparison group the amount is 3-5 cigarettes per day. About the habit of tobacco chewing, 3 clients uses tobacco 1-3 times per day and other 3 uses 3-5 times per day where as in the comparison group one client uses tobacco 1-3 times per day, other 3 uses 3-5 times per day (Table 4).

- *History of Watching T.V:* Among the experimental group 12 clients and in the comparison group 11 clients had the habit of watching T.V. Regarding the duration of watching T.V, among 12 clients in experimental group 6 had the habit of watching T.V half an hour,8 watches 1-2 hours. Where as in comparison group 3 watches half an hour, 4 watches 1-2 hours and 6 watches more than 2 hours. Data regarding the type of programme showed that majority of people in both groups watches serials. Regarding the time of watching TV, 5 clients each in the experimental and comparison group watches T.V before going to bed. About the type of serials, majority of clients watches 3-5 serials, mostly emotional type (Table 5, Figure 9).

Table 1: Demographic Details of Hypertensive clients

S. No.	Characteristics	Experimental group			Comparison group			Total
		n=15	M	F	n=15	M	F	n=30
1	**Age in years**							
	40-50 years	1	0	1	1	0	1	2
	50-60 years	5	0	5	7	2	5	12
	Above 60 years	9	1	8	7	4	3	16
2	**Marital status**	-	-	-	-	-	-	-
	Married	-	9	-	-	10	-	19
	Widow	-	6	-	-	5	-	11
3	**Educational status**	-	-	-	-	-	-	-
	Uneducated	-	8	-	-	6	-	14
	Primary	-	6	-	-	2	-	8
	High school	-	1	-	-	6	-	7
	Higher secondary	-	0	-	-	1	-	1

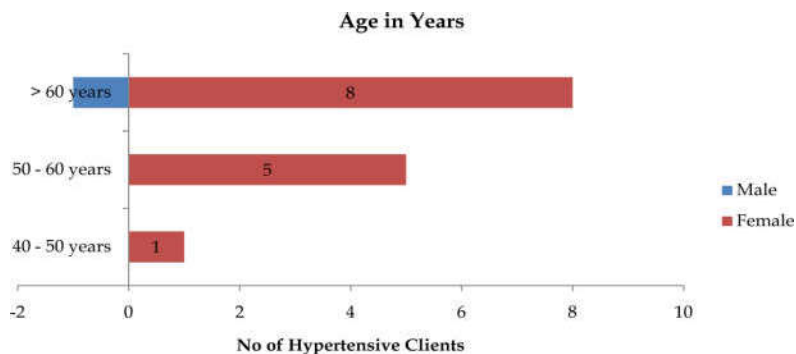| 4	Occupation	-	-	-	-	-	-	-
	Employed	-	3	-	-	4	-	7
	Unemployed	-	12	-	-	11	-	23
5	Income	-	-	-	-	-	-	-
	Rs.2500-Rs.5000	-	8	-	-	3	-	11
	Rs.5000-Rs.7500	-	5	-	-	6	-	11
	Above Rs.7500	-	2	-	-	6	-	8

Fig. 2: Age Sex Status of Hypertensive client in experimental group
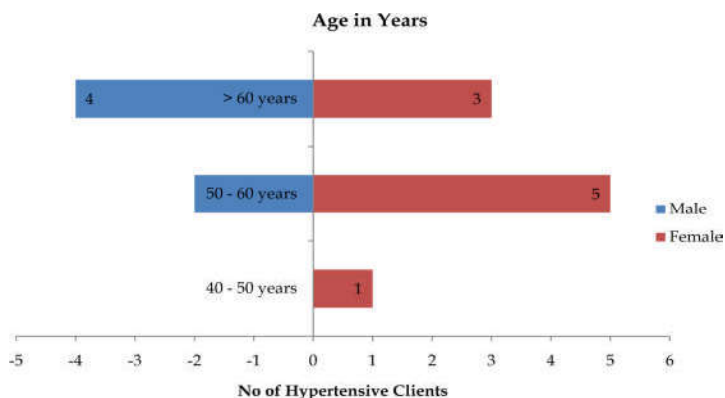

Fig. 3: Age Sex Status of Hypertensive Clients in Comparison Group
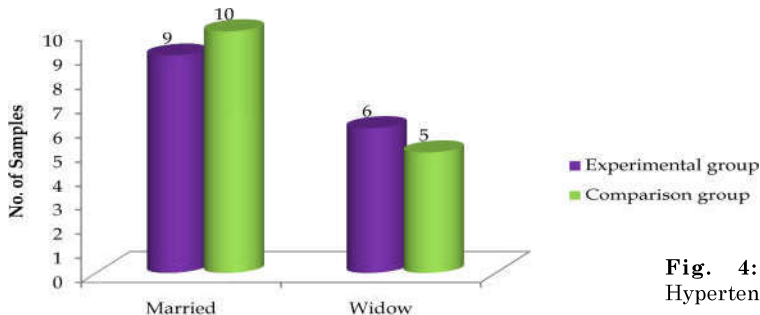
Fig. 4: Marital status of Hypertensive clients
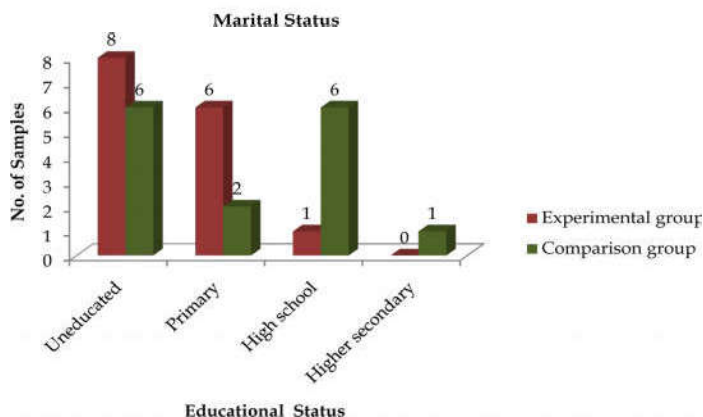
Fig. 5: Educational Status of Hypertensive Clients

Rinu David / Effectiveness of Lemon Juice in Reduction of Blood Pressure among People with
Essential Hypertension in Peelamedu, Coimbator

117
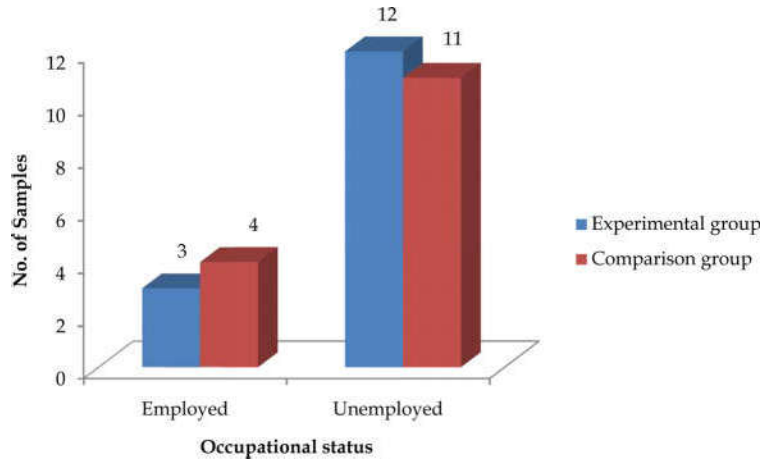
Fig. 5: Occupational Status of Hypertensive clients
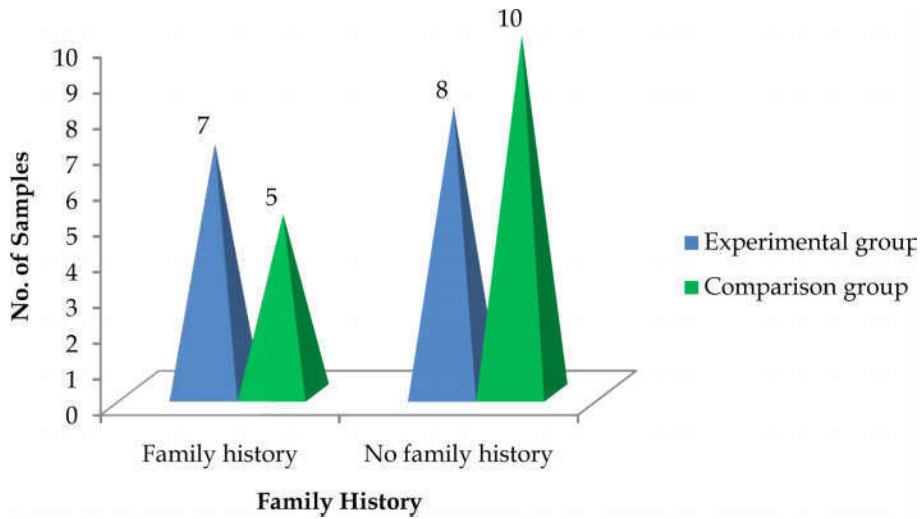
Fig. 6: Family history of hypertension among Essential Hypertensive clients

Table 2: Family history of hypertension among Essential Hypertensive clients   N=30

S. No.	Family history of hypertension	Experimental group n=15	Comparison group n=15	Total
1	Family history	7	5	12
2	No family history	8	10	18
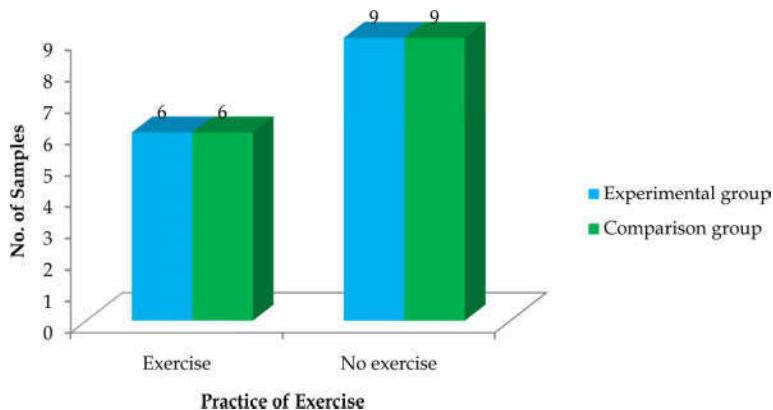
Fig. 7: History of Exercises among Hypertensive Clients

Dietary Factors

- *Extra Salt in the Diet*: Among the experimental group 2 clients and 3 clients in the comparison group were using extra salt in their diet. (Table 6,Figure 10).

- *Type of Cooking Oil*: Among the experimental and comparison group 20 clients were using sunflower oil for the purpose of cooking (Table 6).

- *Intake of Snacks:* Four clients in the experimental group and 7 clients in the comparison group had the habit of taking snacks (Table 6).

- *Habit of Coffee and Tea Intake*: Out of 30, 11 clients in experimental group and 12 clients in comparison group had the habit of coffee intake. Regarding the frequency of intake, majority of them (9) takes coffee more than 2 times in a day. Ten clients in the experimental group and 9 clients in the comparison group had the habit of tea intake. Regarding frequency of intake, majority of them (9) takes tea more than twice

in a day (Table 7 and 8)

Emotional Factors Contributing To Hypertension Among Hypertensive Clients

Among the experimental group and comparison group, majority of them (14 and 13) get upset easily. Regarding the sleeping pattern, among the experimental group 7 of them often have the problem of sleeping difficulty and 2 of them rarely complaint of the same problem. In case of comparison group 10 clients suffer with the problem of sleeping difficulty. About the status of worry, among the experimental group 8 clients are not having the problem of worry where as 5 clients often and 6 clients rarely worries. Among the comparison group 8 clients often and 2 clients rarely the worries. Regarding the measures taken to solve the emotional problems, 12 clients among the experimental group and 11 clients among the comparison group watches T.V whereas 3 clients each in the experimental group and comparison group listens to music (Table 9) .

Table 3: History of Exercises among Hypertensive Clients   N=30

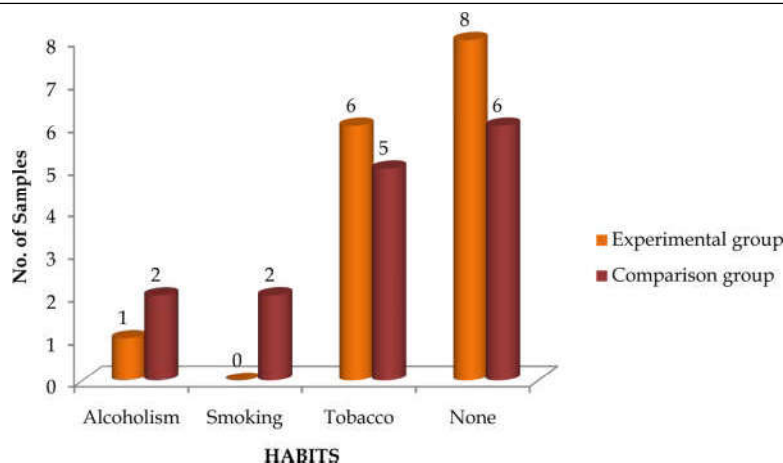| S. No.	Characteristics	Experimental group n=15	Comparison group n=15	Total
1	**Practice of exercise**			
	Exercise	6	6	12
	No exercise	9	9	18
2	**Duration in minutes**			
	Less than 20 minutes	2	2	4
	20-40minutes	3	0	3
	40-60 minutes	1	4	5
	None	9	9	18
3	**No. of practice in a week**			
	Daily	4	5	9
	Once in a week	1	1	2
	Twice in a week	1	0	1
	No practice	9	9	18

Fig. 8: Habits among Hypertensive Clients

Table 4: Habits among Hypertensive Clients   N=30

S. No.	Characteristics	Experimental Group n=15	Comparison Group n=15	Total
1	**Habits**			
	Alcoholism	1	2	3
	Smoking	0	2	2
	Tobacco	6	5	11
	None	8	6	14

3. Information Related to Hypertension

• Duration of Hypertension

Among the experimental group 6 clients and comparison group 7 clients had the duration of hypertension for 1-3 years where as 4 clients each in the experimental group and comparison group had the duration of 3-5years. Five clients in the experimental group and 3 clients in the comparison group had the history of hypertension more than 5 years. No client in the experimental group and only one in the comparison group had the history of hypertension for less than 1year (Table 10, Figure 11).

• History of Medication

About history of medication intake, among the experimental group 4 clients and comparison group 5 clients had duration of medication intake for 1-3 years where as 4 clients in the experimental group and 3 in the comparison group had the duration of 3-5years.5 clients in the experimental group and 4 clients in the comparison group had the history of medication intake more than 5 years. Two clients in the experimental group and 3 in the comparison group had the history of intake of medication less than 1year (Table 11).

Table 5 History of Watching TV among Hypertensive Clients   N=30

S. No.	Characteristics	Experimental group n=15	Comparison group n=15	Total
1	**Habit of watching TV**			
	Present	12	11	23
	Absent	5	2	7
2	**Duration**			
	Half hour	6	3	9
	1-2 hours	4	4	8
	More than 2hours	0	6	6
3	**Type of programme**			
	News	1	3	4
	Music	1	1	2
	Serial	8	9	17
4	**Before going to bed**			
	Present	5	5	10
	Absent	7	6	13
5	**No. of serials**			
	1-3	6	6	12
	4-5	2	3	5
6	**Type**			
	Comedy	3	4	7
	Emotional	5	5	10

Table 6 Dietary Factors Contributing To Hypertension among Hypertensive Clients

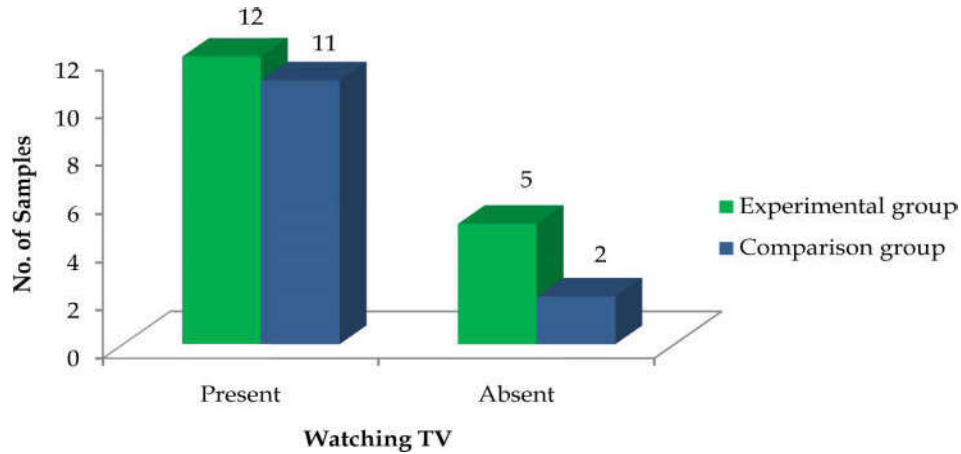| S. No	Characteristics	Experimental group n=15	Comparison Group n=15	Total
1	**Extra salt in diet**			
	Present	2	4	6
	Absent	13	11	24
2	**Type of oil**			
	Ground nut	8	2	10
	Sunflower	7	13	20
3	**Habit of snacking**			
	Present	4	7	11
	Absent	11	8	19

Fig. 9: History of Watching TV among Hypertensive Clients
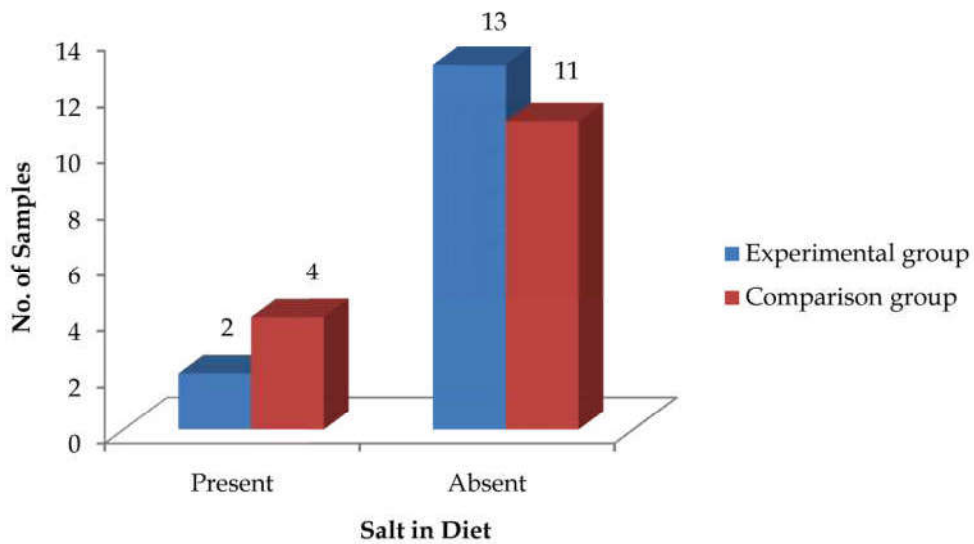
Fig. 10: Dietary Factors Contributing To Hypertension among Hypertensive Clients

Table 7: Habit of Coffee Intake among Hypertensive Clients   N=30

S. No.	Characteristics	Experimental group n=15	Comparison group n=15	Total
1	**Habit of coffee intake**			
	Present	11	12	23
	Absent	4	3	7
2	**No. Of times in day**			
	Once a day	4	4	8
	Twice a day	2	4	6
	More than twice a day	4	5	9

Table 8: Habit of Tea Intake among Hypertensive clients   N=30

S. No.	Characteristics	Experimental group n=15	Comparison group n=15	Total
1	**Habit of tea intake**			
	Present	10	9	19
	Absent	4	7	11
2	**No. of times in day**			
	Once a day	3	3	6
	Twice a day	1	3	4
	More than twice a day	4	5	9

Table 9: Emotional factors among hypertensive clients   N=30

S. No.	Characteristics	Experimental group N=15	Comparison group N=15	Total
1.	**Easily upset**			
	Present	14	13	27
	Absent	1	2	3
2.	**Difficulty in sleeping**			
	Not at all	6	4	10
	Rarely	2	1	3
	Often	7	10	17
3.	**Worried**			
	Not at all	8	1	9
	Rarely	6	2	8
	Often	5	8	13
4.	**Measures**			
	T.V	12	11	23
	Music	3	3	6
	Others	0	1	1

Table 10: Duration of hypertension among hypertensive clients   N=30

S. No.	Duration of Hypertension	Experimental Group N=15	Comparison Group N=15	Total
1	Less than 1year	0	1	1
2	1-3years	6	7	13
3	3-5years	4	4	8
4	More than 5years	5	3	8

Table 11: History of Medications among Hypertensive Clients   N=30

S. No.	Characteristics	Experimental group n=15	Comparison group n=15	Total
1	**Duration of medication**			
	Less than1 year	2	3	5
	1-3 years	4	5	9
	3-5 years	4	3	7
	More than 5 years	5	4	9
2	**Type of antihypertensive medications**			
	Beta blockers	11	11	22
	ACE inhibitors	4	4	8

• *Type of Antihypertensive Medications*

Regarding the type of antihypertensive usage 11 clients each in the experimental group and comparison group used beta blockers whereas 4 clients each in the experimental group and comparison group used ACE inhibitors (Table 11).

• *Adherence To Dietary Modification Among Hypertensive Clients*

About the adherence to the dietary modification, majority clients (14) among the experimental group and all the clients in the comparison group had the history of adherence to the modification of diet whereas only one client in the experimental group and no one in the comparison group reported dietary modifications (Table 12).

4. Influence of Contributing Factors with Systolic Blood Pressure

Hypothesis: There will be a significant association between contributing factors like life style, dietary, emotional factors and Hypertension.

$$X^2 = \frac{(ad \quad bc)^2 \times N}{(a+b)\,(c+d)\,(a+c)\,(b+d)}$$

Chi-Square test

$$X^2 = \frac{N\left[|ad - bc| - N/2\right]^2}{(a+b)(c+d)(a+c)(b+d)}$$

Modified Chi-Square test

Table 12: Adherence to Dietary Modification among Hypertensive clients　　　　　　　　　　　　　　N=30

Sl. No	Adherence to Dietary Modification	Experimental group n=15	Comparison group n=15	Total
1.	Adherence	14	15	29
	No Adherence	1	0	1

In the study result showed, among the life style factors, only the practice of exercise indicated the significant association whereas no other factors showed association with systolic blood pressure (Table 13).

5. Influence of Contributing Factors with Diastolic Blood Pressure

Hypothesis: There will be a significant association between contributing factors like life style, dietary, emotional factors and hypertension .

$$x^2 = \frac{(ad \quad bc\,)^2 \times N}{(a+b)\,(c+d)\,(a+c)\,(b+d)}$$

Chi-Square test

$$X^2 = \frac{N\left[|ad-bc| - N/2\right]^2}{(a+b)(c+d)(a+c)(b+d)}$$

Modified Chi-Square test

The result of the study showed that lifestyle factors like bad habits and dietary factors such as intake of snacks and usage of cooking oil had significant influence on diastolic blood pressure whereas, presence of emotional factors were not identified to have association with diastolic blood pressure (Table 14).

Table 13: Level of Blood Pressure among Hypertensive Clients　　　　　　　　　　　　　　　　　　N=30

S. No.	Level of Hypertension	Systolic				Diastolic			
		Experimental		Comparison		Experimental		Comparison	
		Pre-test	Post test	Pre Test	Post test	Pre-test	Post test	Pre Test	Post test
1	Pre hypertension	1	10	1	0	8	15	8	8
2	Stage I	14	5	14	14	5	0	5	6
3	Stage II	0	0	0	1	2	0	2	1

6. Level of Blood Pressure among Hypertensive Clients

- *Assessment of Systolic Blood Pressure:* In the experimental group the mean systolic blood pressure was 145.8 mmHg on the 1st day, 135.8 mmHg on the 30th day and the mean difference was -10 mmHg, whereas in comparison group the mean systolic blood pressure was 145.6 mmHg on 1st day, 146 mmHg on 30th day and the mean difference was 0.66 mmHg. This assessment shows there was a reduction of systolic blood pressure among the experimental group than the comparison group (Table 13).

- *Assessment of Diastolic Blood Pressure:* In the experimental group the mean diastolic blood pressure was 92.4 mmHg on the 1st day, 82.8 mmHg on the 30th day and the mean difference was 9.6 mmHg, whereas in comparison group the mean diastolic blood pressure was 89.4 mmHg on 1st day, 90.2 mmHg on 30th day and

the mean difference was .93 mmHg. This assessment showed that there was a difference in reduction of diastolic blood pressure in experimental group than comparison group (Table 13).

7. Comparison of Pre-systolic Blood Pressure between Experimental and Comparison group through Independent 't'test

Hypothesis: There will not be a significant difference in presystolic blood pressure between experimental group and comparison group.

$$t = \frac{\overline{x}_1 - \overline{x}_2}{SD\sqrt{1/n_1 + 1/n_2}}$$

t=0.0009

The calculated value of t is 0.0009 which was

Rinu David / Effectiveness of Lemon Juice in Reduction of Blood Pressure among People with
Essential Hypertension in Peelamedu, Coimbator

123

less than the tabulated value at p<0.001, which indicated that there was no significant difference in pre systolic blood pressure between experimental and comparison group before the administration of lemon juice (Table14).

8. Comparison of Pre-diastolic Blood Pressure between Experimental and Comparison Group through Independent 't'test

Hypothesis: There will not be a significant difference in pre-diastolic blood pressure between experimental group and comparison group.

$$t = \frac{\bar{x_1} - \bar{x_2}}{SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

t=0.15

The calculated value of t is 0.15 which was less than the tabulated value at p<0.001.This showed that there was no significant difference in pre diastolic blood pressure between experimental and comparison group before the administration of lemon juice (Figure 18).

Table 14: Comparison of Pre-Systolic and Pre-Diastolic Blood Pressure through Independent 't' Test

S. No.	Blood pressure	Experimental group Mean	Comparison group Mean	SD	't' value	Level of significance
1	Systolic blood pressure	146.1	145.2	2634.9	0.0009	0.001
2	Diastolic blood pressure	92.4	96.2	68.1	0.15	0.001

9. Comparison of Post-systolic Blood Pressure between Experimental and Comparison group through Independent 't'test

Hypothesis: There will be a significant difference in post systolic blood pressure between experimental group and comparison group.

$$t = \frac{\bar{x_1} - \bar{x_2}}{SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

t=4.5

The calculated value of t is 4.5 which was more than the tabulated value at p<0.001,this indicated that there was a significant difference in post systolic blood pressure between experimental group and comparison group after the administration of lemon juice (Table 15).

10. Comparison of Post-diastolic Blood Pressure between Experimental and Comparison group through Independent 't'test

Hypothesis: There will be a significant difference in post diastolic blood pressure between experimental group and comparison group.

$$t = \frac{\bar{x_1} - \bar{x_2}}{SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

t=4.6

The calculated value of t is 4.6 which was more than the tabulated value at p<0.001.This showed that there was a significant difference in post diastolic blood pressure between experimental and comparison group after the administration of lemon juice (Table 16).

Table 15: Comparison of Post-Systolic and Post-diastolic blood pressure through Independent 't' Test

S. No	Blood pressure	Experimental group Mean	Comparison group Mean	SD	't' value	Level of significance
1	Systolic blood pressure	135.8	146.2	6.3	4.5	0.001
2	Diastolic blood pressure	82.8	90.2	4.4	4.6	0.001

11.Comparison of Systolic Blood Pressure among the Experimental group through Paired 't' test

Hypothesis: There will be significant difference in systolic blood pressure among experimental group.

$$t = \frac{|\bar{d}|}{SD/\sqrt{n}}$$

$$t = \frac{|10|}{2.19/\sqrt{15}} \quad = 17.8$$

The calculated t value is 17.8 which was more than the tabulated value at p<0.001.This indicated that there was a significant difference in the systolic blood pressure among the experimental group after the administration of lemon juice.

12. Comparison of Systolic Blood Pressure among the Comparison group through Paired 't' test

Hypothesis: There will not be a significant difference in systolic blood pressure among comparison group.

$$t = \frac{|\overline{d}|}{SD/\sqrt{n}}$$

$$t = \frac{|0.66|}{0.94/\sqrt{15}}$$

= 2.7

The calculated t value is 2.7 which was less than the tabulated value at p<0.001.This indicated that there was no significant difference in the pre-test and post test blood pressure among the comparison group (Table 16).

13. Comparison of Diastolic Blood Pressure among Experimental group through Paired 't' test

Hypothesis: There will be significant difference in diastolic blood pressure among the experimental group.

$$t = \frac{|\overline{d}|}{SD/\sqrt{n}}$$

$$t = \frac{|9.6|}{4.3/\sqrt{15}}$$

= 8.4

The calculated 't' value is 8.4 which was more than the tabulated value at p<0.001. It indicated that there was a significant difference in the diastolic blood pressure between pretest and post test among the experimental group.

Table 16: Comparison of Systolic Blood Pressure between Experimental and Comparison Group through paired't' test

S. No	Systolic blood pressure	Pre test assessment Mean	SD	Post test assessment Mean	SD	't' value	Level of significance
1	Experimental group	145.8	6.9	135.8	7.2	17.8	0.001
2	Comparison group	145.6	3.4	146.2	5.3	2.7	0.001

Table 17: Comparison of Diastolic Blood Pressure between Experimental and Comparison Group through paired 't' test

S. No.	Diastolic blood pressure	Pre test assessment Mean	SD	Post test assessment Mean	SD	't' value	Level of significance
1	Experimental group	92.4	6.8	82.8	3	8.4	0.001
2	Comparison group	89.4	5.8	90.2	7	3.7	0.001

14. Comparison of Diastolic Blood Pressure among Comparison group through Paired 't' test

Hypothesis: There will not a be significant difference in diastolic blood pressure among the comparison group.

$$t = \frac{|\overline{d}|}{SD/\sqrt{n}}$$

$$t = \frac{|0.93|}{0.96/\sqrt{15}}$$

=3.7

The calculated 't' value is 3.7 which was less than the tabulated value at p<0.001. It indicated that there was no significant difference in the diastolic blood pressure between pre-test and post test among the comparison group (Table 17).

Summary and Conclusion

Major Findings of the Study

- Among the total 30 samples 23 were females and 16 clients were above the age group of 60 years. The youngest age for male in the study was 40 years and 42 years for females.

- Regarding the duration of hypertension 13 clients were between 1-3 years and 22 of them were in use of beta blockers.

- In relation to factors contributing to hypertension, about lifestyle factors 11 clients had the habit of tobacco chewing.

- In case of dietary factors 20 clients used sunflower oil for cooking and 23 clients had the habit of coffee intake.

- About the emotional factors, 27 clients were getting upset easily and among them 23 used to watch T.V as a measure to solve it.

- Regarding the association of factors contributing to hypertension Among the life style factors, the practice of exercise alone indicated the significant association with systolic blood pressure, whereas in relation to diastolic blood pressure, only the lifestyle factors and dietary factors had significant association.

- In the experimental group the mean systolic blood pressure was 145.8 mmHg on the Ist day, 135.8 on the 30th day and the reduction of blood pressure was about 10 mmHg.

- In the comparison group the mean systolic blood pressure was 145.6 mmHg the 1st day 146 mmHg on the 30th day and the mean difference was .66 mmHg.

- The paired t test value of systolic and diastolic blood pressure in the experimental group (t=17.8, 8.4) is greater than the table value at the level of P=0.001.This showed there was a significant difference in blood pressure among the experimental group.

- The paired t test value of systolic and diastolic blood pressure in the comparison group (t=2.7, 3.7) is lesser than the table value at the level of P=0.001.This showed there was no significant difference in blood pressure among the comparison group.

- The independent t test value of systolic, diastolic (t=4.5, 4.6) is greater than the table value at the level of P =0.001. This showed there was a significant difference in blood pressure between experimental group and comparison group.

Limitations

Findings cannot be generalized to all population due to small sample size.

Suggestions for Future Study

- A similar study can be replicated in a larger sample.

- A similar study can be performed in hospital settings.

- A similar study can be tried with other vitamin C rich foods.

Recommendations

In-service education can be organised to the health workers to make the public aware about the health benefits of Lemon juice.

References

1. AsmaRahim. Principles and practice of community Medicine,Japee Brothers Medical Publishers(2nd edition). 2008.

2. Basavanthappa, B.T. Nursing Research (Ist ed.).New Delhi: Jaypee Brothers Publications. 2009.

3. Burns. Understanding Nursing Research (4th ed).Philadelhia, W.B Saunders Company. 2007.

4. Clark, M.J. Nursing in the Community (2nd ed.).Stanford Indian journal of Community Medicine, 1996;43(5):04-106.

5. Denise P.F. Nursing research Principles and Methods (7thed.).Philadelphia: Lippincott Williams and Wilkins Publications. 2004.