Tropical Journal of
Medicine & Dental Practice

Website: http://www.tjmdp.org

Open Access

Original Research Article

Trop J Med Dent Pract
June 2021;2(2):39-45
doi: 10.47227/tjmdp.v2i2.1

Level of physical activity among patients with hypertension attending a tertiary health care facility in Southern Nigeria

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Abstract

Introduction: The role of daily physical activity in preventing cardiovascular disease is well established and increased physical activity has been shown to be effective in the treatment of high BP in several populations. It is uncertain how many adults with hypertension are physically active in our setting. Thus, the aim of the study was to assess the level of physical activity among patients with hypertension presenting to Irrua Specialist Teaching Hospital (ISTH), Irrua, Nigeria.
Methods: The study was a hospital based, descriptive cross-sectional study of 502 adult hypertensives, 18 years and above, systematically selected from the medical clinics of ISTH. A semi structured interviewer administered questionnaire was used to obtain information from respondents after obtaining ethical approval and signed informed consent. Data was analysed using epi info 7.1.2.0 and level of significance was set at 0.05.
Results: Mean age of the respondents was 53±12.5years. The study found a significantly higher level of physical activity among respondents who were older than 45 years ($p < 0.001$ compared to those that are younger), not currently married ($p < 0.001$ when compared to those that are married), with tertiary level of education ($p < 0.001$), and a monthly household income of more than N50,000 (USD80.00; $p < 0.001$ when compared to those who earn less). Respondents who were physically active had a significantly better BP control ($p < 0.001$) compared to those who were not physically active.
Conclusion: The study found a low level of physical activity among hypertensives in ISTH particularly among those less than 45 years with low level of education and income. There is therefore the need for increased education to patients with hypertension on the need to engage in physical activity.

Keywords: Physical activity, hypertension, blood pressure, control

Introduction

Hypertension has been identified as a major public health issue that affects over 40% of adults globally.[1,2] It is strongly associated with a high risk of cardiovascular mortality and as a result, long-term survival necessitates proper blood pressure (BP) regulation.[3] In Africa, heart disease is the second leading cause of death with hypertension accounting for half of all cases of heart disease, stroke, and heart failure.[4,5] Chronic diseases such as cardiovascular disease account for 24.2% and 25.1% of all deaths in males and females in Nigeria respectively. [6] Hypertension is very common in older adults (70%-80%) and there has been an increase in the diagnosis of hypertension in children and adolescents in recent years.[7,8] Low- and middle-income countries are disproportionately affected by hypertension, with two-thirds of those affected living in economically developing countries. The cost of healthcare is heavily influenced by BP-related disease.[9,10] There is therefore the need for cost effective, non-pharmacologic methods of BP control.

Hypertension has been linked to increased urbanization and associated lifestyle changes such as high salt, alcohol, fat intake, and physical inactivity in developing countries [11]. Lifestyle changes such as exercise, dietary control, alcohol, and tobacco restriction are all part of a drug-free approach to BP control.[12] The role of daily physical activity in

preventing cardiovascular disease is well established.[13] The level of physical inactivity and obesity are associated with the development of hypertension and increased physical activity has been shown to be effective in the treatment of high BP in several populations.[14,15] .

Physical activity is a low-cost, realistic, safe, and efficient method of lowering BP. Regular physical activity, in addition to other lifestyle changes, is a key component of lifestyle therapy for the primary prevention of BP.[16] It is a component of the American, European, and World Health Organization (WHO) guidelines for antihypertensive therapy.[17,18] Reduced ambulatory and resting BP, as well as improvements in cardiorespiratory health, are antihypertensive benefits of physical activity.[19,20] The World health organization recommends that all adults should have at least 150 to 300 minutes of moderate-intensity physical activity or 75 to 150 minutes of vigorous-intensity physical activity weekly as a means to attaining overall well-being.[21,22] It is uncertain how many adults comply with or are able to meet up with this recommendation. Thus, the aim of the study was to assess the level of physical activity among patients with hypertension presenting to Irrua Specialist Teaching Hospital (ISTH), Irrua, Nigeria. The ultimate goal is to create recommendations that would improve awareness of physical activity and its benefits in the management of hypertension.

Methods

Study Location

This study was conducted at the General and Medical Outpatient Department Clinics of Irrua Specialist Teaching Hospital (ISTH), Irrua, Edo State, Nigeria. ISTH is a tertiary health facility located in a semi urban location in southern Nigeria. The General and Medical Outpatient Clinics attend to all patients with hypertension presenting to the hospital except emergencies that present to the Accidents and Emergency unit of the hospital.

Study Design

The study was a descriptive cross-sectional study.

Sample Size Determination

The sample size was determined using the formula:

$n = 2Z^2 \times pq/d^2$

where, n = the desired sample size, z = the standard normal deviate, set at 1.96 which correspond to a 95% confidence level, p = the prevalence of hypertension in Nigeria (18.4%) obtained from a systematic review on prevalence of hypertension in Nigeria [1], q = 1-p (1-0.184), and d = degree of accuracy desired (set at 0.05). This gave a total of 502 respondents were recruited for the study.

Study Population

Adults with hypertension presenting to the medical clinics (GOPD, Staff/NHIS clinic, and MOPD) of ISTH, Irrua.

Selection Criteria

Inclusion Criteria: All adult patients aged 18 years and above with established or confirmed hypertension (persistently elevated BP of 140/90mmHg or higher or those on antihypertensive medications irrespective of current BP status that have been diagnosed of hypertension for up to a year) who consented to participate in the study.

Exclusion Criteria: Exclusion criteria included patients with cognitive impairment that will affect provision of accurate data, those with physical disability who may not be able to exercise and those who were critically ill preventing them from participating.

Sampling Technique

Systematic sampling was used to select 502 participants for the study. From hospital records, an average of 50 patients with hypertension are seen daily in the hospital. Over the three-month period of the study, an estimated 3,000 patients with hypertension were seen. Using the formula k = N/n (where k = sampling interval, N = no of patients with hypertension seen during the period of study, n = sample size,) a sampling interval of 6 was determined. Simple random sampling was used to determine the first patient. Thereafter, every sixth adult patient with hypertension that met the selection criteria was recruited until the required sample size was reached.

Data collection

Data was collected with the aid of research assistants using Google survey form with an interviewer-based semi-structured questionnaire. The questionnaire contained questions assessing socio-demographic characteristics, hypertension-related questions, and questions on level of activity.

Anthropometry: Omron 6 digital sphygmomanometer (OMRON M2 Classic Intellisense) [23] was used to measure BP. An adult sized cuff was applied on the mid arm used with patient sitting down and resting his/her back and arm exposed. The mean of three measurements 10 minutes apart was used. BP Control was determined using the JNC 7 criteria to categorise patients as having poor BP control if they had blood pressure ≥ 140/90mmHg, fair BP control if they had BP of 120 – 139/80 – 89 mmHg, and optimal BP control if they had BP of ≤ 120/80mmHg. [1,7]

Level of Activity was determined using the WHO criteria. [21] Patients with less than 150 minutes of moderate to intense physical activity per week were

categorized as being inactive while those with at least 150 minutes of moderate to intense physical activity were categorized as active. Such activities included brisk walking, jogging, running, swimming, cycling and skipping. [21]

Obesity was assessed using the Body Mass Index (BMI) and the Waist Hip Ratio. Weight was measured and recorded to the nearest 0.1kg using weighing scale (Secca 770 Floor Digital Scale, Hamburg Germany) while the patient was bare footed and wearing light clothing. Height was measured and recorded to the nearest 0.01metre using a stadiometer (Secca 240 wall mounted, Hamburg Germany). The BMI was then determined by dividing the weight (in kilograms) by the square of the height (in meters). Patients were categorized based on their BMI as Underweight (<18Kg/m^2), Normal weight (18-24.9 kg/m^2), overweight (25-29.9 kg/m^2) and Obese (≥ 30 kg/m^2) [22]. A non-stretch tape was used to measure waist circumference to the nearest 0.1 cm by placing it horizontally at the midpoint between the coastal margin and the iliac crest at the mid-axillary line with the abdomen bare. The hip circumference was measured to the nearest 0.1cm using the same non-stretch tape placed horizontally at the widest point around the greater trochanter. Dividing the waist circumference with the hip circumference gave the Waist Hip Ratio. Patients with waist hip ratio < 1.0 for men and < 0.9 for women were categorized as normal while others were categorized as obese.

Data analysis

Statistical Package for Social Sciences (SPSS Inc., Chicago, IL) version 22.0 (IBM Corp., Armonk, N.Y., USA) was used for data analysis. Descriptive statistics were used to summarize the demographic and baseline characteristics. Continuous variables were summarized as numbers of observed values, means, standard deviation, and range. Categorical variables were described as frequency and percentages. Binary logistic regression was used to analyse for the predictors of level of physical activity. A p-value <0.05 was considered to be statistically significant.

Ethical approval was obtained from the ethics and research committee of ISTH (ISTH/HREC/20201412/138). Informed verbal consent was obtained from the participants before the commencement of the study. Privacy was maintained during interview sessions and data was encrypted before transfer to prevent unauthorized access. The system was protected against cyber-attack using up-to-date cyber protection.

Results

A total of 502 adults who have been diagnosed for hypertension for over a year participated in the study. Majority of respondents were middle aged (46 – 65 years) 246 (49%) with a mean age of 53 ± 12.8 years. Respondents were mostly females 276 (55.0%), Christians 363 (72.3%), currently married 432 (86.1%) with tertiary level of education 308 (61.4%) and having a household income of between N51, 000 to N100, 000 monthly 193 (38.4%). They have been hypertensive for over 5 years 291 (58.0%) with poor BP control 323 (64.3%). The Sociodemographic characteristics are summarized in Table 1.

Table 1: Sociodemographic characteristics and clinical variables of respondents

Variables	Frequency (N = 502)	Percentage (%)
Age (years)*		
< 45	163	32.5
46-65	246	49.0
> 65	93	18.5
Sex		
Male	226	45
Female	276	55
Religion		
Islam	137	27.3
Christianity	363	72.3
Traditional	2	0.4
Marital Status		
Currently married	332	66.1
Separated/divorced	57	11.4
Single	45	9.0
Widowed	68	13.5
Educational Status		
No formal education	24	4.8
Primary	60	11.9
Secondary	308	61.4
Tertiary	110	21.9
Monthly Household Income (Naira)		
<30,000	224	44.6
30,000- 50,000	182	36.3
50,000- 100,000	74	14.7
>100,000	22	4.4
Duration of Hypertension		
≤ 5 years	211	42.0
> 5 years	291	58.0
Blood Pressure Control		
Poor BP Control	325	64.8
Fair BP Control	99	19.7
Optimal BP Control	78	15.5

*Mean age ± standard deviation = 53 ± 12.8 years

The lifestyle of respondents is tabulated in Table 2. Most respondents were inactive 398 (79.3%), with BMI in overweight category 188 (37.4%), and WHR in obesity category 270 (53.8%). Majority of respondents did not consume alcohol 383 (76.3%), did not smoke 437 (87.1%), and did not take excess salt 328 (65.3%). Most respondents however took fatty meat 263 (52.4%), consumed sugary drinks 306 (61%) and had 3-4 servings of fruits and vegetables daily 297 (59.2%).

Table 2: Lifestyle of respondents

Variables	Frequency (N = 502)	Percentage (%)
Physical Activity Level		
Active	104	20.7
Inactive	398	79.3
Body Mass Index		
Underweight	9	1.8
Normal weight	136	27.1
Overweight	188	37.4
Obesity	169	33.7
Waist Hip Ratio		
Normal	270	53.8
Obesity	232	46.2
Alcohol Consumption	119	23.7
Smoking	65	12.9
Excessive Salt Intake	174	34.7
Fatty Meat Consumption	263	52.4
Consumption of Sugary drinks/Beverages	196	39.0
Fruits and Vegetables (Servings per day)		
≤ 2	145	28.9
3 – 4	297	59.2
≥ 5	60	11.9

Table 3: Association between sociodemographic characteristics and exercise among respondents

Variable	Engagement in Exercise		χ^2	P value
	Active 104 (%)	Inactive 398(%)		
Age (years)			15.553	<0.001*
< 45	17 (10.4)	146 (89.6)		
≥ 45	87 (25.7)	252 (74.3)		
Sex			0.162	0.386
Female	59 (21.4)	217 (78.6)		
Male	45 (19.9)	181 (80.1)		
Marital Status			13.486	<0.001*
Currently Married	53 (16.0)	279 (84.0)		
Not Married	51 (30)	119 (70)		
Education Status			16.400	<0.001*
Non-graduate	66 (16.8)	326 (83.2)		
Graduate	38 (34.5)	72 (65.5)		
Monthly Household Income			17.907	<0.001*
≤ N50, 000	69 (17.0)	337 (83.0)		
> N50, 000	35 (36.5)	61 (63.5)		
Blood Pressure Control			86.419	<0.001*
Uncontrolled	27 (8.3)	298 (91.7)		
Controlled	77 (43.5)	100 (56.5)		

*statistically significant

There was no significant association between level of physical activity among respondents and BMI (p = 0.960), WHR (p = 0.499), salt intake (0.103), meat intake (p = 0.438), intake of sugary drinks (p = 0.556) and alcohol consumption (p = 0.228). There was however a statistically significant association between the level of physical activity among respondents and cigarette smoking (p = 0.005). The study found a significantly higher level of physical activity among smokers compared to non-smokers. The association between lifestyle and physical activity is tabulated in Table 4.

Discussion

This study has assessed the level of physical activity among a predominantly young and middle-aged population of hypertensives residing in a semi-urban area, majority of whom earn a low-level income. The age distribution in our study is similar to that from other studies [24,25] in parts of Nigeria. The proportion of uncontrolled hypertension in this study is in line with the 2017 National survey on hypertension prevalence, awareness and control [26]. This underscores the need for organized and collective approaches towards control of blood pressure in individuals on medications for hypertension.

The proportion of physically active hypertensives in this study (20.7%) was lower than the pooled crude prevalence (52.0%) gotten from meta-analysis of studies done in Nigeria [25]. When compared with a study carried out in a rural location in South-west Nigeria [27], our study revealed a much lower

Table 4: Association between lifestyle and exercise among respondents

Variable	Engagement in Exercise		χ^2	P value
	Yes 104 (%)	No 398(%)		
Body Mass Index (kg/m²)			0.081	0.960
< 25	29 (20.0)	116 (80.0)		
25-29.9	40 (21.3)	148 (78.7)		
≥ 30	35 (20.8)	134 (79.2)		
Waist Hip Ratio			0.458	0.499
Normal	59 (21.9)	211 (78.1)		
Obesity	35 (20.8)	134 (79.2)		
Excessive Salt Intake			2.660	0.103
Yes	29 (16.7)	145 (83.3)		
No	75 (22.9)	253 (77.1)		
Fatty Meat Intake			0.600	0.438
Yes	58 (22.1)	205 (77.9)		
No	46 (19.2)	193 (80.8)		
Sugary Drinks or Beverages			0.346	0.556
Yes	38 (19.4)	158 (80.6)		
No	66 (21.6)	240 (78.4)		
Fruit Serving			1.500	0.221
1-2	25 (17.2)	120 (82.8)		
≥ 3	79 (22.1)	278 (77.9)		
Alcohol Consumption			1.452	0.228
Yes	20 (16.8)	99 (83.2)		
No	84 (21.9)	299 (78.1)		
Smoking			7.836	0.005*
Yes	22 (33.8)	43 (66.2)		
No	82 (18.8)	355 (81.2)		

*statistically significant

prevalence of physical activity. However, the proportion is comparable with studies carried out in urban areas and in Saudi Arabia [28-30]. Our differences may be explained by the setting of our research, being hospital-based and amongst subjects already known to be hypertensive. In addition, the proportion of middle aged to elderly patients in our study (67.5%) may have contributed to this as it is known that level of physical activity declines with increasing age [31,32]. Our study showed that physically active individuals were significantly older and more educated. This is different from some studies carried out among middle income workers in Nigeria that showed that physical activity declined with increasing age [28].

Our study also linked physical activity positively with higher income. Our finding is in line with some studies [33,34]. One of them [33] observed that higher income in women in their study was associated with increased number of aerobic steps. The other study linked low-income housewives with reduced level of physical activity [34]. An explanation for the link between increased physical activity and higher income is that higher income may provide more time for leisure-time based physical activity.

With respect to education, higher education may increase comprehension of lifestyle modification activities. One study showed that individuals with lower level of educational are more likely to have decrease in their level of activity compared to more educated people because of a low perceived control over life [35].

Although just above half of physically active individuals had normal WHR, it did not show significant relationship with physical activity. Most individuals in the study imbibed healthy eating practices like avoiding excess salt intake, non-consumption of fatty meat, not consuming sugary drinks, little to no alcohol consumption, and not smoking. The lack of significant relationship between physical activity and some of these healthy habits may be because the entire population studied is generally inactive. This may indicate that physical inactivity is a major risk factor for the development of hypertension in this study population. The level of physical inactivity may also explain the low proportion of individuals with optimal blood pressure level.

Limitations: This outcome is this work and the interpretation may be limited by the fact that the patients' comorbidities that may limit physical activity like joint problems and poor vision were not assessed. This might have comprised majorly of middle aged and elderly hypertensives. The role of other medical conditions like diabetes, chronic kidney disease and dyslipidemia that may affect waist hip ratio and BMI were also not explored. Level of drug compliance was not assessed as poor drug compliance may have been able to explain part of the reason for low proportions of optimal blood pressure control in some of the hypertensives recruited for the study.

Conclusion

The proportion of physically active hypertensives assessed using standard measures was alarmingly low. This is reflective in the obesity indices assessed in this study. Physical activity was lower in

respondents less than 45 years with low level of education and income. There is therefore the need for increased education of patients with hypertension on the need to engage in physical activity. Also, education on the entire bundle of lifestyle changes and non-pharmacological measures necessary in hypertension management should be emphasized to all hypertensives at the time of diagnosis. Reinforcement of education given and reassessment of patients to ascertain that these modifications are being made is also important.

List of abbreviations

WHR, Waist Hip Ratio.

Declarations

Ethical issues

None declared.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

No conflict of interest associated with this work.

Funding

No funding was received for this work

Contribution of Authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

Acknowledgements

None declared.

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