

Lifestyle counselling and behavioural change: role among adult hypertensives in a rural tertiary institution

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Background: In spite of the availability of myriads of antihypertensive medications, the control of high blood pressure is still low. Studies on effect of lifestyle behavioural changes through counselling on blood pressure control are scant in Nigeria. Therefore, this study set out to determine the role of lifestyle counselling on behavioural change among hypertensive patients attending the Federal Medical Centre, Ido-Ekiti.

Methods: A total of 322 adult hypertensive participants who had been on treatment for at least three consecutive months were randomised into two groups. Relevant data were collected using an interviewer-administered semi-structured questionnaire and clinical parameters were measured pre- and post-intervention. The intervention group was counselled on lifestyle behaviours, namely regular exercise, eating adequate fruits and vegetables, moderate alcohol intake and cessation of smoking.

Results: Post-intervention, among the intervention group 22.4%, 71.4% and 100%, as compared with the control group at 6.2%, 41.0% and 87.6%, met recommendations for physical activity, fruit and vegetable consumption and alcohol consumption respectively. The difference in each category was statistically significant ($p < 0.001$). However, the difference in smoking habits between the two groups (83.9% vs. 79.5%) was not statistically significant ($p = 0.313$). There was a statistically significant difference ($p \leq 0.001$) in the difference in mean arterial pressure (96.4 ± 8.1 vs 106.2 ± 7.6 mmHg) between the intervention and control group post-intervention.

Conclusion: Lifestyle modifications form part of an important and effective treatment modality for hypertension. It is desirable that primary care physicians devise and implement clinical and public health strategies that promote and maintain a combination of pharmacologic interventions and lifestyle modifications.

Introduction

Hypertension is the leading risk factor for cardiovascular disease, affecting over 25% of the world population.¹ Hypertension, the topmost risk factor for death worldwide, remains the commonest non-communicable disease in Nigeria and a leading cause of myocardial infarction, heart failure and stroke worldwide.^{2,3}

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) and the Nigerian Hypertension Society (NHS) guideline for the management of hypertension recommends lifestyle modification for all patients with hypertension or pre-hypertension.⁴ Adoption of a healthy lifestyle by all individuals is critical for the prevention of high blood pressure and is an indispensable part of the management of those with hypertension because, apart from contributing to the control of hypertension, these strategies are beneficial in managing most of the other cardiovascular risk factors.^{5,6} In hypertensive individuals with medication-controlled blood pressure, lifestyle modification may facilitate drug step-down and drug withdrawal in highly motivated individuals who achieve and maintain lifestyle changes, while in the non-hypertensive, lifestyle modification has the potential to prevent hypertension and, more broadly, to reduce blood pressure and thus lower the risk of blood pressure-related clinical complications in general populations.⁷ Although high degree of motivation is needed to sustain the benefits of non-pharmacological treatment, unfortunately data from a cross-sectional study showed that non-pharmacological treatment for patients with hypertension is still inadequate.⁸ Lifestyle modifications involve weight reduction, regular physical exercise, reduction of salt intake, healthy eating (diet rich

in fruits, vegetables and dairy products with reduced saturated and total fat), restriction of alcohol intake and cessation of smoking, among others.

Studies of hypertension are frequently focused on only the pharmacological interventions; however, lifestyle behavioural changes are a cornerstone to the management of hypertension. Also, studies on the effect of nutritional and lifestyle behavioural changes counselling on blood pressure control are scant in Nigeria. Concern about the modifiable cardiovascular risk factors that are amenable to lifestyle behavioural changes prompted this present study.

Materials and methods

Study area

The study was conducted in the General Outpatient unit of the Family Medicine department at the Federal Medical Centre, Ido-Ekiti, Ekiti State. Although the hospital is a tertiary health institution, it also renders primary and secondary health care for a large number of people in its catchment areas of Ekiti, Kwara, Kogi, Ondo and Osun States. It is an accredited centre for postgraduate medical training in eight fields of medical and surgical specialties. The hypertensive patients are seen daily in the general outpatient department of the hospital by the resident doctors under the supervision of consultant family physicians.

Study design

The study was a hospital-based interventional study.

Duration of study

The study was conducted over a period of 20 weeks.

Sample size

This was determined using the formula $n' = 2z^2pq/d^2$.⁹ The minimum sample size was 141. However, to allow for unexpected data losses and dropouts during recruitment, a sample size of 161 per group was used for the study.

Sampling technique

Simple random and systematic random sampling techniques were used to recruit subjects among hypertensive patients attending the clinic. The first participant was selected by simple random sampling; two small pieces of paper were marked YES and NO. The first two patients in the waiting area who gave consent to participate in the study were asked to pick one piece of paper, and the patient that picked the YES was the first for that day and then every second patient was selected by systematic random sampling. This was repeated every clinic day until the sample size was met.

Randomisation of the study

Subjects were allocated into two groups (control and intervention) by randomisation. The intervention and control group were randomised by using opaque envelopes numbered serially with cards that indicated whether a patient should be in the intervention or control group. They were matched for sociodemographic characteristics.

Inclusion and exclusion criteria

Inclusion criteria included hypertensive patients aged ≥ 30 years and ≤ 80 years, who had been on treatment for at least three consecutive months.

Excluded from the study were critically ill and psychiatric patients, and pregnant women.

Ethical clearance and consent

Ethical clearance was obtained from the Ethical Review and Research committee of the Federal Medical Centre, Ido-Ekiti. Informed verbal and written consent were also obtained from willing participants.

Data collection and instruments

A pre-tested semi-structured interviewer-administered questionnaire adapted from the World Health Organization (WHO) STEPS questionnaire was used,¹⁰ drafted in English.

The questionnaire was divided into three sections, namely: sociodemographic (section A), clinical data (section B) and lifestyle behaviour assessment (section C).

The hypertension-related lifestyle behaviours examined in this study were:

1. physical activity status;
2. fruit and vegetable consumption;
3. smoking status;
4. alcohol consumption.

Physical activity was assessed by asking participants how often and duration per session in a usual week and how long in their lifetime they engaged in moderate physical activities (such as brisk walking, bicycling, gardening or anything else

that causes small increases in breathing or heart rate) or vigorous physical activities (such as running, weight training, organised sports or anything else that causes large increases in breathing or heart rate). Participants were then categorised as either met recommendations for physical activity (performing moderate physical activities for ≥ 30 minutes per day on ≥ 5 days per week and/or vigorous physical activities for ≥ 20 minutes per day on ≥ 3 days per week) or did not meet physical activity recommendations (insufficient quantity to achieve either moderate or vigorous physical activity recommendations).¹¹

Fruit and vegetable consumption was assessed by asking participants how many times per day they ate fruit/vegetables, how many servings and for how long. Participants were categorised as met recommendations if he/she consumed ≥ 5 servings of fruits and vegetables per day and did not meet recommendations if he/she consumed < 5 servings of fruits and vegetables per day.¹¹ One serving of fruit was defined as an equivalent of one fruit (e.g. orange, mango) or one milk tin chopped size of fruit (e.g. pawpaw, pineapple), while one serving of vegetable was defined as an equivalent of three heaped tablespoons of vegetables (raw or cooked).¹²

Alcohol consumption was assessed by asking participants how many drinks of any alcoholic beverages they drank per week and for how long (a drink of alcohol was defined as an equivalent of one shot of liquor or one bottle of beer. One unit of drink contains 8 grams of alcohol). Participants were categorised as met recommendations if consuming moderate or no alcohol, taking ≤ 2 drinks per day in men, and ≤ 1 drink per day in women and did not meet recommendations if consuming ≥ 2 drinks per day in men, and ≥ 1 drink per day in women.⁵

Smoking status was assessed by asking participants how many cigarettes they smoked per day and for how long, as well as how long have they been using snuff and/or chewing tobacco and how often. Participants were categorised as met recommendations if not smoking or stopped smoking and did not meet recommendations if smoking or chewing tobacco or using snuff.¹³

Participants were assisted in various ways. Analgesics were prescribed for some participants who complained of body pains following uptake of regular physical activity. The obese/overweight participants were advised to enrol at a gymnasium where they could join a support group to take regular exercise. Participants who were drinking alcohol (who did not meet the recommendation) or smoking were advised to write a change plan, obtain a substitute for alcohol/smoking and enlist the help of their spouse(s) in stopping the habit(s). Some participants drinking alcohol or smoking were linked to community resources (religious body) and advised to spend their leisure time on religious activities to assist them in stopping the habit(s).

An Accoson® brand (Accoson, Harlow, Essex, UK) mercury sphygmomanometer with appropriate cuff and stethoscope was used to measure the blood pressure of the patients in a sitting position using the left arm. An appropriate-sized cuff with bladder encircling at least 80% of the arm was used. The first appearance of sound (phase 1 Korotkoff) was used for systolic blood pressure (SBP), and a phase 5 Korotkoff sound (disappearance of sound) was used to measure diastolic blood pressure (DBP). The blood pressure was recorded to the nearest 2 mmHg. Two measurements were taken after the

patient has been allowed to sit for 5–10 minutes and an average value was taken. Mean arterial pressure (MAP) was calculated from the SBP and DBP.

Research protocol

The study was done in two phases. Phase 1 was the first contact with the patient when the sociodemographic data and clinical parameters such as blood pressure were taken, and the (baseline) questionnaire was administered to assess lifestyle behaviour for both the control and intervention groups. Counselling on lifestyle behaviours such as regular exercise, eating of adequate fruits and vegetables, moderate alcohol intake and stoppage of smoking was undertaken using the 'Five As' (ask, assess, advise, assist, arrange) technique¹⁴ for the intervention group by the principal investigator. Each counselling session for each participant lasted about 30–45 minutes. Each session started with open-ended interrogative communication using lay language. The author provided clear and thorough information and adequate time was allowed to respond to participants' questions. The participants had one session of counselling. However, there were reinforcements of the counselling through reminders to the participants every two weeks for a period of 12 weeks after phase 1. This was achieved with phone calls and short message services (SMS).

Phase 2 commenced 12 weeks after phase 1 and this phase involved re-administration of the questionnaire to assess lifestyle behavioural changes. The post-intervention data collection was carried out in both the intervention and control groups three months after the intervention.

Three trained research assistants, i.e. a resident doctor, a nurse and a health information officer, were used.

Statistical analysis

All data collected were analysed, using the Statistical Package for the Social Sciences (SPSS) for Windows software version 17.0 (SPSS Inc, Chicago IL, USA). Two-stage analysis was done, involving analysis of the pre-intervention and post-intervention questionnaire. Frequency tables were generated for relevant variables. Means, standard deviations and percentages were determined as appropriate. The means and standard deviation (SD) were calculated for continuous variables while categorical variables were analysed using proportions. A chi-square test was used to determine the statistical significance of observed differences in cross-tabulated variables. A test of significance was done using Student's t-test. This t-test was used to compare the means when there were only two means to compare. A *p*-value of ≤ 0.05 was taken to be statistically significant.

Results

The mean age (SD) of the respondents was 60.9 ± 10.2 ; the age group 50–59 had the highest numbers of respondents (34.2%). The majority (82.9%) of the respondents were Christians. The sociodemographic characteristics of the respondents (both intervention and control group) were similar, as there is no statistically significant difference between the two groups (Table 1). Table 2 shows that 8.7% of respondents in the intervention group and 6.2% of respondents in the control group met the recommendation for physical activity, and 91.3% of the respondents in the intervention group and 85.7% of respondents in the control group met the recommendation for alcohol consumption. With regard to smoking, 72.7% of respondents in the intervention group and 78.3% of respondents in the control group met the recommendation for smoking. However, the difference in each category of the lifestyle behaviours was not statistically significant ($p = 0.396, 0.116, 0.244$).

Table 1: Sociodemographic comparison of characteristics of respondents.

Variables	Intervention group (<i>n</i> = 161)	Control group (<i>n</i> = 161)	χ^2	df	<i>p</i> -value
Age summary:					
Mean \pm SD*	61.3 \pm 9.7	60.5 \pm 10.3	0.715	320	0.475
Age in years:	<i>n</i> (%)	<i>n</i> (%)			
40–49	18 (11.2)	24 (14.9)	1.570	3	0.666
50–59	58 (36.0)	52 (32.3)			
60–69	51 (31.7)	47 (29.2)			
70+	34 (21.1)	38 (23.6)			
Sex:					
Male	76 (47.2)	83 (51.6)	0.609	1	0.435
Female	85 (52.8)	78 (48.4)			
Marital status:					
Single	4 (2.5)	1 (0.6)			0.197**
Married	128 (79.5)	141 (87.6)			
Divorced	12 (7.4)	9 (5.6)			
Widowed	17 (10.6)	10 (6.2)			
Religion:					
Christianity	131 (81.4)	136 (84.5)			0.347**
Islam	24 (14.9)	23 (14.3)			
Traditional	6 (3.7)	2 (1.2)			
Ethnicity:					
Yoruba	140 (87.0)	146 (90.7)			0.295**
Ibo	13 (8.0)	12 (7.4)			
Hausa	8 (5.0)	3 (1.9)			

*Independent samples t-test applied. **Fisher's exact test applied.

Table 2: Pattern of lifestyle behaviours of respondents pre-intervention

Variables	Intervention group (n = 161)	Control group (n = 161)	χ^2	df	p-value
Physical activity status:					
Met recommendation	14 (8.7)	10 (6.2)	0.720	1	0.396
Did not meet recommendation	147 (91.3)	151 (93.8)			
Fruit and vegetable consumption					
Met recommendation	54 (33.5)	65 (40.4)	1.613	1	0.204
Did not meet recommendation	107 (66.5)	96 (59.6)			
Smoking status					
Met recommendation	117 (72.7)	126 (78.3)	1.359	1	0.244
Did not meet recommendation	44 (27.3)	35 (21.7)			
Alcohol consumption					
Met recommendation	147 (91.3)	138 (85.7)	2.473	1	0.116
Did not meet recommendation	14 (8.7)	23 (14.3)			

Table 3: Pattern of lifestyle behaviours of respondents post-intervention

Variables	Intervention group (n = 161)	Control group (n = 161)	χ^2	df	p-value
Physical activity:					
Met recommendation	36 (22.4)	10 (6.2)	17.145	1	0.000
Did not meet recommendation	125 (77.6)	151 (93.8)			
Fruit and vegetable consumption:					
Met recommendation	115 (71.4)	66 (41.0)	30.294	1	0.000
Did not meet recommendation	46 (28.6)	95 (59.0)			
Smoking:					
Met recommendation	135 (83.9)	128 (78.5)	1.017	1	0.313
Did not meet recommendation	26 (16.1)	33 (20.5)			
Alcohol consumption:					
Met recommendation	161 (100.0)	141 (87.6)	21.325	1	0.000
Did not meet recommendation	0 (0.0)	20 (12.4)			

Table 3 shows that many respondents in the intervention group met the recommendations for physical activity (22.4%), fruit and vegetable consumption (71.4%) and alcohol consumption (100%) compared with the control group (6.2%, 41.0%, 87.6%) post-intervention. The difference in each category was statistically significant ($p < 0.001$). However, the difference in smoking habits between the two groups (83.9% vs. 79.5%) was not statistically significant ($p = 0.313$). There was no statistically significant difference ($p = 0.268$) in MAP of the intervention and control group pre-intervention; however, there was a statistically significant difference ($p < 0.001$) in MAP (96.4 ± 8.1 vs 106.2 ± 7.6 mmHg) between the intervention and control group post-intervention (Table 4).

Discussion

In this study at baseline, the pattern of lifestyle behaviour with regard to physical exercise was 8.7% in the intervention group

and 6.2% in the control group. These were lower than 16.4%, 31% and 38.9% as found in similar studies in Nigeria, Turkey and the USA respectively^{11,15}. The differences in the methodology and location of the studies may account for observed differences. However, the lower uptake of physical activity in this study might be due to the fact that many participants engaged in sedentary jobs (e.g. teaching, clerk). Also, reliance on labour-saving devices and use of automobiles instead of walking/cycling to work may be responsible for low daily physical exercise. The pattern of lifestyle behaviour with regard to fruit and vegetable consumption in this study was lower than 75.7% (dietary vegetables) and 66.2% (dietary fruits) as found in a similar study in Nigeria,¹⁵ but higher than 12.9% and 25.2% as found in another Nigeria and USA study respectively.^{4,11} The consumption of fruits and vegetables among the study population might be influenced by the agricultural

Table 4: Summary of change in mean arterial blood pressure of respondents

Variables	Intervention group (n = 161)	Control group (n = 161)	t-test	df	p-value
Pre-intervention:					
Mean arterial pressure (mmHg)	105.9 \pm 8.4	106.9 \pm 8.3	-1.108	320	0.268
Post-intervention:					
Mean arterial pressure (mmHg)	96.4 \pm 8.1	106.2 \pm 7.6	-11.232	320	< 0.001

endowment of the Ekiti people, as most people have farms/gardens irrespective of their status in the society and as such there is availability and affordability of fresh fruits and vegetables. The pattern of lifestyle behaviour with regard to tobacco smoking was higher than 6.5%, 8% and 12% as reported in Nigeria, Accra and India.^{4,16,17} The differences in study population, study design and geographical location might account for the differences in smoking/tobacco usage. Also, the high proportion of tobacco users (smokers) may be due to inclusion of tobacco and snuff use in this study. The pattern of lifestyle behaviour with regard to alcohol in this study was similar to the 90.7% found in a descriptive cross-sectional study carried out on adult patients with essential hypertension at a primary care clinic in Nigeria,¹⁵ but higher than 32.3% as found in a descriptive cross-sectional study carried out among hypertensive adults in a semi-urban community in Nigeria.⁴ A high percentage of respondents meeting alcohol consumption and tobacco smoking recommendations may be connected to their religious inclinations, which discourage smoking and alcohol consumption.

It was found in this study that the difference between lifestyle behaviours of the intervention and control group was not significant before the intervention but counselling intervention improved lifestyle behaviours in the intervention group. Post-intervention result showed that 36 (22.4%) and 10 (6.2%) of the intervention and the control group met the recommendation for physical exercise, 115 (71.4%) of the intervention group and 66 (41.0%) of the control group met the recommendation for fruit and vegetable consumption, while 161 (100.0) of the intervention group and 141(87.6) of the control group met the recommendation for alcohol. The differences in each lifestyle were statistically significant, $p < 0.001$. However, post-intervention the difference in the smoking pattern in the intervention and control group was not statistically significant, $p = 0.313$. This might be due to the addictive nature of smoking and the age group of the study population. The findings in this study were similar to Bjorkna's study in a randomised trial of lifestyle intervention in primary healthcare,¹⁸ especially on physical activity and tobacco use. In that study, counselling intervention led to improved lifestyle behaviour among the intervention group in all the domains, and the differences were statistically significant, $p < 0.001$. In a study among market women in Lagos, the proportion of hypertensive subjects who commenced medication and lifestyle modification post-counselling increased from 30.2% to 97.67%.¹⁹ Physicians counselling on lifestyle during their encounters with adult hypertensive patients remain imperative for optimum care, and receiving counselling from a physician regarding a healthy lifestyle led to maintenance of a healthy lifestyle.²⁰

In the present study, in the intervention group only 22.4% met recommendations for physical activity and 100% met recommendations for alcohol consumption post-intervention. This finding is in agreement with the reports that physical activity is inadequate among hypertensive individuals in Nigeria and Kuwait.^{3,21} This may mean that cultural and geographical differences have little or no influence on adoption of physical activity as a lifestyle. Technological advancement in terms of transport, which had replaced trekking, cycling and horse riding, and less involvement in manual agriculture in Nigeria may be partly responsible.

The pre-intervention MAP was 105.9 ± 8.4 and 106.9 ± 8.3 mmHg for the intervention and control group respectively

while the MAP post-intervention was 96.4 ± 8.1 and 106.2 ± 7.6 mmHg in the intervention and control group respectively, and the difference is statistically significant. Ultimately, this shows that lifestyle counselling and behavioural change among the intervention group may be the probable reason for achieving better blood pressure control, as reflected in the MAP.

Conclusion

Lifestyle behavioural counselling intervention and reminders among the intervention group of hypertensive patients had a positive impact on lifestyle behaviour and ultimately resulted in better blood pressure control. Counselling hypertensive patients on physical activity and the consequences of inactivity should be the most important aspect of hypertensive management in primary care. Physicians need to maintain constant counselling in a patient-centred manner to achieve improved lifestyle in hypertensive individuals.

Limitations

This study only matched for sociodemographic characteristics, but not for other variables such as therapy-related factors (medication cost, complexity of regimen). Also, the intervention was short due to time constraints. Hence, longer duration research to determine the effect of lifestyle counselling on blood pressure control is recommended.

Acknowledgement – The help of all resident doctors in the department of Family Medicine, Federal Medical Centre, Ido-Ekiti is greatly appreciated.

Disclosure statement – No potential conflict of interest was reported by the authors.

Financial support and sponsorship – None.

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Received: 20-09-2018 Accepted: 5-01-2019