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A Study to Evaluate the Effectiveness of Watermelon on Blood Pressure among Patient with Hypertension Attending Outpatient Department at Primary Health Centre, Adaikampatti, Perambalur

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Abstract: ***A study to evaluate the effectiveness of watermelon on blood pressure among patient with Hypertension attending outpatient department at Primary health centre, Adaikampatti, Perambalur. A Quantitative evaluative approach with Quasi experimental pre test and post test design study was conducted at Primary health centre, Adaikampatti, Perambalur among 60 hypertensive patients by using non – probability convenience sampling technique. First day the investigator introduced himself to the patients and explained the purpose of the study. After obtaining the consent the investigator checked the blood pressure for experimental group. On second day the investigator selected 30 Patients for control group after obtaining the consent the investigator checked the blood pressure and advised to continue the prescribed treatment. Third day the investigator visited the experimental group houses and two cups of ripped watermelon pieces will given daily for 21days. Patients of experimental group will instructed regarding intake of watermelon before lunch and dinner. A data sheet will maintain by the investigator regarding intake of watermelon. The post test blood pressure was assessed by using sphygmomanometer on 23rd day for experimental group and 24th day for control group patients. The collected data will analyzed by using descriptive and inferential statistics. In experimental and control group 21 (70 %) and 20 (66.7%) were male. In experimental and 23 (76.7%) and control group 16 (53.4 %) possess family history of hypertension. Majority 22 (73.3%) were having habit of alcohol consumption in both groups. In experimental group 19 (63.4 %) and control group 20 (66.7 %) were not practicing regular exercise. The mean systolic blood pressure before intervention 140.46 and after intervention 132.93. The diastolic blood pressure before intervention was 90.73 after intervention was 85.20. It reveals that watermelon is effective in reducing blood pressure. The calculated 't' value for systolic blood pressure (4.13) and diastolic blood pressure (3.78) which is higher than table value hence it can be concluded that watermelon is effective in reducing blood pressure. The research hypothesis H_1 is retained.***

Keywords: Watermelon, Blood pressure, Effectiveness Reducing

1. Introduction

Hypertension (HTN) is an enormous health problem and is one of the biggest health challenges in the 21st century. Although the condition is common, readily detectable, and easily treatable, it is usually asymptomatic and often leads to lethal complications if left untreated. The Global Burden of Disease study has reported HTN as the 4th contributor to premature death in developed countries and the 7th in the developing countries, **(Potter. P, 2009).**

Amino acids found in watermelon have been shown to lower blood pressure. In addition to healthy vitamins and minerals, watermelon contains two amino acids, L-arginine and L-citrulline that reduce hypertension, **(Fred lee, 2010).**

Watermelon is the richest edible natural source of L-citrulline, which is closely related to L-arginine, the amino acid required for the formation of nitric oxide essential to the regulation of vascular tone and healthy blood pressure**, (Figueroa).**

2. Need for the Study

Hypertension is a complex, multifactorial disease process. In a number of ways morbidity can be "measured". Historically, diastolic blood pressure was viewed the more important measure to control, but recent information shows that systolic blood pressure is the stronger predictor of total morbidity and adverse cardiovascular events in a number of large, comprehensive clinical trials. Quarter of the adult population is affected with hypertension. The prevalence of hypertension depends on the age, racial composition and the criteria to define the condition. In a white population 20% of the adults in the age group 35-65 yrs have a diastolic blood pressure in the range 90-109mmHg, 4-5% have a range of 110-129mmHg and 0.5% have blood pressure levels >130mmHg. In the white population the prevalence is higher, **(Arun Prasad K.P, 2002).**

Diet can be a powerful strategy to combat hypertension, consuming a diet which is rich in fiber, high in potassium, calcium and magnesium from vegetables, fruits, legumes, whole grains, low fat diet product reduce the blood pressure. The diet is the backbone of any treatment plan for hypertension, without dietary intervention good metabolic control usually cannot be achieved; dietary changes are of paramount importance for reducing the risk of hypertension, (**Park, 2002).**

Hypotheses

H_1: There will be a significant difference between pre test and post test level of blood pressure.

H_2: There will be significant association between the blood pressure among patient with hypertension and their selected demographic variables.

3. Review of Literature

3.1 Literature related to hypertension

Patrick Smith, et.al., (2010) conducted a comparative study to find the effect of Dietary Approaches to Stop Hypertension (DASH diet), exercise, calorie restriction in improving the mental function and heart health in overweight, among 124 hypertension adults between the average age 52. The participants were divided into three groups: (DASH diet) combined with a behavioural weight and calorie restriction; the (DASH diet) alone in one group; and no diet or exercise in control group. None were receiving medication for hypertension. Researcher found that the diet and weight management group had improved cognitive function, strikingly reduced blood pressure by systolic pressure 16mmHg and diastolic pressure 10 mm Hg over the 4 month study period, improved cardio vascular fitness and lower weight as well as reduced blood pressure blood pressure compared to the other groups.

David Conen, et.al., (2009) conducted a prospective Cohort study to assess the socioeconomic status, blood pressure progression and incident hypertension among female health professionals. Investigator selected 27, 207 female health professional who are free of hypertension and cardiovascular disease at baseline. Participants were grouped in five educational categories and in six income categories. At 48 months of follow – up, 48% of women had blood pressure progression. In joint analyzes education but not income remained associated with progression and incident hypertension. It was concluded that the socio economic status, determined by education not by income, is a strong independent predictor of blood pressure progression and incident hypertension in women.

3.2 Literature related to Watermelon

Arturo Figueroa., (Oct2013)his document improved aortic hemodynamic in pre-hypertensive but otherwise healthy middle aged men and women receiving therapeutic doses of watermelon. Figueroa said. “These findings suggest that this ‘functional food’ has a vasodilatory effect, and one that may prevent prehypertension from progressing to full-blown hypertension, a major risk factor for heart attacks and strokes.

Stephen Daniells., (Jun 2012) daily supplement of a watermelon extract may help reduce moderately elevated blood pressure. The extract a rich source of the amino-acid L-citrulline and L-arginine, was associated with reduction in systolic and diastolic blood pressure. An earlier study from the same group with 4gms/ day of the watermelon extract only reduced systolic blood pressure. The new study used a dose of 6gms/day and the benefits to both systolic and diastolic blood pressure.

4. Methodology

4.1 Research Design

The research design chosen for the study is quasi experimental pre test and post test design. The design can be represented as,

4.2 Description of the Setting

The investigator had selected Primary health centre, Adaikampatti, Perambalur to conduct this study. It is located Thuraiyur to permabalur road. The bed strength of the hospital is 50 bedded. The total number of patients with hypertension attending Primary health centre Outpatient Department approximately 40 – 50 per day.

4.3 Variables

Independent variable
In this study Watermelon was the independent variable

Dependent variables
In this study Hypertension was dependent variable.

Extraneous variables
Age, Sex, Education, Occupation, Monthly income, family history of hypertension, smoking habit, Habit of alcoholism, Dietary Habit, and Practising Regular exercise.

Population
The population for this study is patients who are attending outpatient department at Primary health centre, Adaikampatti, Perambalur.

Sample
The sample for this study comprises of patients with hypertension attending outpatient department at Primary health centre, Adaikampatti, Perambalur during the study period and those meet sampling criteria.

Sampling Technique
Non Probability Convenience Sampling Technique will used in this study.

Sample Size
The investigator selected 60 patients with hypertension. Among them, 30 patients with hypertension will be assigned to experimental group and other 30 patients with hypertension will assigned to control group.

4.4 Criteria for Sample Selection

The sample selection is based on following inclusion and exclusion criteria.

a) Inclusion criteria

The patient who are:

- Between the age group of35 - 65years of age.
- Attending the out- patient department.
- Hypertensive Patient and on regular anti-hypertensive agents.
- Residing near Primary health centre, Adaikampatti, Perambalur

b) Exclusion criteria

- Patients with associated illness like diabetes mellitus, asthma, cardiac diseases.
- Patients who are on any other adjuvant treatment

Development of the Tool

The tool for the data collection was conducted by doing extensive literature review. The primary and secondary sources of literature were reviewed to develop an appropriate tool. Content validity was obtained from experts in the field of general medicine and nursing. Their opinions and valuable suggestions were incorporated in the tool and it was finalized.

Description of the Tool

Instrument is a device used to collect data**. (Polit& Beck, 2011)**

Section- A

A structured interview schedule was used to collect information regarding demographic data such as Age , Sex, Education, occupation, Monthly income, family history of hypertension , Smoking habit, Habit of alcoholism, Dietary Habit and Practising Regular exercise.

Section –B

National heart, lung and blood Institute categories blood pressure level in adults (2008 Oct 26) which was used to evaluate the blood pressure.

Table 1: Blood pressure categories and scoring procedure

Category	Systolic BP mmHg	Diastolic BP mmHg
Normal	Less than 120or	Less than 80
Pre-hypertension	120-139or	80-89
Hypertension stage I	140-159or	90-99
Hypertension stage-II	More than 160or	More than 100

Scoring Procedure

After consumption of watermelon the blood pressure level will categories as follow,

Category	Scoring
Normal	0
Pre-hypertension	1
Hypertension stage I	2
Hypertension stage-II	3

Validity and Reliability

Validity

Validity of the tool was obtained by experts, 6 from the field of nursing, 2 from the field of medicine and one dietician.

Reliability

The reliability of the tool was checked and was established by using inter-rater method $r^1 = 0.98$ which showed that the tool was reliable and was considered for proceeding.

Method of Data Collection

Period of Data Collection

The data was collected over a period of four weeks

Data Collection Procedure

The data was collected over a period of 4 weeks. In first day the investigator selected 30 Patients for experimental group along with their residential address also collected from outpatient department at Primary health centre, Adaikampatti, Perambalur First day the investigator introduced himself to the patients and explained to the purpose of the study. After obtaining the consent the investigator checked the blood pressure for experimental group. On second day the investigator selected 30 Patients for control group after obtaining the consent the investigator checked the blood pressure an advised to continue the prescribed treatment. Third day the investigator visited the experimental group houses and two cups of ripped watermelon pieces was given daily for 21days.Patients of experimental group was instructed regarding intake of watermelon before lunch. Also the patients were provided with daily record sheet and were instructed to maintain it daily.

The post test blood pressure was assessed using sphygmomanometer on 23rd day for experimental group and 24th day for control group patients. The collected data was analyzed by using descriptive and inferential statistics.

5. Results

Section –A

Distribution of Patients with Hypertension according to Their Selected Demographic Variables in Experimental Group and Control Group.

Table: Frequency and percentage distribution of biographic variables among Hypertension patient in experimental group and control group, n=60

S. No	Demographic variables	Experimental group		Control group	
		F	%	F	%
1	Age(in years)				
	a) 35 to 45	4	13.3	1	3.3
	b) 46 to 55	15	50	15	50
	c) 56 to 65	11	36.6	14	46.6
2	Sex				
	a) Male	21	70	20	66.7
	b) Female	9	30	10	33.3
3	Education				
	a) No formal education	7	23.4	12	40
	b) Primary	7	23.4	7	23.3
	c) Secondary	4	13.3	3	10
	d) higher secondary	3	10	4	13.3
	e) Diploma	3	10	2	6.76
	f) Graduate	4	13.3	2	6.76
	g) Post graduate	2	6.6	0	0
4	Occupation				
	a) Secondary	2	6.6	3	10
	b) Moderate	12	40	14	46.6
	c) Heavy	16	53.4	13	43.3

Table: Frequency and percentage distribution of illness related variables among Hypertension patient in experimental group and control group, n =60

S. No	Demographic variables	Experimental group		Control group	
		F	%	F	%
1	Family history of hypertension				
	a) Yes	23	76.7	14	46.6
	b) No	7	23.3	16	53.4
2	Habit of smoking				
	a) Yes	13	43.3	4	13.3
	b) No	17	56.7	26	86.7
3	Habit of alcohol				
	a) Yes	8	26.7	8	26.7
	b) No	22	73.3	22	73.3
4	Dietary habit				
	a) Vegetarian	5	16.7	2	6.6
	b) Non-vegetarian	25	83.3	28	93.4
5	Duration of illness (in years)				
	a) <1	2	6.6	1	3.3
	b) 1 to 3	7	23.3	6	20
	c) 4 to 6	14	46.6	12	40
	d) 7 to 9	4	13.3	10	33.4
	e) >9	3	10	1	3.3
6	Regular exercise				
	a) Yes	11	36.6	10	33.3
	b) No	19	63.4	20	66.7
7	Body Mass Index				
	a) 18.5 to 24.9	9	30	6	20
	b) 25 to 29.9	14	46.6	22	73.4
	c) 30 to 34.9	7	23.4	2	6.6
	d) 35 to 39.9	0	0	0	0
	e) 40	0	0	0	0

Section-B: Distribution of Patient with Hypertension according to their Systolic and Diastolic in Experimental and Control Group

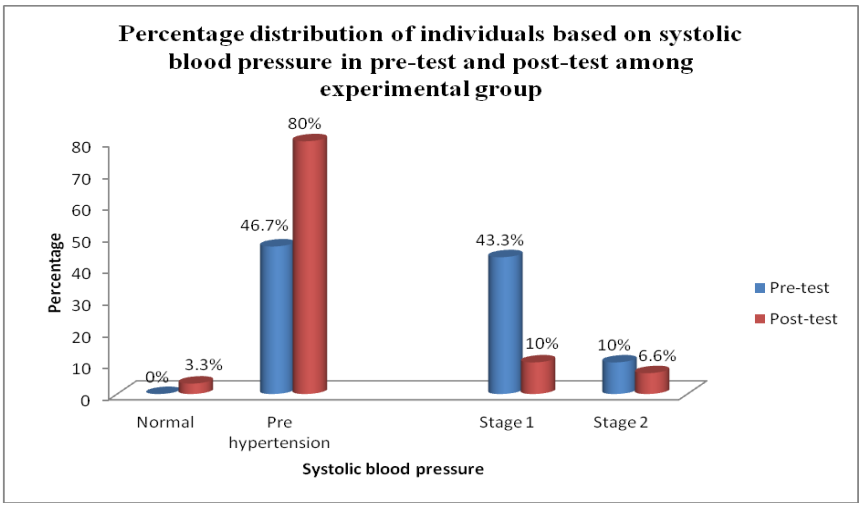

Figure 3: Percentage distribution of systolic blood pressure according to the pre test and post test among patient with hypertension in experimental group

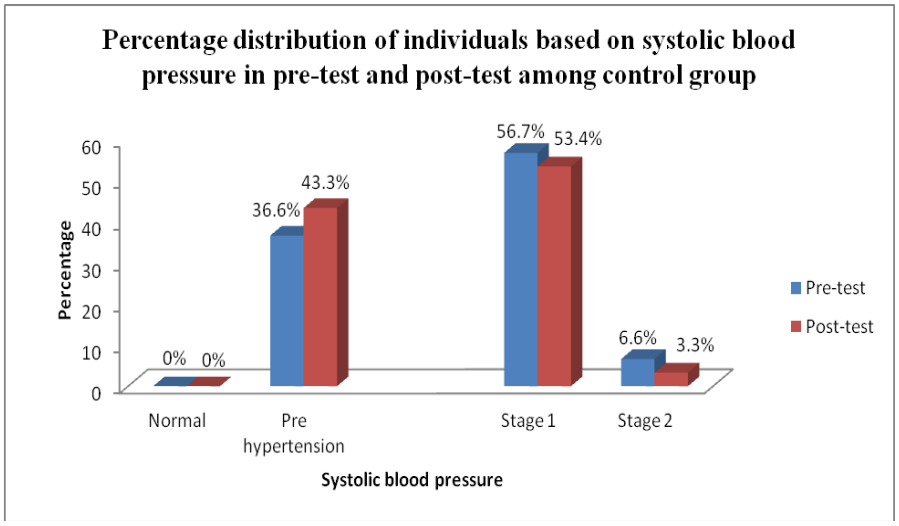

Figure 4: Percentage distribution of systolic blood pressure according to the pre test and post test among patient with hypertension in control group

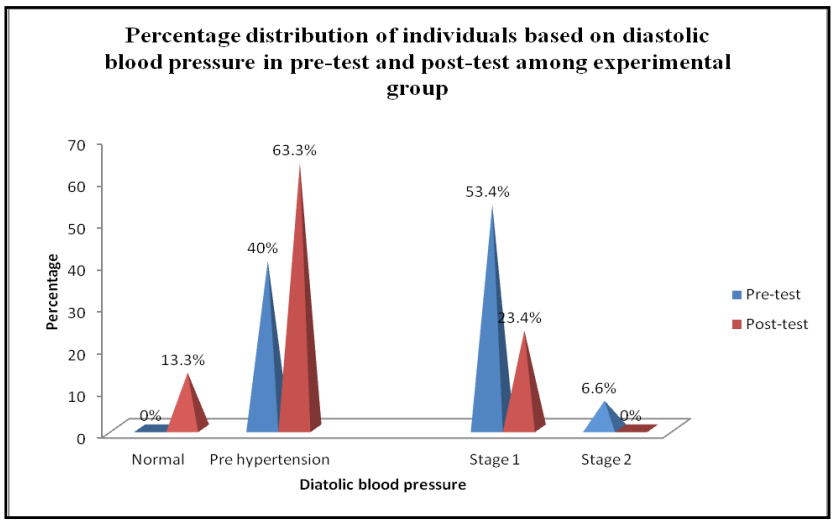

Figure 5: Percentage distribution of diastolic blood pressure according to the pre test and post test among patient with hypertension in experimental group

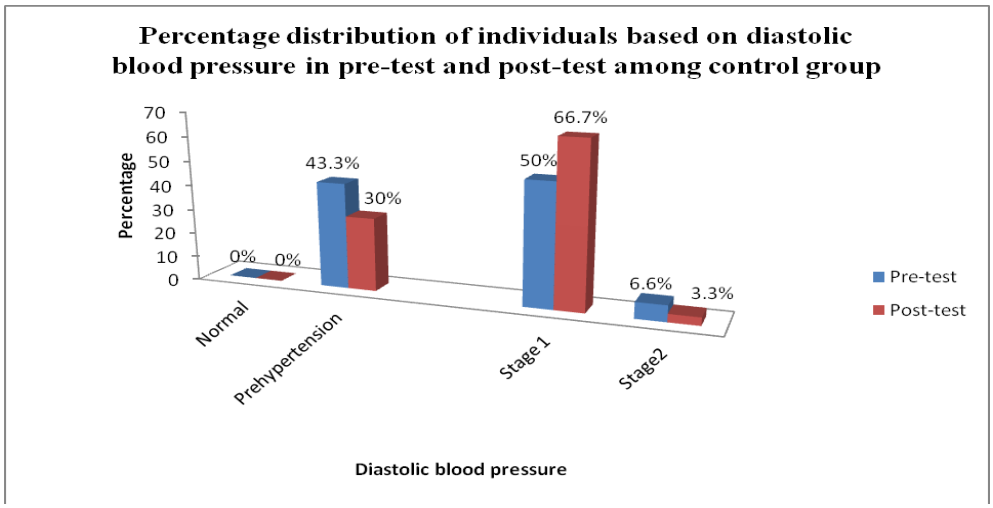

Figure 6: Percentage distribution of diastolic blood pressure according to the pre test and post test among patient with hypertension in control group

Section-c

Comparison of mean, standard deviation and mean difference among patients with hypertension in experimental and control group.

Table: Pre and post test Compression of systolic and diastolic blood pressure among hypertension patient in both experimental and control group.

Blood pressure		Experimental group N=30			Control group N=30		
		Mean	SD	df	Mean	SD	Df
Systolic	Pre test	140.46	9.84	29	143.40	9.96	29
	Post test	132.93	11.40		142.73	8.41	
Diastolic	Pre test	90.73	5.44		90.33	5.94	
	Post test	85.20	5.90		90.66	4.17	

Table 4 represent in experimental group calculated t value for systolic and diastolic blood pressure 14.93 and 11.61 which was significant at p <0.05 level. In control group calculated t value for systolic and diastolic blood pressure 1.18 and 0.68 which was not significant at p <0.05 level

Section - D

Hypotheses Testing

Effectiveness of Watermelon on Blood Pressure Level among Patient with Hypertension in Experimental and Control Group

Table: Effectiveness of Watermelon on blood pressure among patient with hypertension in experimental and control group

Blood pressure		Experimental group n=30		Control group n=30		t value	df
		MD	SD	MD	SD		
Systolic	Post test	5.53	5.90	0.33	4.17	4.137**	58
Diastolic	Post test	7.53	11.40	0.66	8.41	3.787**	

* Significance at p<0.05 level , table value- 1.96
** highly significance p<0.01 level, table value -3.29

Table-5 represents post test blood pressure of experimental and control group patient for the experimental group the mean post test systolic was 5.53±5.90 diastolic was 7.53±11.40. Calculated 't' value for systolic blood pressure 4.137 and diastolic blood pressure 3.78 at P<0.01 level is greater than table value (3.26). Hence the research hypothesis H_1 is retained. It was evident that watermelon was effective in reducing blood pressure among hypertensive patient.

Section-E

Association of Posttest Blood Pressure among Patient with Hypertension in Experimental Group with their Selected Demographic Variables.

Table: Association between post test level of systolic blood pressure of individual with Hypertension the experimental group and their selected demographic variables

Demographic variables		Blood Pressure score				Df	Chi Squire
		0	**1**	**2**	**3**		
Age	35 -45	-	4	-	-	5	24.583* (11.07)
	46 -55	1	10	2	2		
	56 -65	-	10	1	-		
Sex	Male	1	16	3	1	4	12.540* (9.49)
	Female	-	8	-	1		
Education	No formal	-	5	1	1	9	76.262* (16.92)
	Primary	-	7	-	-		
	Secondary	-	3	-	1		
	Higher secondary	-	2	1	-		
	Diploma	-	3	-	-		
	Graduate	1	2	1	-		
	Post graduate	-	2	-	-		
Occupation	Sedentary	-	2	-	-	5	25.146* (11.07)
	Moderate	1	7	2	2		
	Heavy	-	15	1	-		
Family history of hypertension	Yes	1	18	2	2	4	19.006* (9.49)
	No	-	6	1	-		
Smoking habit	Yes	-	9	3	1	4	12.149* (9.49)
	No	1	15	-	1		
Alcohol habit	Yes	-	7	1	-	4	8.097 (9.49)
	No	1	16	3	2		
Dietary habit	Vegetarian	1	4	-	-	4	15.600* (9.49)
	Non-veg	-	19	4	2		
Duration of illness	<1Year	-	2	-	-	7	31.417* (14.07)
	1 – 3	-	6	1	-		
	4 – 6	1	9	3	1		
	7 – 9	-	4	-	-		
	>9	-	2	0	1		
Regular exercise	Yes	1	6	3	1	4	12.201* (9.49)
	No	-	17	1	1		
Body mass index	18.5 - 24.9	1	7	1	-	7	20.282* (14.07)
	25 - 29.9	-	11	2	1		
	30 -34.9	-	5	1	1		
	35 - 39.9	-	-	-	-		
	> 40	-	-	-	-		

* Significant

There is a significant association found between systolic blood pressure and demographic variables of experimental group, except alcoholic habit. Hence the research hypothesis H_2 is retained.

6. Discussion

Demographic variables

In experimental group and control group 15(50%) and 15(50%) belongs to the age group **between 46 – 55 years.**In experimental group 21(70%) and control group 20(66.7%) were male. In experimental group 7(23.4%) were no formal education and primary education and control group 12(40%) were no formal education.

In experimental group 16(53.4%) were heavy worker and control group 14(46.6%) were moderate worker. In experimental group 23(76.7%) and control group 16(53.4%) posses family history of hypertension. Majority 22(73.3%)

were having habit of alcohol consumption in both groups. In experimental and control group 25(83.3%) and 22(73.3%) patients ere non vegetarian. In experimental group 19(63.4%) and control group 20(66.7%) were not practicing regular exercise. Body mass index, in experimental and control group 14(46.6%) and 22(73.4%) were found to be between 25 – 29.9.The mean systolic blood pressure before intervention 140.46 and after intervention 132.93. The diastolic blood pressure before intervention was 90.73 after intervention was 85.20. It reveals that watermelon is effective in reducing blood pressure. The calculated 't' value for systolic blood pressure (4.13) and diastolic blood pressure (3.78) which is higher than table value hence it can be concluded that watermelon is effective in reducing blood pressure. The research hypothesis H_1 is retained.

Objective 1: To assess the pre test level of blood pressure among patient with hypertension in experimental and control group.
In experimental group during pre test 46.7% patient had pre hypertension 13(43.3%) had stage-I hypertension 3(10%) had stage-II hypertension.

Investigator felt that majority of patient were having increased blood pressure. A need was felt to incorporate adjunct treatment with drug therapy to maintain blood pressure.

Objective 2: To evaluate the effectiveness of watermelon among patient with hypertension experimental group and control group.
The post test blood pressure of experimental and control group patient for the experimental group the mean post test systolic was 5.53±5.90 diastolic was 7.53±11.40. Calculated 't' value for systolic blood pressure 4.137 and diastolic blood pressure 3.78 at $P<0.01$ level is greater than table value (3.26). Hence the research hypothesis H_1 is retained. It was evident that watermelon was effective in reducing blood pressure among hypertensive patient.

Objective 3: To associate the post test blood pressure in patient with hypertension with their selected demographic variables in experimental group and control group
The present study findings level that there is a significant association between blood pressure. There is a significant association found between systolic blood pressure and demographic variables of experimental group, except alcoholic habit. Hence the research hypothesis H_2 is retained.

7. Summary, Conclusion, Implications and Recommendations

7.1 Summary

The purpose of this study to evaluate the effectiveness of watermelon on blood pressure among patient with hypertension. A quasi experimental design was used to conduct the study at Primary health centre, adaikampatti, Perambalur. Total 60 samples among 30 were assigned for experimental group and control group. A structured interview schedule was used to collect general information and Sphygmomanometer was used to check the pre-test and post-test blood pressure. The patients of experimental group were given two cups of ripped watermelon for 21 days. Post-test was done on 23rd day for experimental group and 24th day for control group.

The baseline data was tabulated by formulating frequency table. The pretest blood pressure was assessed using descriptive statistics. The effectiveness of watermelon was evaluated by inferential statistics 't' test. The chi-square analysis was done to associate the blood pressure with their selected demographic variables patients with hypertension.

7.2 Major findings of the study

In experimental group and control group 15(50%) belongs to the age group between 46 – 55 years. In experimental group 21(70%) and control group 20(66.7%) were male. In experimental group 7(23.4%) were no formal education and primary education and control group 12(40%) were no formal education.

In experimental group 16(53.4%) were heavy worker and control group 14(46.6%) were moderate worker. In experimental group 23(76.7%) and control group 16(53.4%) posses family history of hypertension. Majority 22(73.3%) were having habit of alcohol consumption in both groups. In experimental and control group 25(83.3%) and 22(73.3%) patients were non vegetarian. In experimental group 19(63.4%) and control group 20(66.7%) were not practicing regular exercise. Body mass index in experimental and control group 14(46.6%) and 22(73.4%) were found to be between 25 – 29.9.The mean systolic blood pressure before intervention 140.46 and after intervention 132.93. The diastolic blood pressure before intervention was 90.73 after intervention was 85.20. It reveals that watermelon is effective in reducing blood pressure. The calculated 't' value for systolic blood pressure (4.13) and diastolic blood pressure (3.78) which is higher than table value hence it can be concluded that watermelon is effective in reducing blood pressure. The research hypothesis H_1 is retained.

7.3 Conclusion

This study was to evaluate the effectiveness of watermelon on blood pressure among patient with hypertension in Primary health centre, adaikampatti, Perambalur. The result showed that the watermelon is effective in reducing blood pressure inpatient with hypertension. There was significant association found with their selected demographic variables.

7.4 Implications

The findings of the study have the following implications in the various areas of nursing service, nursing education, nursing administration and nursing research.

Nursing Service

- The nurse should understand the importance of watermelon in reducing blood pressure.
- The nurse should develop sensitivity to the effect of watermelon as an adjunct to pharmacological therapy in nursing practice.

- Nursing staff can take specialized training in adjunct treatment to prevent complication of hypertension.
- The nurse should teach the benefit of watermelon in reducing blood pressure among hypertensive patient in hospital.

Nursing Education

- Nursing curriculum needs to be update to identify the aspect of nursing care that the lacking to provide supportive education to alternative system of medicine.
- The nurse educator should involve the concept to alternative and complementary therapy in nursing profession.
- The nurse educator should provide exposure to alternative and complementary therapy to encourage the student to expand their career in that field.
- The nurse educator should provide exposure to alternative and complementary therapy to encourage the student to expand their career in that field.
- Nursing curriculum should emphasize on adjunct therapy along with pharmacological management of disease.
- The nurse should encourage the students to educate their patients regarding adjunct treatment during their clinical exposure.

Nursing Administration

- Nurse administrator should arrange for public awareness programme importance of adjunct therapy.
- In hospitals policy may be developed to practice of adjunct therapy for hypertension.
- Prepare efficient health personnel through adequate training and encouragement in adjunct therapy.

Nursing Research

- More researchers can be done in establish effectiveness of watermelon throughout the world.
- Researcher should concentrate non pharmacological intervention to reduce blood pressure.
- Disseminate the findings through conference, seminars, publications in professional, national and international journals.

7.5 Recommendations

- Similar study can be done with large group.
- Similar study can be done in extended period.
- Similar study can done with other setting.
- Comparative study can be done with pharmacological and non-pharmacological management of hypertension.
- Comparative study can be done to evaluate the effectiveness of watermelon with other alternative therapies among hypertensive patient.

References

Books

[1] Basavanthappa. B.T, (2006), *Nursing Research*, (3rd edition), Jaypee Brothers, Bangalore, Pg 2011-2026.

[2] Basavanthappa. B.T, (2007), *Nursing theories*, (3rd edition), New Delhi, Jayapee Brothers, Pg 306-323.

[3] Birkenhager. W.H, (2001), *Hand book of hypertension*, (5th edition), Peninsula, Elsevier, Pg 645-673.

[4] Black & Elliott. (2007), *Hypertension, A companion to braunwald's heart disease*, (4th edition), Canada, W.B. Saunders Company, Pg 253-278.

[5] Brunner & Suddarth, (2004), *Medical Surgical Nursing*, (11th edition), Philadelphia, Lippincott Company, Pg 1003-1099.

Journals

[6] Agarwal.V.K, Bhalwar.R, & Basannar .D .R, (2008). Prevalence and determinants of hypertension in a rural community, MJAF 164, Pg.21-25.

[7] Anne Heart, (2009), Complementary and alternative therapies for high blood pressure, American Journal of clinical Nutrition, 90(1), Pg493-498.

[8] Banerjee. S. K & Mauli. S. K., (2002). Effect of garlic on cardiovascular disorder, *Journal of nutrition*, 1: 4 – 5.

[9] Borek. C., (2006), Garlic reduces dementia & heart – disease, *Journal of nutrition*, 136: 810 – 12.

[10] Gupta.R, (2007), Trends in hypertension epidemiology in Indian Journal of Human hyptertension, Volume 18, Pp.73-78.

[11] Hajjar & Kotchen., (2003), Hypertension 'Silent killer', *Clinical guidelines in adult health*. 21(8): 19.

Net Reference

[12] Johnson.P.(2002).Highbloodpressure.Retrivedfrom.August2010http://www.iowagaric.com/a159763-high-blood-pressure-vs-garlic.cfm

[13] Judt Rob.(2004).Hypertension and garlic. Retrieved from April 2010.http://www.healthy-holistic-living.com/garlic-and-high-bloodpressure.htm#xzz0lkbhCZCG

[14] Merlyn.(2008).Garlicforhypertension.retrivedfromApril2010.http://Www.Brighthub.Com/Health/Alternative medicine/Articles/18132.Aspx#Xzz0lkey0lhh

[15] Ried Karim. etal., (2008). Hypertension. retrived from. November 2010. http://www.biomedcentral.com/1471-2261/8/13.