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Influence of Health Education on Blood Pressure and Body Mass Index of Rural Dwellers IMO State

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Abstract

Background and objectives: Hypertension has been globally recognized as the most prevalent Cardiovascular Disease (CVD) and a potent risk factor in the development of other CVD outcomes such as coronary heart diseases, stroke, and renal insufficiency. It has been reported to be on the increase in recent years, being the most rapidly rising CVD in Sub-Saharan Africa. Meanwhile it is associated with preventable risk factors as salt, alcohol and obesity. The purpose of the study is to screen participants for high blood pressure and BMI, provide information on healthy lifestyles as a measure to reduce risk factors that predispose to hypertension among the populace.

Methods: This work was an intervention study that adopted quasi experimental design in which only the Experimental Group (EG) was exposed to health education package aimed at lifestyle modification. Study was guided by three objectives and four hypotheses based on objective.

Results: Percentage of participants with normal blood pressure reading in the EG increased from 37% at baseline to 47% at end-line unlike the Control Group (CG). There was significant difference between the blood pressure readings of the EG and CG, P value=0.000 but there was no significant difference between the BMI of the EG and CG, p value>0.05.

Interpretation and conclusion: This implies that health education influenced their lifestyles positively. There was no significant change in BMI as obesity was not a problem among the populace. Awareness through Health Education on healthy lifestyles especially importance of DASH diet need to be intensified in rural communities by Health workers.

Keywords: Blood pressure; Awareness; Blood pressure; Body mass index; Healthy lifestyle; Dash diet; Risk factors; Health education; Rural dwellers

Introduction

Non-Communicable Diseases (NCD) pose increasing important public health problem in low income and middle income countries (LMICs). In 2008, 80% of global NCD deaths occurred in LMICs [1]. Hypertension, a NCD of Cardio Vascular type is common worldwide and is now regarded as a major public health problem [2]. One billion people worldwide have hypertension with 7.1 million deaths yearly [3]. The prevalence of hypertension varies within various countries. It has been reported to be on the increase in recent years, being the most rapidly rising CVD in Sub-Saharan Africa [4,5]. A systematic review and meta- analysis by Ataklte to assess the recent burden of hypertension in Sub-Saharan Africa, based on 33 surveys pooled from 2000-2013 publications involving 110,414 participants of mean age 40 years revealed prevalence varied from 15-70% [6]. Hypertension has been globally recognized as the most prevalent cardiovascular disease and has been acknowledged as a potent risk factor in the development of other cardiovascular disease outcomes such as coronary heart diseases, stroke, and renal insufficiency [7,8]. Hypertension places stress on target organs such as the kidneys, eyes, and heart [9]. Extensive epidemiological studies show that hypertension is one of the commonest cardiovascular ailments in Africa and that blood pressure assumes more importance with increasing age [10]. The risk of developing any of these complications is higher if hypertension is not controlled and if other risk factors such as tobacco, obesity, and diabetes exist [11]. Obesity has been implicated in development of Hypertension. Both childhood and adult obesity predispose to hypertension, hence the need to investigate the blood pressure and BMI of Isunjaba people, a rural community in South East of Nigeria where sudden deaths and stroke has been observed by the researcher.

Material and Methods

It is a community intervention study that utilized quasi experimental design involving an experimental and a control group. Two communities out of the four that made up Isunjaba was selected through simple random sampling and designated Experimental and Control groups by same method. The study lasted from July to December 2012. Study population was men and women aged 20 to 75 years residing in Isunjaba. Sample size determination was based on the formula for two proportions [12] and a total sample of 442 was computed.

By simple random selection using balloting, the required number of clusters of villages, households and participants was drawn. Experimental group constituted a sample of 199 subjects (45%) while control constituted 243 (55%), respectively. This was based on proportion of 968:1,184 which makes a total for a study population of 2,152. In each village, the center was identified tossing the coin and based on the side of the coin, (the head is right and the tail is left) the first house on the street was identified, followed by selection of men and women alternatively from the selected households until required number was got. Validity and reliability of measuring tools was ensured. Ethical approval was obtained from the ethical committee, Nnamdi Azikiwe

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University Teaching Hospital Nnewi (NAUTH/CS/66/VOL.3/009), Anambra State in line with its ethical protocol. Participants were given essential information about the study procedure, duration, its purpose and benefits and informed consent was obtained. Only those who were willing to participate were included in the study.

After identifying the first household and participant for the study in his or her home, blood pressure, weight and height measurements were taken and information on lifestyles gathered using structured questionnaire. The exercise ran for four weeks at baseline. Each of the two communities chose two days in a week, with their market day excluded. This exercise was repeated twice at three monthly intervals for six months after the baseline session in the experimental and control groups.

Body Mass Index (BMI) was calculated as weight (kg) divided by height (m^2). This exercise; measurement of height, weight and BMI was also measured at baseline, and post intervention at three monthly intervals over six months.

Community Health nursing intervention was Health education package on lifestyle modification for Experimental Group and none for Control. This was to improve lifestyle habits of participants in relation to hypertension prevention and control. This was done two weeks after the baseline questionnaires, blood pressure checks; height and weight measurements were taken. The Health Education package consisted of health promotion instruction on the following:

Definition, symptoms, risk factors, prevention, management, and complications of hypertension, importance of checking blood pressure regularly and implications, lifestyle modification information; moderate sodium intake and diet rich in vegetable and fruits, regular exercise (walking briskly, cycling, strolling at least once every week, visit to the primary Health Center for regular blood pressure checks, role plays to emphasize benefits of compliance. This was for the experimental group only.

Data was analyzed using descriptive and inferential statistics. McNemar Bowker's test was used to compute the significant difference in BP while ANOVA was used for BMI in the 2 groups at various phases. T-test was used in compares of mean values of lifestyle scores in the two groups. Result was presented using tables and graphs.

Results

Demographic variable showed that ages of respondents ranged from 20-75 with mean 49.49+14.45. Ages 50-59 were greatest in number 100 (22.6%) followed by ages 60-69 [94 (21.3%)] while <30 were the least with 42 (9.5%) in number. Participants with primary school education had the highest percentage of 38.5. Participants of low income class were 243 (57.6%) while upper class was 28 (6.6%). This is based on house hold income/day of Lower class<N 500 (<$3), Middle class N 500-2500 ($3-15), and Upper class>N 2500 (>$15) [13] (Table 1). There were more women in the study than men (Figure 1) which showcased a typical rural community in Nigeria.

Objective 1: To determine blood pressure of participants

Classification of respondents' blood pressure pre and post intervention: At baseline in experimental group, 74 (37.2%) had normal blood pressure while it was 115 (47.5%) in the control (P>0.05). At midterm in experimental group, 91(45.7%) had normal blood pressure while it was 100 (41.3%) in the control (P<0.05). At end-line in experimental group, 93 (46.7%) had normal blood pressure while it was 92 (38.0) in the control (P<0.05). There was steady increase in the number of participants with normal blood pressure in the experimental group at the three phases (Table 2).

The percentage change in blood pressure in the group's pre and post intervention

Percentage change in blood pressure at baseline and midterm: There is significant difference in the change in proportion of blood pressure from baseline to midterm. P value=0.000 in the experimental. Change in blood pressure is significant and hypothesis rejected. Change in blood pressure is not significant in the control, P value is=3.48 and hypothesis was accepted (Table 3).

Percentage change in blood pressure at baseline and end-line: Percentage of participants with normal blood pressure reading in the Experimental group was 37% and 47% at baseline and end- line respectively while it was 48% and 38% in the Control respectively. There is significant difference in the change in proportion of blood pressure from baseline to end-line. P value=0.0001 in the experimental group. Change in blood pressure is significant and hypothesis rejected. P value in control is=0.166. Change in blood pressure is not significant and hypothesis accepted.

Percentage change in blood pressure at midterm and end-line: There is significant difference in the change in proportion of blood from midterm to end-line. P value=0.019 in the experimental. Change in blood pressure is significant and hypothesis rejected. P value in control is=0.040. Change in blood pressure is significant and hypothesis also rejected.

Objective 2: To determine Body Mass Index (BMI) of participants

Classification of respondents' Body Mass Index (BMI): Out of the 442 participants, 292 (66.1%) were of normal weight, 112 (25.3%) were overweight while 38 (8.6%) were obese at baseline (Figure 2). Participants with normal BMI at baseline in experimental group were 121 (60.8%) while in control it was 171 (70.4%). Obese were 19 (9.5%) and 19 (7.5%) respectively. At end-line, participants with normal BMI were 120 (60.3%) in experimental group and 172 (71.1%) in control. Obese were 19 (9.5%) and 16 (7.4%) in experimental and control respectively (Table 4).

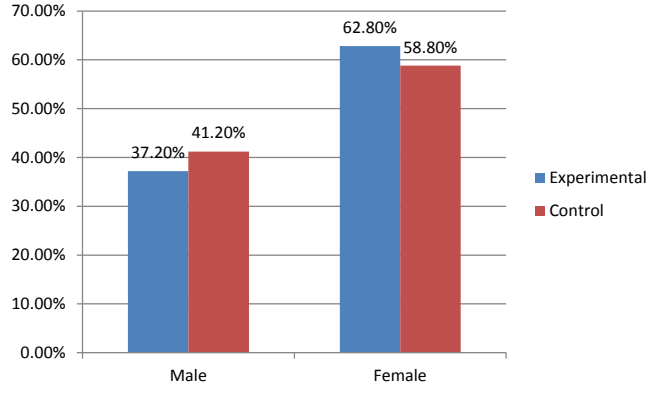

Figure 1: Sex distribution of participants in Experimental and Control.

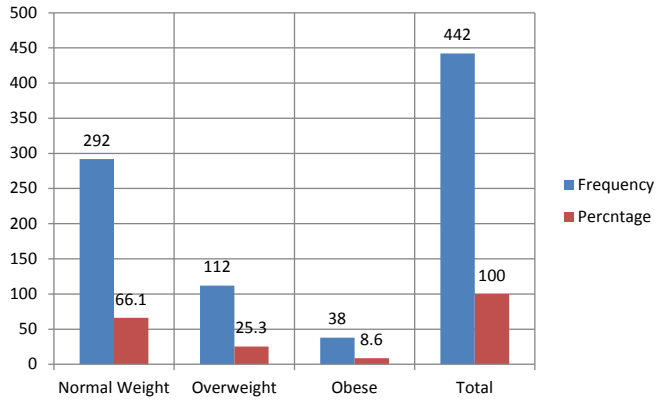

Figure 2: Classification of weight of Participants.

Variables	Experimental N=199	Control N=243	Total N=442	X2	P value
Sex					
Male	74 (37.2)	108 (44.4)	182 (41.2)	0.123	2.38
Female	125 (62.8)	135 (55.6)	260 (58.8)		
Marital Status					
Married	166 (83.4)	198 (81.5)	364 (82.4)	0.365	0.947
Single	22 (11.1)	31 (12.8)	53 (12.0)		
Separated	2 (1.0)	3 (1.2)	5 (1.1)		
Widowed	9 (4.5)	11 (4.5)	20 (4.5)		
Age (Yrs)					
<30	21 (10.6)	21 (8.6)	42 (9.5)	1.28	0.937
30-39	30 (15.1)	37 (15.2)	67 (15.2)		
40-49	43 (21.6)	47 (19.3)	90 (20.4)		
50-59	45 (22.6)	55 (22.6)	100 (22.6)		
60-69	40 (20.1)	54 (22.2)	94 (21.3)		
>70	20 (10.1)	29 (11.9)	49 (11.1)		
Occupation					
Jobless	21 (10.6)	28 (11.5)	49 (11.1)	9.197	0.056
Civil Servant	45 (22.6)	39 (16.0)	84 (19.0)		
Farming	68 (34.2)	114 (46.9)	182 (41.2)		
Petty trading	37 (18.6)	32 (13.2)	69 (15.6)		
Artisan	28 (14.1)	30 (12.3)	58 (13.1)		
Income					
Upper class	14 (7.0)	14 (6.3)	28 (6.6)	13.988	0.003
Middle class	31 (15.6)	11 (26.2)	42 (10.0)		
Lower middle class	50 (25.1)	59 (26.5)	109 (25.8)		
Lower class	104 (52.3)	139 (62.3)	243 (57.6)		
Religion					
Anglican	11 (5.5)	9 (3.7)	20 (4.5)	7.077	0.132
Catholic	147 (73.9)	200 (82.6)	347 (78.7)		
Pentecostal	33 (16.6)	26 (10.7)	59 (13.4)		
Moslem	2 (1.0)	0 (0.0)	2 (0.5)		
African Traditional	6 (3.0)	7 (2.9)	13 (2.9)		
Level of education					
Non formal	29 (14.6)	42 (17.3)	71 (16.1)	1.655	0.647
Primary	73 (36.7)	97 (39.9)	170 (38.5)		
Secondary	47 (23.6)	51 (21.0)	98 (22.2)		
Tertiary	50 (25.1)	53 (21.8)	103 (23.3)		

Table 1: Socio demographic characteristics of respondents in Experimental and Control at baseline.

Objective 3: To determine if there is any significant difference between the two groups in respect of the variables under investigation

Ho1: There will be no significant difference in the blood pressure of participants in Experimental and control groups' pre and post intervention: Comparison of blood pressure scores between group's pre and post intervention showing mean scores and standard deviation of experimental and control groups at baseline, midterm and end-line. P value at baseline, midterm and end-line were 0.197, 0.011 and 0.001 respectively. P>0.05 at baseline and midterm while at end-line P<0.05 (Table 5).

Ho2: There will be no significant difference in the BMI of participants in experimental and control groups pre and post intervention: Comparison of BMI scores between group's pre and post intervention showing mean scores and standard deviation of experimental and control groups at baseline, midterm and end–line. P value at baseline, midterm and end-line were 0.006, 0.003 and 0.002 respectively (Table 6).

Ho3: There will be no significant difference between the lifestyle score of participants in experimental and control groups pre and post intervention: There was significant difference between the life style of experimental and control groups after intervention p value=<0.05 (Table 7).

Ho4: There will be no relationship between BMI and blood pressure within the experimental and control groups, pre and post intervention: The mean and SD values at baseline, midterm and end-line within Experimental and Control groups are stated in Table 8 with P<0.05, establishing relationship between the two variables.

Discussion

One hundred and eighty-nine (42.8%) had normal blood pressure at baseline, which increased to 191 (43.2%) at midterm and dropped to 185 (41.9%) at end-line. One hundred and thirty one (29.6%) had pre hypertension, 80 (18.1%) had stage 1 and 42 (9.5%) had stage 2 hypertension. WHO states that prehypertension (blood pressure 120-139/80-89 mmHg) increases the risk for developing hypertension and should be treated with lifestyle modification [14]. This implies that the one hundred and thirty one (29.6%) in the study that had pre hypertension should continue with prescribed lifestyle habits. Percentage of participants with normal blood pressure reading in the Experimental group increased from 37% to 47% at baseline and end-line respectively while it dropped from 48% to 38% in the Control respectively. There was significant difference between the blood pressure readings from baseline and end-line in the Experimental group, P value=0.000. There was no significant difference between the blood pressure of baseline and end-line in the control, P value=0.166. This may be as a result of the improved attitude and lifestyle habits in the Experimental group. The percentage change from 48% to 41% and 38% in the control at baseline/midterm and midterm/end–line respectively may be as a result of the referrals, which was not limited to the experimental group only. This is unlike the study by Carpaccio, which showed that a reduction in the average salt intake in the whole community led to a small but significant reduction in population systolic blood pressure [15]. In a related study on the relationship between Dietary Approaches to Stop Hypertension (DASH diet) and salt intake, it was evident that both have influence on blood pressure, one cannot state that the reduction in blood pressure in this study was due to the adoption of only dash diet or reduction of salt intake as

Period	Group Experimental	Control	Total
Baseline			
Normal	74 (37.2)	115 (47.5)	189 (42.8)
Pre-hypertension	64 (32.2)	66 (27.3)	131 (29.6)
Stage 1	42 (21.1)	38 (15.7)	80 (18.1)
Stage 2	19 (9.5)	23 (9.5)	42 (9.5)
Total	199 (45.0)	243 (55.0)	442 (100)
Midterm			
Normal	91(45.7)	100 (41.3)	191 (43.2)
Pre-hypertension	85 (42.7)	82 (33.9)	167 (37.8)
Stage 1	19 (9.5)	45 (18.6)	64 (14.5)
Stage 2	4 (2.0)	15 (6.2)	19 (4.3)
Total	199 (45.0)	242 (55.0)	441 (99.8)
End-line			
Normal	93 (46.7)	92 (38.0)	185 (41.9)
Pre-hypertension	86 (43.2)	87 (36.0)	173 (39.1)
Stage 1	17 (8.5)	46 (19.0)	63 (14.3)
Stage 2	3 (1.5)	17 (7.0)	20 (4.5)
Total	199 (45.0)	242 (55.0)	441 (100.0)

Table 2: Classification of respondents' blood pressure pre and post Intervention.

Period	Experimental						Control					
	Blood Pressure Classification				Mc Nemar	P-value	Blood Pressure Classification				Mc Nemar	P-value
	N	Pre	1	2			N	Pre	1	2		
Baseline Mid Term % change	74	64	42	19	42.7	0	115	66	38	23	3.48	0.748
	37.2	32.2	21.1	9.5			47.5	27.3	15.7	9.5		
	91	85	19	4			100	82	45	15		
	45.7	42.7	9.5	2			41.3	33.9	18.6	6.2		
	8.5	10.5	10.5	7.5			6.2	-6.6	-2.9	3.3		
Mid Term End-line % change	91	85	19	4	13.6	0.019	100	82	45	15	10	0.04
	45.7	42.7	9.5	2			41.3	33.9	18.6	6.2		
	93	86	17	3			92	87	46	17		
	46.7	43.2	8.5	1.5			38	36	19	7		
	-1	-0.5	1	0.5			3.3	-2.1	-0.4	0.8		
Baseline End-line % change	74	64	42	19	50.2	0	115	66	38	23	9.13	0.166
	37.2	32.2	21.1	9.5			47.5	27.3	15.7	9.5		
	93	86	17	3			92	87	46	17		
	46.7	43.2	8.5	1.5			38	36	19	7		
	-9.5	-11	12.6	8			9	-8.7	-4.7	2.5		

Key: **N**=Normal; **Pre**=Prehypertension; **1**=Stage 1 Hypertension; **2**=Stage 2 Hypertension.

Table 3: Percentage change in blood pressure readings pre and post intervention.

	Group Experimental	Control	Total
Baseline			
Normal	121 (60.8)	171 (70.4)	292 (66.1)
Overweight	59 (29.6)	53 (21.8)	112 (25.3)
Obese	19 (9.5)	19 (7.8)	38 (8.6)
Total	199 (45.0)	243 (55.0)	442 (100.0)
Midterm			
Normal	122 (61.3)	172 (71.1%)	294 (66.7)
Overweight	58 (29.1%)	52 (21.5%)	110 (24.9)
Obese	19 (9.5%)	18 (7.4%)	37 (8.4)
Total	199 (45.0)	242 (55.0%)	441(100.0)
End-line			
Normal	120 (60.3%)	172 (71.1%)	292 (66.2)
Overweight	60 (30.2%)	52 (21.5%)	112 (25.4)
Obese	19 (9.5%)	16 (7.4%)	37(8.4)
Total	199 (45.0%)	243 (55.0%)	441 (100.0)

Key: Normal=18-24.9; Over weight=25-29.9; Obese=30 and above.

Table 4: Classification of respondents' Body Mass Index (BMI) pre and post intervention.

	Mean ± S.D	t-test	P-value
Baseline			
Experimental	136.33 ± 2.50	1.292	0.197
Control	133.19 ± 26.26		
Midterm			
Experimental	129.98 ± 17.13	-2.553	0.011
Control	134.96 ± 22.70		
End-line			
Experimental	129.35 ± 15.83	-3.379	0.001
Control	135.78 ± 22.69		

Table 5: Comparison of blood pressure scores between the groups pre and post intervention.

	Mean ± S.D	t-test	P-value
Baseline			
Experimental	24.7396 ± 4.25810	2.775	0.006
Control	23.6197 ± 4.19072		
Midterm			
Experimental	24.6923 ± 4.31895	2.955	0.003
Control	23.4855 ± 4.22553		
End-line			
Experimental	24.6923 ± 4.36529	3.048	0.002
Control	23.4300 ± 4.29775		

Table 6: Comparison of participants' Body Mass Index (BMI) scores between the groups pre and post intervention.

	Mean ± S.D	t-test	P-value
Baseline			
Experimental	21.89 ± 4.53		
Control	20.65 ± 5.16	2.656	0.08
Midterm			
Experimental	16.99 ± 2.19		
Control	8.85 ± 2.40	36.908	0.0001
End-line			
Experimental	26.17 ± 1.89		
Control	16.17 ± 3.02	40.228	0.0001

Table 7: Comparison of mean Lifestyle scores between the groups pre and post intervention.

	Mean	SD	F-value	P-value
Experimental				
Baseline				
Normal	23.6302	3.83143		
Pre-hypertension	25.1465	3.99086	3.899	0.01
Stage I	26.2671	5.07423		
Stage II	24.3131	3.77263		
Midterm				
Normal	23.4051	3.38457		
Pre-hypertension	25.9252	4.34809	5.64	0.0001
Stage I	25.5038	6.43472		
Stage II	23.9219	3.37202		
End-line				
Normal	23.4605	3.35612		
Pre-hypertension	25.5858	4.53502	5.36	0.0001
Stage I	26.8186	6.57507		
Stage II	25.2121	2.18069		
Control				
Baseline				
Normal	22.6789	3.88631		
Pre-hypertension	24.2078	3.43056	3.987	0.008
Stage I	24.7326	5.53149		
Stage II	24.7723	4.35278		
Midterm				
Normal	22.3131	3.79683		
Pre-hypertension	23.924	3.9635	5.507	0.0001
Stage I	24.5425	5.18352		
Stage II	25.7334	3.184		
End-line				
Normal	22.1487	3.93976		
Pre-hypertension	23.6945	3.65448	6.458	0.0001
Stage I	24.4821	5.34258		
Stage II	26.164	4.11453		

Table 8: Relationship between BMI and blood pressure within the Experimental and control groups, pre and post intervention.

regular exercise was also adopted by participants in this study [3]. This study also revealed that there was significant difference between the blood pressure of women in the experimental and those of the control group after intervention unlike the men. This shows that women comply with preventive measures if informed more than men. This may be the reason why more men have hypertension than women [16].

Out of the 442 participants, 66% were of normal weight, 25% were overweight while 9% were obese. The obsessed were half the number in the study at Port-Harcourt in which 408 (44.30%) had a normal (BMI of<24.9), 346 (37.24%) were overweight (BMI=25-29.9) and 170 (18.46%) were obese with BMI>30 [17]. The obesity may be attributed to the nature of people in the coastal region. Maintenance of normal weight may be attributed to the fact that majority are peasant farmers coupled with the low economy class of majority. The low prevalence of obesity may also be attributed to the non-sedentary lifestyle among rural dwellers and should be encouraged.

Conclusion

More than half of the participants with high blood pressure were only revealed during screening. Knowledge and awareness of risk factors is a component of behavior change as shown by finding in this study. Maintaining a healthy blood pressure is an important health strategy. Lifestyle modification has important roles in hypertensive as well as non-hypertensive individuals [18]. Non pharmacological measures rather than drugs should be adopted in prevention and control of hypertension for its cost effective advantage. For rural dwellers, who engage in active manual labor and do not have enough on their tables the emphasis should be on other risk factors of hypertension and not obesity. DASH diet should be encouraged at every Primary Health Center. Health Care workers should make blood pressure screening, awareness and lifestyle modification the focus every intervention to reduce the rising trend in hypertension prevalence.

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