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ORIGINAL ARTICLE

THE EFFECT OF CHANGE IN LIFESTYLE MEASURES ON BLOOD PRESSURE CONTROL AMONG ADULT HYPERTENSIVE PATIENTS IN A TERTIARY HOSPITAL IN NORTH CENTRAL NIGERIA.

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ABSTRACT

Aim: The study was undertaken to determine the effect of change in lifestyle measures on blood pressure control among adult hypertensive patients.
Methods: The study was a randomized controlled trial involving hypertensive adults aged 20 years and above presenting in the General Outpatients' Clinic (GOPC) of Jos University Teaching Hospital (JUTH). Participants were consecutively selected and randomized to an intervention group that was offered structured counselling on lifestyle modification and a control group that was offered routine advice only. Participants in both groups were also taking antihypertensive medications. Participants were followed up monthly for twelve weeks and adherence to lifestyle modification measures noted. The proportion of observed changes were analysed using Chi square and Fischer's exact tests. The means at 95% confidence intervals of the blood pressure values were determined using the independent t-test. Data was analyzed on an intention-to-treat basis. A *p*-value of <0.05 was considered significant in all analyses.
Results: Changes in lifestyle measures were notably more among the intervention group. There was a greater reduction in the average blood pressure values of the intervention group compared to the control group after twelve weeks and the difference in systolic blood pressure (SBP) was statistically significant. The mean SBP difference was 5.5 mmHg (0.43, 10.5; 95% CI) and the mean diastolic (DBP) difference was 2.76 mmHg (-1.32, 5.66, 95% CI).
Conclusion: Findings from the study show that lifestyle modifications during a period of 12 weeks following structured counselling in hypertensive adults can help to control or reduce blood pressure.

INTRODUCTION

Hypertension is defined as systolic blood pressure (SBP) of ≥ 140mmHg or diastolic blood pressure (DBP) of ≥ 90mmHg, based on "two or more properly measured seated blood pressure (BP) readings on each of two or more office visits".[1] Management of hypertension by lowering BP into a more optimal range can be expected to lower cardiovascular disease (CVD) risks and BP related morbidities. Hypertension is associated with a decreased life expectancy, increased hospitalizations, increased health care costs and serves as a precursor to CVD.[2,3] Although treatment of hypertension is mostly pharmacological, lifestyle changes is redefining this range of BP and emphasizing the role of health care providers in its management.[4]

Current recommendations for the prevention and treatment of high BP emphasize non-pharmacological therapy, also termed "lifestyle modification". JNC-7 recommends lifestyle modification for all patients with hypertension and prehypertension.[5,6] These modifications include:

1. Reducing dietary sodium to less than 2.4g per day
2. Increasing exercise to at least 30 minutes per day, four days per week
3. Limiting alcohol consumption to two drinks or less per day for men and one drink or less per day for women. One standard drink contains 10g of alcohol e.g one bottle of beer = 2.6 standard drinks
4. Following the dietary approaches to stop hypertension (DASH) eating plan (high in fruits, vegetables, potassium, calcium and magnesium, low fat and salt)
5. Achieving a weight loss goal of 4.5kg or more
6. Cessation of smoking (not recommended in JNC 7).

The aim of this study, was to determine the effect of change in lifestyle measures on blood pressure control among hypertensive adults.

METHODOLOGY

The study was conducted between February to May 2012 among hypertensive individuals aged 20 years and above presenting in the General Outpatients Clinic (GOPC) of Jos University Teaching Hospital (JUTH). The study was a randomized controlled trial, comprising an intervention group that received structured counseling on lifestyle modification and a control group that was only advised on lifestyle modification. Using the Power of 80% and a 95% confidence level, the sample size for means was used for the study and 60 participants were recruited, with thirty in each group. Patients with a systolic blood pressure of ≥140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg were included. Information collected included the participants' socio-demographic data, history of alcohol ingestion, hypertension and smoking, current exercise activity and a 24-hour dietary recall.

Blood pressure readings were recorded to the nearest even number and the mean of three recordings computed. All patients in the intervention group were counseled and advised concerning diet and exercise using a structured format. They were given written dietary and exercise instructions in either English or Hausa and asked to keep an exercise diary. They were asked to return for follow up at four, eight and twelve weeks. At each follow up visit, the instructions were reviewed and repeated according to the structured format to reinforce them. The blood pressure was recorded at each follow up visit as described above. The duration of exercise each day was also recorded. The control group were only given general advice on exercise and a healthy diet.

Data was analysed using Epi Info version 3.5.3 (Centres for Disease Control and Prevention, Atlanta, Georgia, USA).[7] Background descriptive analysis was done to compare both groups. The primary outcome variable of interest was blood pressure. The proportions of categorical variables were compared using the χ^2 test and the Fisher's exact test. A p value of 0.05 was considered significant in all analyses

RESULTS

Sixty subjects fulfilled the inclusion criteria and participated in the study – 30 each in the control and intervention groups. Fifty three completed follow-up (88.33%) while seven (11.67%) did not complete the study, comprising three in the control group and four in the intervention group.

Socio-demographic characteristics of study participants:

The mean ages of the participants in the control and intervention groups were 48.64±9.78 years and 48.22±10.46 years (p=0.87). The age range was 27 to 68 years. Seventeen (28.3%) of the participants were males and 43 (71.7%) were females. Ninety percent of them were married. Details are shown in Table 1.

Table 1: Sociodemographic characteristics of the study participants:

	Control group N=30	Intervention group N=30	p value
Mean Age (years)	48.64±9.78	48.22±10.46	0.87
Age category(years)			
20-29	2	1	
30-39	3	4	
40-49	10	9	
50-59	10	12	
60-69	5	4	
Gender:			0.77
Male	8	9	
Female	22	21	
Educational Level:			0.92
None	12	12	
Primary	4	5	
Secondary	6	7	
Tertiary	8	6	
Marital Status:			**0.38**
Married	26	28	
Single	4	2	
Religion:			0.60
Christian	19	17	
Muslim	11	13	
Ethnicity			**0.39**
Plateau People	20	23	
Non- Plateau People	10	7	

Lifestyle Habits

Alcohol consumption: At baseline, sixteen (26.67%) participants in the control group and 19 (31.67%) in the intervention group had a current history of alcohol consumption in the form of beer, wine, whisky and local brew, of more than two standard drinks per day and a duration of at least one year. One "standard" drink contains roughly 14 grams of pure alcohol, which is found in: 12 ounces of regular beer, which is usually about 5% alcohol, 5 ounces of wine, which is typically about 12% alcohol, 1.5 ounces of distilled spirits (gin/whisky), which is about 40% alcohol. Post intervention, nine (15%) participants in the control group and 12 (20%) in the intervention group had reduced alcohol consumption (p=0.04).

Cigarette smoking: No participant in either the control group or the intervention group had a current history of cigarette smoking, and none had resumed or started smoking during the study.

Exercise: At enrollment, nine participants (15%) from the control group and ten (16%) from the intervention group were involved in some form of regular aerobic exercise. The control group exercised for an average of two days per week for an average of 34.5 minutes per day while the intervention group also exercised for an average of two days per week but for an average of 37 minutes per day. Among those that exercised, the most common exercise undertaken was brisk walking in both groups, comprising seven (77.7%) participants in the control group and five (50%) in the intervention group. At the end of the study, 25 (54.3%) participants from the control group and 22 (47.8%) from the intervention group were involved in some form of regular aerobic exercise (p=0.18). The control group exercised for an average of three days per week for an average of 32 minutes per day while the intervention group exercised for an average of four days per week for an average of 35 minutes per day. The most common

exercise undertaken was brisk walking in both groups, with 13 (43.3%) participants in the control group and 15 (50%) in the intervention group (p=0.68). Jogging, skipping, climbing staircases, cycling, tennis, football and other forms of aerobic exercises made up the remaining.

Dietary pattern: Based on a 24-hour dietary recall and estimated from the average equivalent of the DASH diet, the dietary pattern of participants in the study groups were compared. All patients in both groups had less than the expected daily servings of fruits with 63.3% and 70% of participants having less than the expected daily servings of fruits and vegetables in the control and intervention groups respectively. Of the total study participants, 93.3% of the participants in the control group had more than the expected daily servings of fats and oils versus 96.7% in the intervention group while 70% of the control group had more than the expected daily servings of grain and grain cereals versus 76.7% in the intervention group. Only 13.3% of the control population had the expected value for lean meat, poultry or fish against 10% of the intervention population. Only 10% of the control population had some form of nuts, seeds or legumes and in required daily amounts at enrollment versus 6% in the intervention group. All participants in the study group were taking more than the expected daily servings of more than one teaspoon full of salt either in prepared meals or on the table or both.

On completing the study, 47.2% of the control group had the expected daily servings of fruits against 67.8% of the intervention group (p=0.03). The control and intervention groups comprised 47.7% and 56.3% of participants who had the expected daily servings of vegetables respectively (p=0.035). In the control group, 11.4% had the expected daily servings of fats and oils versus 18.3% in the intervention group (p=0.58). The control group was made up of 27.8% who had the expected daily servings of grain and grain cereals which was comparable with 34.9% in the intervention group (p=0.41). Only 41.1% of the control group had the expected servings for lean meat, poultry or fish against 38.9% of the intervention group (p=0.63). On completion of the study, 9.3% of the control group had some form of nuts, seeds or legumes versus 11.4% of the intervention group (p=0.29). All participants in both study arms had reduced their salt intake at the end of the study. Based on a 24 hour dietary recall and estimated from the average equivalent of the DASH diet, the dietary pattern of participants in the study groups were compared at baseline and on completing the study (Figures 1 and 2).

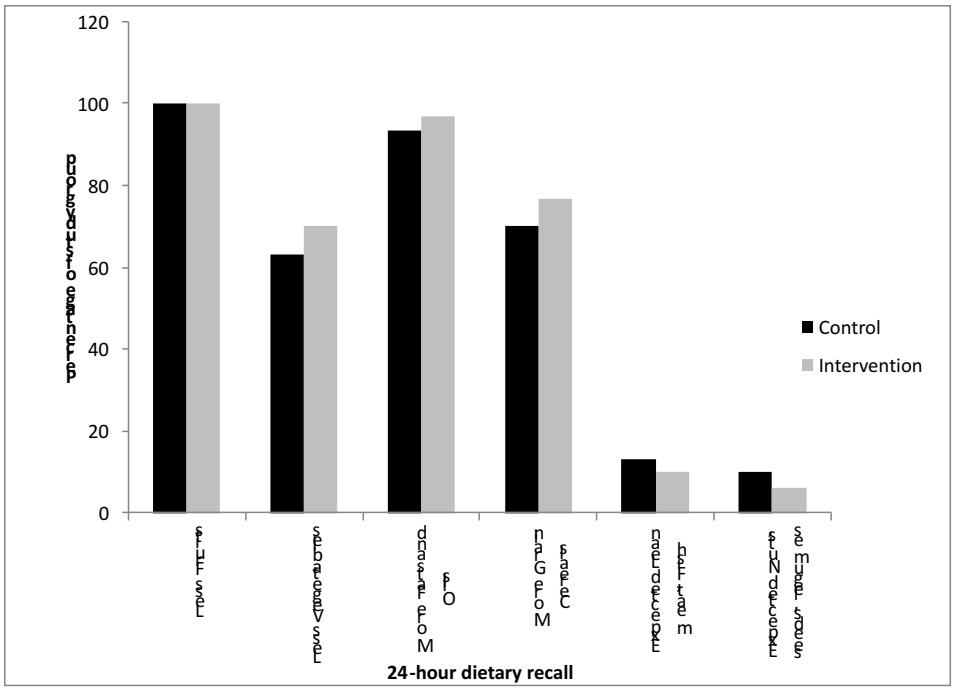

Fig 1. Baseline dietary pattern of the control and intervention groups based on a 24-hour dietary recall

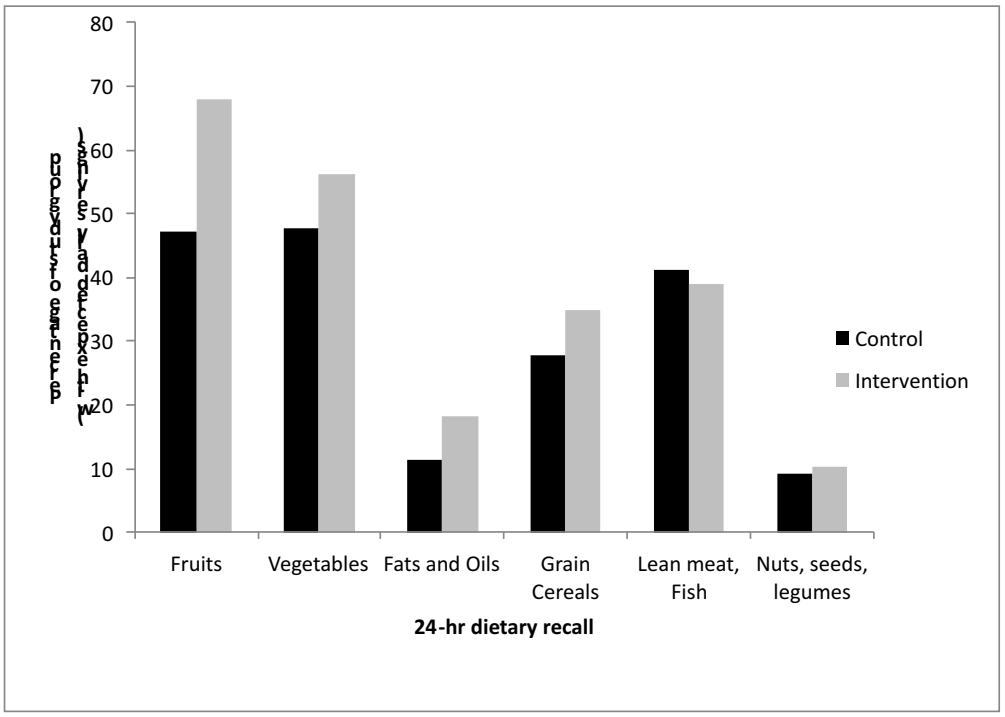

Fig 2. Post-intervention dietary pattern of the control and intervention groups based on a 24-hour dietary recall.

Blood pressure changes between the control and intervention groups: Independent t-test analysis gave a mean systolic blood pressure difference of 5.5 mmHg (0.43, 10.57, 95% CI) between the two study groups and this was statistically significant. Conversely, the mean diastolic difference of 2.76 mmHg (-1.32, 5.66; 95% CI) between the same study groups was not statistically significant. Figure 3 and Table 2 summarize the changes in baseline and post-intervention mean blood pressure values among participants in each study group.

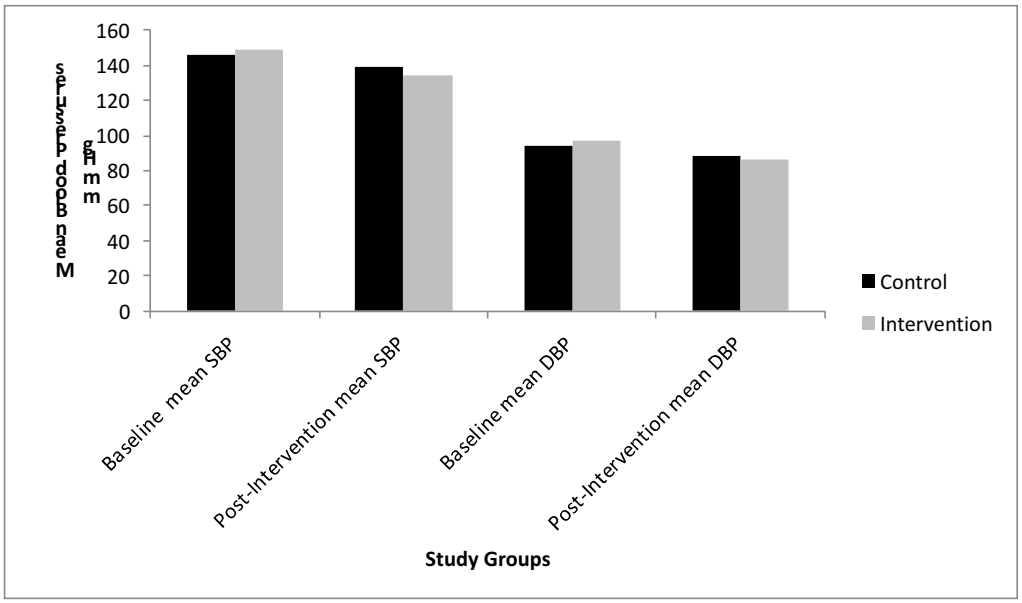

Fig 3. Baseline and post-intervention mean systolic and diastolic blood pressures between the control and intervention study participants.

Table 2. Comparison of the blood pressure changes among participants in control and intervention groups at the beginning and end of the study.

	Control N=30		Intervention N=30	
	Baseline	**Post-Intervention**	**Baseline**	**Post-Intervention**
Mean SBP (mmHg)	146.61±13.81	139.5±8.74	148.44±16.43	134±10.78
Mean DBP (mmHg)	91.96±6.7	88.17±7.48	95.88±10.21	86±5.93

DISCUSSION

This study evaluated the cumulative benefit of multiple lifestyle interventions and the benefit that can be expected from structured therapeutic lifestyle changes. Several similar studies investigating the effect of lifestyle interventions on hypertension have been done elsewhere.[8-10]

This study showed an average lowered systolic blood pressure of 5.5 mmHg between the control and intervention groups at three months. The mean reductions in systolic as well as diastolic BP values are clinically relevant but less than those achieved in the PREMIER and TOHP clinical trials which also evaluated the effects of combined lifestyle interventions.[11,12] The PREMIER study showed an average of 6.3 mmHg difference between the two groups of hypertensive participants after six months. It was shown to be sufficient to reach non-pharmacological treatment goals in many individuals with stage I hypertension thus preventing additional increase in blood pressure and CVD risk associated with elevated BP.[11] A longer duration of this study of at least six months may have produced results comparable with the PREMIER studies.

Hypertensive patients can achieve greater blood pressure control using non-pharmacological in addition to pharmacological approaches. In 2002, review of six RCTs in a meta-analysis by the Institute for Clinical Systems Improvement (ICSI) in the USA on hypertension treatment, multifaceted lifestyle interventions on hypertensive patients on antihypertensive medications reported a modest reduction in systolic blood pressure (5.5mmHg, 95% CI: 2.3 to 8.8) that was statistically significant in the intervention group when compared to the control group.[13] This compares favourably with this study where a similar statistically significant result was seen (5.5mmHg, 95% CI: 0.43 - 10.57). However, despite a significant mean reduction in diastolic blood pressures in both studies, (4.5mmHg, 95% CI: 2.0 to 6.9) in the ICSI study versus (3.91mmHg, 95% CI: -1.3 to 5.5) in this study, the difference in means was not statistically significant in this study. The systolic BP change associated with the intervention group (net of change with the control group) was statistically significant and of a magnitude that was clinically significant. Therefore, it can be concluded for all groups, that maximum blood pressure benefit requires maximizing the effectiveness of lifestyle change interventions.

CONCLUSION

This study shows that changes in lifestyle measures are associated with a decrease in blood pressure values. Individuals with hypertension can make and sustain, during a period of 12 weeks, multiple lifestyle modifications which can help to control blood pressure and reduce the risk for cardiovascular diseases.

Implication for clinical practice

This study demonstrates the utility of effecting lifestyle changes in controlling blood pressure and consequently reducing co-morbidities that may be associated with elevated blood pressure. Clinicians should therefore be aware of the presence of risk factors associated with increased blood pressure and the screening and risk categorization of patients should be a routine aspect of patient care. A change in lifestyle measures incorporating both primary and secondary prevention should be part of the repertoire in the management of these individuals.

Implication for policy makers

Public policy to support and encourage lifestyle changes can be implemented at all levels of government. The provision of sports grounds, smoke-free public spaces and 'green' spaces in communities, and legislation on the sale and consumption of alcohol, among other measures will create a supportive environment in which healthier lifestyle choices are easier to make.

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