

## Knowledge, attitude and Practice of Exercise for blood pressure control: A cross-sectional survey

Awotifebe<sup>1</sup>, T.O., Adedoyin<sup>1</sup>, R.A., Rasaq,<sup>1</sup> W.A., Adeyeye<sup>2</sup>, V.O., Mbada<sup>1</sup>, C.E., Akinola,<sup>3</sup> O.T., Otwombe<sup>4</sup>, K.N.

<sup>1</sup>Department of Medical Rehabilitation, College of Health Sciences, Obafemi Awolowo University, Ile - Ife, Nigeria

<sup>2</sup>Cardiac Care Unit, Obafemi Awolowo University Teaching Hospitals Complex, Ile - Ife, Nigeria

<sup>3</sup>Department of Physiotherapy, Lagos University Teaching Hospital, Lagos, Nigeria

<sup>4</sup>Perinatal HIV Research Unit, University of the Witwatersrand, Johannesburg, Gauteng, South Africa

\*Correspondence: Taofeek O. Awotifebe, Department of Medical Rehabilitation, College of Health Sciences, Obafemi Awolowo University, Ile - Ife, Nigeria, E-mail: [tidebet@yahoo.com](mailto:tidebet@yahoo.com)/ [tawotifebe@oauife.edu.ng](mailto:tawotifebe@oauife.edu.ng)

### Abstract

There is emerging empirical evidence of the efficacy of exercise in blood pressure control, however, little is known about factors limiting exercise engagement in patients with hypertension. This cross-sectional study assessed knowledge, attitude and practice of exercise for blood pressure control among Nigerian patients with hypertension. A total of 150 (male, 66 and female, 84) patients with hypertension whose ages were 20 years and older participated in this study. A structured questionnaire which sought information on socio-demographics, knowledge, attitude and practice of exercise for blood pressure control was used to obtain data from the respondents who were recruited from selected government hospitals. Data were analysed using descriptive and inferential statistics at 0.05 Alpha level. More than half of the respondents, 90(60.0%) demonstrated poor exercise practice. A majority, 101(67.3%) had poor knowledge of exercise for hypertension control while a quarter, 39(26.0%) had positive attitude towards exercise. There were significant associations between knowledge of exercise and level of education ( $\chi^2=28.337$ ;  $p=0.001$ ), attitude ( $\chi^2=38.297$ ;  $p=0.001$ ) and practice of exercise ( $\chi^2=12.757$ ;  $p=0.001$ ) respectively. Significant association was found between knowledge and each of socio-economic status ( $\chi^2=19.192$ ;  $p=0.001$ ) and attitude ( $\chi^2=25.634$ ;  $p=0.001$ ). Practice of exercise for blood pressure control was low among Nigerian patients with hypertension which was significantly influenced by poor knowledge of and negative attitude towards exercise practice for blood pressure control.

**Keywords: Knowledge, attitude, practice, exercise, hypertension control.**

### Introduction

Hypertension remains a major global public health challenge as the leading risk factor for cardiovascular morbidity and mortality (WHO 2002; Chobanian et al., 2003; Kearney et al., 2004). Annually, it accounts for 7.1 million (one-third) of global preventable premature deaths (Kearney et al., 2004; Bhalt et al., 2006; Gunarathne et al., 2008). In Nigeria, over 4.3 million individuals above the age of 15 years were classified as hypertensive

using 160/90 mmHg cut-off point (National Expert Committee, 1997; Ike, 2009). Similarly, Adedoyin et al, (2008) reported a prevalence rate of 36.6% among elderly individuals which peaks at 49 years in both sexes using 140/90mmHg cut-off point. Thus, prevention and control of high blood pressure has become an important public health concern. There is substantial evidence that pharmacological therapy is effective in the control or prevention of

target organ damage in patients with hypertension (Pontremoil *et al*, 2001; Elliot, 2004) but hypertension treatment success rate is still below optimal level (Rayner *et al*, 2007). Factors such as cost of medication (Busari *et al*, 2010), multiple antihypertensive medications (Jokisalo *et al*, 2001), socio-economic disparity (Morenoff *et al*, 2007) and adverse effects (Bardage and Isacson, 2000) have been implicated for poor treatment success rate. Hence, non-pharmacological therapy for BP control has been advocated by many health authorities in the recent times (Pate *et al*, 1995; WHO 2003).

Non-pharmacological approaches for BP control include dietary plan, weight reduction and regular exercise programmes (Chobanian *et al*, 2003; Obarzanek *et al*, 2003). These approaches are known to have no adverse effects and are less expensive than pharmacological therapy (Whelton *et al*, 2002; WHO 2003; Pescatello *et al*, 2005). Exercise alone has been reported to offer a reduction in blood pressure up to 12mmHg and 5 mmHg in both systolic and diastolic respectively and has been considered to be clinically relevant in the management of hypertension (Westhoff *et al*, 2002).

In order to achieve the desire goal for hypertension management, knowledge of its care is paramount. Adequate knowledge of a disease condition has been reported to influence patients' attitude and practice in the management of their illnesses, and improving knowledge is known to improve compliance with treatment in conditions such as hypertension (Busari *et al*, 2010). Similarly, exercise practice entails good knowledge of its application in order to

maximize its benefits. In spite of emerging empirical evidence of the efficacy of exercise in blood pressure control, little is known about factors limiting exercise engagement in patients with hypertension. Therefore, this study assessed knowledge, attitude and practice of exercise for BP control among Nigeria patients with hypertension.

### **Materials and Methods**

**Respondents:** This cross-sectional study recruited 165 patients with hypertension who were receiving treatment at the Cardiac Care Clinics of some selected government hospitals in Osun State, southwest, Nigeria. The selected hospitals were Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile – Ife, Wesley Guild Hospital unit of the OAUTHC, Ilesha, and Ladoke Akintola University Teaching Hospital, Osogbo. Inclusion criteria for participation in the study involved having a medical diagnosis of hypertension by the physician, being 20 years and older, and an attendance at the medical outpatient clinics of the any of the selected hospitals for a duration of at least 6 months before the study. Patients were excluded if presented or reported any severe medical condition such as cancer, chronic obstructive pulmonary disease, neurological condition and dementia.

**Procedure:** Ethical approval for this study was obtained from the Institute of Public Health, Obafemi Awolowo University, Ile-Ife, Nigeria. Permission to conduct study was also obtained from the selected hospitals respectively. Each respondent gave informed consent to participate in the study. Of the 165 copies of questionnaires administered, only 150 copies were returned and found valid for

analysis therefore yielding a response of 90.9%.

**Instruments:** Knowledge, attitude & practice Questionnaire

The instrument used in this study was developed by a panel of experts on exercise prescription and cardiopulmonary rehabilitation comprising of three physical therapists and exercise physiologists respectively. The questionnaire sought information on knowledge, attitude and practice of exercise for blood pressure control. The questionnaire was tested for content validity and the test-retest reliability was determined in a pilot study among 20 patients with hypertension who were not part of the main study. Consequently, items on the questionnaire that were ambiguous or extraneous were either modified or expunged. The internal consistency of the questionnaire was found to be 0.89 on Cronbach’s alpha.

The questionnaire has two sections: section A sought information on demographics such as age, marital status, sex, education, occupation and income. Section B sought information on knowledge, attitude and practice of exercise for blood pressure control. Items on knowledge consists of four sub-sections which included previous advice on exercise by health-care professionals, type of exercise for hypertension control, combination of exercise with medication, the importance of exercise in high BP control, adverse effects of exercise on patient, place of exercise (indoors or outdoors) and forms of exercise (multiple options). Items on attitude were of three sub-sections which included confidence of individuals to participate in exercise programme. Questions on practice also

consisted of four sub-sections which included current state of exercise involvement, frequency of exercise practice, and duration of exercise and challenges involved in participating in exercise for BP control.

The answering options were “Yes”, “No” or “I don’t know”. A correct response was assigned score of 2, incorrect response was given a score of 0 and “I do not know” was assigned score of 1. Responses to the questions were summed up and the maximum obtainable score for knowledge was 38 points, attitude was 14 points while practice was 26 points. A below average knowledge score (i.e. < 19 points) was graded as “poor”, average while scores >19 points was graded as “good”. A below average attitude score (i.e. < 7 points) was graded as “negative” while >7 was graded as positive. Similarly, a below average practice score (i.e. <13 points) was graded “poor” while > 13 was graded “good” practice.

Socio-Economic Status Questionnaire

Socio-economic Status was assessed using Socio-economic Status (SES) Questionnaire by *Adedoyin et al. (2005)*. The questionnaire was used to obtain information on major SES indicators; occupational status, level of education and income. Important assets and household equipment valuable in Nigerian community such as house, car, Colour TV, video, computer, refrigerator, fan, generator, air conditioner etc. were also assessed. Individual position in the society such as community leader, religious leader etc. was included in the questionnaire. The summative scores of the three socio-economic indicators yielded a maximum obtainable score of

27. The respondent were categorised as lower class (< 9); middle class (10-18); or high class (19-27).

*Data Analysis:* Data were summarized using descriptive statistics of mean, standard deviation, frequency and percentage. Inferential statistics of Chi Square test was used to determine associations among age, level of education, occupation, socioeconomic status, knowledge, attitude and practice for blood pressure control.

## Results & Discussion

**Table 1: Socio-demographic characteristics socioeconomic status, graded scores for knowledge, attitude and practice of respondents (N=150)**

VARIABLE	N	%
<b>Age Group</b>		
20-30	6	4.0
31-40	7	4.7
41-50	28	18.7
51-60	109	72.6
<b>Sex</b>		
Male	66	44.0
Female	84	56.0
<b>Occupation</b>		
Artisans	24	15.8
Business	57	38.1
Civil servants	46	30.8
Retirees	23	15.3
<b>Marital Status</b>		
Single	5	3.3
Married	106	70.7
Divorced	1	0.7
Widowed	38	25.3
<b>Level of education</b>		
Primary school	20	13.3
Secondary school	32	21.3
Tertiary institution	64	42.7
No formal education	34	22.7
<b>Socio-economic status</b>		
Low	33	22.0
Middle	94	62.7
High	23	15.3
<b>Knowledge Score</b>		
Poor	101	67.3
Good	49	32.7
<b>Attitude Score</b>		
Negative	111	74.0
Positive	39	26.0
<b>Practice Score</b>		
Poor	90	60.0
Good	60	40.0

The mean age of the respondents in this study was 57.7±12.6 years. The study recruited higher proportion of females constituting 56.0%. A majority, 106(70.7%) of the respondents were married while less than half, 64(42.7%) had tertiary education. More than half, 94(62.7%) of the respondents were in the middle socio-economic status. 67.3% had poor knowledge exercise for hypertension control and 26.0% had good attitude towards exercise while 40.0% demonstrated good exercise practice (Table 1).

**Table 2: Respondents' knowledge, attitude and practice of exercise for blood pressure control (N=150)**

Variables	Yes (N%)	No (N%)	Do Not Know (N%)
<b>Knowledge</b>			
<i>Advice on exercise by health-care provider</i>			
<b>(Exercise Advise by Health Providers)</b>	72(48.0)	78(52.0)	
<i>Aerobic</i>	63(42.0)		
<i>Anaerobic</i>	1(0.7)		
<i>Others</i>	86(57.3)		
<b>Combination of exercise and Medication</b>	50(33.3)	1(0.7)	99(66.0)
<i>Exercise is important in controlling high BP</i>	49(32.7)	3(2.0)	98(65.3)
<i>Important</i>	29(19.4)		
<i>Very Important</i>	20(13.3)		
<i>Not Sure</i>	101(67.3)		
<i>Exercise has adverse effects on patient with high BP</i>	18(12.0)	9(6.0)	123(82.0)
<b>Place of exercise</b>			
<i>Indoors</i>		107(71.3)	
<i>Outdoors</i>		43(28.3)	
<b>Forms of exercise (multiple options)</b>			
<i>Brisk walking</i>	149(99.3)	1(0.7)	
<i>Running</i>	24(16.0)	126(84.0)	
<i>Cycling</i>	24(16.0)	126(84.0)	
<i>Strength training</i>	21(14.0)	129(86.0)	
<i>Swimming</i>	3(2.0)	147(98.0)	
<i>Stretching</i>	60(40.0)	90(60.0)	
<i>Jogging</i>	25(16.7)	25(83.3)	
<b>Attitude</b>			
<b>I: Confident about exercise</b>			
<i>Try hard enough to always overcome barriers with regard to</i>	22(14.7)		

exercise			
Always find ways to exercise and be physically active	39(26.0)		
Easy for me to accomplish my activity and exercise goals	56(37.3)		
When confronted with a barrier to exercise I could find several solutions to overcome this barrier	17(11.3)		
I could exercise even when I am tired	16(10.7)		
<b>2: Exercise interference with personal responsibilities</b>	15(10.0)	115(76.7)	20(13.3)
<b>3: Exercise during the workday</b>	115(76.7)	35(33.3)	
<b>Practice</b>			
<b>1. Engage in an exercise presently</b>	60(40.0)	90(60.0)	
<b>2. Participation in exercise</b>			
Once a week	13(8.7)		
Twice a week	13(8.7)		
Thrice a week	17(11.3)		
Once a week	17(11.3)		
No Exercise	90(60.0)		
<b>3. Duration of exercise</b>			
0 min	90(60.0)		
10 min	15(10.0)		
20 min	24(16.0)		
30 min	12(8.0)		
1 hour	9(6.0)		
<b>4. Difficulty in participating in an exercise</b>	11(7.3)	139(92.7)	
<b>5. Being on exercise before and unable to stick with it due to health problem</b>	13(8.7)	137(91.3)	

**Table 3: Test of association between respondents' knowledge, demographic characteristics, attitude and practice of exercise for blood pressure control**

Variables	<b>Knowledge of Exercise</b>			
	Yes(N%)	No(N%)	$\chi^2$	p-value
<b>Age Group (Yrs)</b>				
20-30	3(50.0)	3(50.0)		
31-40	3(42.9)	4(57.1)		
41-50	12(42.9)	16(57.1)	3.357	0.340
>51	31(28.4)	78(71.6)		
<b>Level of Education</b>				
Primary	8(15.0)	12(85.0)	28.337	0.001*
Secondary	9(28.1)	23(71.9)		

Date of Communication: Nov. 26, 2013  
Date of Acceptance: Dec. 25, 2013

Tertiary	35(54.7)	29(45.3)		
No formal education	2(5.9)	32(94.1)		
<b>Socio-economic status</b>				
Low	2(6.1)	31(93.9)	19.192	0.001*
Middle	33(35.1)	61(64.9)		
High	14(60.9)	9(39.1)		
<b>Attitude</b>				
Slightly confident	1(4.5)	21(95.5)		
Moderately confident	13(30.8)	26(69.2)		
Very confident	14(42.9)	32(57.1)	23.823	0.002*
Extremely confident	10(58.8)	15(41.2)		
Not at all confident	1(6.3)	17(93.7)		
<b>Practice</b>				
Yes	25(58.3)	35(41.7)	12.757	0.001*
No	14(15.6)	76(84.4)		

\*p<0.05

**Table 4: Chi-Square Test of association between attitude toward exercise as blood pressure control and each of respondent age group, level of education and socio-economic status**

Variables	<b>Knowledge of Exercise</b>			
	Yes (N%)	No (N%)	$\chi^2$	p-value
<b>Age Group (Yrs)</b>				
20-30	0(0.0)	6(5.5)		
31-40	0(00.0)	4(3.6)	25.615	0.001*
41-50	4(10.3)	24(21.6)		
>51	35(89.7)	74(66.7)		
<b>Level of Education</b>				
Primary	4(10.3)	16(14.4)		
Secondary	6 (15.8)	25(22.5)		
Tertiary	9(23.7)	55(49.5)	38.297	0.001*
No formal education	19(50.0)	15(13.5)		
<b>Socio-economic status</b>				
Low	16(41.0)	17(15.3)	25.634	0.001*
Middle	18(46.1)	76(68.5)		
High	5(12.8)	18(16.2)		

\*p<0.05

**Table 5: Chi-Square Test of association between practice of exercise for blood pressure control and each of respondent age group, level of education and socio-economic status**

Variables	Practice of Exercise		$\chi^2$	p-value
	Yes(N%)	No(N%)		
<b>Age Group (Yrs)</b>				
20-30	5(83.3)	1(16.7)	8.390	0.390
31-40	5(71.4)	2(28.6)		
41-50	11(39.3)	17(60.7)		
>51	39(35.8)	70(64.2)		
<b>Level of Education</b>				
Primary	6(30.0)	14(70.0)	14.861	0.002*
Secondary	17(53.1)	15(46.9)		
Tertiary	32(50.0)	32(50.0)		
No formal education	5(14.7)	29(85.3)		
<b>Socio-economic status</b>				
Low	7(21.2)	26(78.8)	6.786	0.340
Middle	(43.6)	53(56.4)		
High	12(52.2)	11(47.8)		

\*p&lt;0.05

Respondents who had received advice from health-care providers on the benefits of exercise for blood pressure control were less than half, 72(48.0%). A quarter, 39(26.0%) reported moderate confidence in exercise engagement for BP control while only a tenth, 15(10.0%) believed that exercise may interfere with their personal responsibilities.

More than half, 90(60.0%) of the respondents admitted that they were not engaged in any form of exercise. However, only a few, 17(11.3%) reported an engaging in exercise thrice weekly with 8.0% of the respondents practicing exercise for 30 minutes. A majority 149(99.3%) considered brisk walking while 21(14.0%) opined strength training as a form of exercise for BP control (Table 2). There was significant association between knowledge of exercise for BP control and each of attitude ( $\chi^2 = 23.823$ ;  $p=0.002$ ) and practice ( $\chi^2=12.757$ ;  $p=0.001$ ). There was significant association between knowledge of exercise for BP control and socio-demographics such as level of education ( $\chi^2= 28.337$ ;  $p=0.001$ ) and SES

( $\chi^2=19.192$ ;  $p=0.001$ ) (Table 3). There were significant inverse association between attitude towards exercise and age ( $\chi^2=25.615$ ;  $p=0.001$ ); level of education ( $\chi^2 =38.297$ ;  $p=0.001$ ) and socio-economic status ( $\chi^2=25.634$ ;  $p=0.001$ ) respectively (Table 4). Significant inverse association was also found between level of education ( $\chi^2=14.861$ ;  $p=0.002$ ) and practice of (Table 5).

**Discussion:** This study investigated knowledge, attitude and practice of exercise for BP control among Nigerian patients with hypertension. The finding of this study shows that knowledge of exercise for BP control among patients with hypertension was poor. This finding is similar to the reports of previous studies that knowledge of hypertension care using pharmacological treatment is poor among patients with hypertension (Sabouhi et al, 2011; Piwońska et al, 2012). This finding may be due to lack of awareness of exercise as complementary or start up therapy in early mild hypertension other than medication. Evidence abound in the literature that pharmacological therapy is the only widely known approach for BP control in spite of emerging evidence on the efficacy of the non-pharmacological management (Hagberg et al, 2000; Pescatello et al, 2005; Appel et al, 2006; Fagard and Cornelissen, 2007). This could be linked to inadequate public enlightenment and lack of adequate health education on the causes, prevention, diagnosis, detection, and multidisciplinary management of hypertension using various lifestyle modifications.

Despite conclusive evidence of hypotensive efficacy and enormous

benefits of exercise in the control and management of hypertension, knowledge of exercise for BP control still remains low. Over dependence on drug seems to contribute to poor exercise application for BP control. There is evidence that knowledge transferred from medical staff induces patients' ability to comply with lifestyle modification (*Thorogood et al, 2003; Hroschikoski et al, 2006*) but there is strong suspicion that advice such as regular exercise may not be adequate enough to influence patients in taking informed decision for BP control (*Egede et al, 2002*). However, Huang et al, (2004) submitted that low counselling rates and lack of expertise in exercise prescription among health care professionals could contribute to poor BP control among patients with hypertension. Furthermore, lack of referral to exercise experts such as physical therapists in the cardiopulmonary rehabilitation constitutes a significant shortcoming. Hence, emphasis on team work in the management of hypertension may help increase use of exercise for BP control among patients with hypertension.

Exercise culture is a health behaviour which may be influenced by many psychosocial factors such as family support and confidence. Our study revealed that attitude of patients towards exercise for BP control was negative. Similar to the finding of a previous study, attitude of patients with chronic disease towards exercise was negative (*Murphy, 2011*). Many individuals with hypertension are known to engage in sedentary behaviour and consequent poor confident in taking up specific task such as exercise behaviour (*King et al, 2009*). The ability to take up specific task was

described by *Bandura, (1977)* as self-efficacy and has been described as a strong predictor of exercise behaviour. This psychosocial construct is central to several theoretical models such as Trans-theoretical Model, Social Cognitive Theory, Ecological models of health behaviour and Health Belief Model and has been used to explain exercise behaviour in many studies (*Bandura et al, 1997; Sallis et al, 2003*). Hence, exercise self-efficacy should be taking into consideration when goal-setting and reinforcement for exercise programme in achieving adequate BP control.

The present study also found that patients with hypertension demonstrated poor level of exercise practice. This finding is consistent with reports of previous study that practice of exercise among patients with hypertension was below optimal level (*Khanam, 2008; Sabouhi et al, 2011*). Many factors may contribute to poor level of exercise practice among patients which are not limited to perceived benefit of exercise, level of education, access to recreational facilities and neighbourhood environment (*Pan et al, 2009*). Amongst these, educational level has been reported to play significant role to influence good practice. This is in accordance with study of *Giardina et al, (2009)* who opined that individuals with higher level of education were more knowledgeable about the health benefits of exercise. Consequent to the foregoing, our study revealed that SES was significantly associated with knowledge, attitude and practice of exercise for BP control. This is consistent with result of previous study that SES is a salient factor in hypertension pathogenesis and management

(McMurray et al, 2000; Lynch et al, 2007). SES might be independently associated with hypertension care which could affect factors such as disease awareness and knowledge, health-promoting behaviours, access to health care, and family and social support (Morenoff et al, 2007). There is the need to improve social equalities in terms of health services, social welfare and health education on various lifestyle modifications.

In line with studies on knowledge, attitude and practice (KAP), this present study has some limitations which bothered on non-availability of standardized instrument for KAP of exercise for BP control which has been employed previously or in other settings. However, the questionnaire used in this study was subjected to various psychometric processes. Furthermore, the sample size used in this study may limit its generalizability, however, the study employed a multi-venue approach reduce sampling bias.

*Clinical Implication of findings:* Epidemiological studies suggest that exercise is efficacious in BP control. Exercise has multiple benefits for patients with hypertension thereby reducing the risk of cardiovascular event and mortality. Unfortunately, most patients with hypertension are placed on pharmacological therapy exclusively. Although some informed physician often advise patients with hypertension to engage in exercise programme. Some even assume the role of exercise experts without adequate knowledge of exercise prescription and training. Furthermore, there seems to be insufficient number of

physical therapists who are skilled in exercise prescription and management of high risk patients such as the hypertensives. In line with emerging evidence-based practice, it behooves the physical therapists to have empirical data on the perception of patients with hypertension towards exercise for BP control and also to understand the limiting and facilitators of exercise practice for BP control. This present study provided insight into exercise practice of patients with hypertension and also evaluated the influence of knowledge and attitude towards exercise on exercise practice. The outcome of this study may serve as leverage for future study on the use of exercise in prevention and management of hypertension.

*Conclusion:* Practice of exercise for blood pressure control was low among Nigerian patients with hypertension which was significantly influenced by poor knowledge of and negative attitude towards exercise practice for blood pressure control. Education significantly influenced knowledge, attitude and practice of exercise for BP control. Concerted efforts are needed in improving knowledge of exercise in order to maximise its benefits for prevention and management of hypertension.

*Acknowledgements:* The authors wish to thank the Consortium for Advanced Research Training in Africa (CARTA) for her support. CARTA is funded by the Carnegie Corporation of New York (grant: B8606.R01), Swedish International Development Corporation Agency – SIDA (grant: 54100029), Ford Foundation (grant: 1120-1838) and the



Wellcome Trust (UK) (grant: 087547/Z/08/Z).

## References

- Adedoyin, R.A., Mbada, C.E., Balogun, M.O., Tanimola, M., Adebayo, R.A., Akintomide, A 2008. Prevalence and Pattern of Hypertension in a Semi-urban Community in Nigeria. *The Eur J Cardiovasc Prev Rehabil.* 15, 683-687.
- Adedoyin, R.A., Mbada, C.E., Awofolu, O.O., Oyebami, O.M. 2005. The influence of socioeconomic status on casual blood pressures of the adult Nigerians. *Eur J Cardiovasc Prev Rehabil.* 12(3).
- Appel, L.J., Brands, M.W., Daniels, S.R., Karanja, N., Elmer, P.J., Sacks, F.W. 2006. Dietary approaches to prevent and treat hypertension: a scientific statement from the American Heart Association. *Hypertens.* 47, 296-308.
- Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: W.H. Freeman and Company.
- Bandura, A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev.* 1977; 84:191-215.
- Bardage, C., Isacson, D.G. Self-reported side-effects of antihypertensive drugs: an epidemiological study on prevalence and impact on health-state utility. *Blood Pressure*, 2000; 9(6), 328-334.
- Bhatt, D.L., Steg P.G., Ohman, E.M. 2006. International prevalence, recognition and treatment of cardiovascular risk factors in outpatients with atherothrombosis; *JAMA*, 295; 180-189.
- Busari, O.A., Olanrewaju, T.O., Desalu, O.O., Opadijo, O.G., Jimoh, A.K., Agboola, S.M., Busari, O.E., Olalekan, O. 2010. Impact of Patients' Knowledge, Attitude and Practices on Hypertension on Compliance with Antihypertensive Drugs in a Resource-poor Setting. *TAF Prev Med Bull*, 9(2):87-92
- Chobanian, A.V., Bakris, G.L., Black, H.L., Cushman, W.C., Green, L.A., Izzo, J.L. 2003. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertens.* 42:1206-1252.
- Egede, L.E., Zheng, D. 2002. Modifiable cardiovascular risk factors in adults with diabetes: prevalence and missed opportunities for physician counselling. *Arch Intern Med*, 162: 427-33.
- Elliot, H.L. 2004. 24 hours blood pressure control: its relevance to cardiovascular outcomes and the importance long-acting antihypertensive drugs. *J. Hum. Hypertens.* 18, 539-543.
- Fagard, R.H., Cornelissen, V.A. 2007. Effect of exercise on blood pressure control in hypertensive patients. *Eur J Cardiovasc Prev Rehabil.* 14(1):12-7.
- Giardina, E.G., Laudano, M., Hurstak, E. 2009. Physical activity participation among Caribbean Hispanic women living in New York: relation to education, income, and age. *J Women's Health*, 18:187-193.
- Gunaranthne, A., Patel, J.V., Potluri, R., Gill, P.S., Hughes, E.A., Lip, G.Y.H. 2008. Secular trends in the cardiovascular risk profile and mortality of stroke admissions in an innercity, multiethnic population in the United Kingdom (1997-2005). *J. Hum. Hypertens.* 22: 18-23.
- Hagberg, J.M, Park, J.J., Brown, M.D. 2000. The role of exercise training in the treatment of hypertension. *Sports Med.* 30: 193-206.
- Hennis, A., Wu, S.Y., Nemesure, B., Leske, M.C. 2002. Hypertension prevalence, control and survivorship in an Afro-Caribbean population. *J. Hypertens.* 20(12): 2363-2369.
- Hroschikoski, M.C., Solberg, L.I., Sperl-Hillen, J.M., 2006. Challenges of change: a qualitative study of chronic care model implementation. *Ann Fam Med.* 4: 317-26.
- Huang, J, Y.u.H, Marin, E., Brock, S., Carden, D., Davis, T., 2004. Physicians' weight loss counseling in two public hospital primary care clinics. *Acad Med.* 79 (2): 156-61.
- Ike, S.O. 2009. Prevalence of hypertension and its complications among medical admissions at the University of Nigeria Teaching Hospital, Enugu, Nigeria (Study 2). *Nig. J. Med.*, 18(1): 68-72.
- Iyalomhe, G.B.S., Iyalomhe, S.I., 2010. Hypertension-related knowledge, attitudes and life-style practices among hypertensive patients in a sub-urban Nigerian community, *J. Public Health Epidemiol.* 2(4), 71-77.
- Jokisalo, E., Kumpusalo, E., Enlund, H., Takala, J. 2001. Patients perceived problems with hypertension and attitudes towards medical treatment. *J. Hum. Hypertens.* 15, 755-761.
- Kearney, P.M., Whelton, M., Reynolds, K., Muntner, P., Whelton, P.K, He, J. 2004. Global burden of hypertension. *J. Hypertens.* 22(1): 140.
- King, D.E., Mainous, A.G., Carnemolla, M., Everett, C.J., 2009. Adherence to Healthy Lifestyle Habits in US Adults, 1988-2006. *Am. J. Med.* 122(6):528-534.
- Lynch, E., Liu, K., Spring, B., 2007. Association of ethnicity and socioeconomic status with judgments of body size: the Coronary Artery Risk Development in Young Adults (CARDIA) Study. *Am J Epidemiol.* 165:1055-1062.
- Mari, H., Ukai, H., Yamamoto, H. 2006. Current status of antihypertensive prescription and associated blood pressure control in Japan. *Hypertens Res.* 29: 143-151.
- McMurray, R.G., Harrell, J.S., Deng, S., Bradley, C.B., Cox, L.M., Bangdiwala, S.I. 2000. The influence of physical activity, socioeconomic status, and ethnicity on the weight status of adolescents. *Obesity res.* 8(2):130-9.
- Morenoff, J.D., House, J.S., Hansen, B.B., Williams, D.R., Kaplan, G.A., Hunte, H.E. 2007. Understanding social disparities in hypertension prevalence, awareness, treatment, and control: the role of neighbourhood context. *Soc. Sci. Med.*, 65: 1853-66.

- Murphy, C.L., Sheane, B.J., Cunnane, G. 2011. Attitude of patients with chronic disease toward exercise. *Postgrad. Med. J.*, **87**: 1024, 96
- National Expert Committee on Non-Communicable Diseases in Nigeria. 1997. *Final report of a national survey*. Federal Ministry of Health, Abuja.
- Obarzanek, E., Proschan, M.A., Vollmer, W.M., Moore, T.J., Sacks, F.M., Appel, L.J. 2003. Individual blood pressure responses to changes in salt intake: results from the DASH-Sodium Trial. *Hypertens.*, **42**: 459-467.
- Pan, S.Y., Cameron, C., DesMeules, M., Morrison, H., Craig, C.L., Jiang, X. 2009. Individual, Social, Environmental, and Physical Environmental Correlates with Physical Activity among Canadians: A Cross-sectional Study. *BMC Public Health*, **9**: 21-29.
- Pate, R.R., Pratt, M., Blair, S.N., Haskell, W.L., Macera, C.A., Bouchard, C., Buchner, D., Ettinger, W., Heath, G.W., King, A.C., Kriska, A., Leon, A.S., Marcus, B.H., Morris, J., Paffenbarger, R.S Jr., Patirck, K., Pollock, M.L., Rippe, J.M., Sallis, J., Wilmore, J.H. 1995. Physical activity and public health – A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA*, **273**: 402-7.
- Pescatello, L.S. 2005. The immediate after-effects of endurance exercise on blood pressure among adults with hypertension. In: Focus on Exercise and Health Research. Edited by Columbus F. Hauppauge, NY: Nova Science Publishers; In press.
- Petrella, R.J., Merikle, E.P., Jones, J. 2007. Prevalence, treatment and control of hypertension in primary care: Gaps, trends and opportunities. *J. Clin. Hypertens.*, **9**(1): 28-35.
- Piwońska, A., Piotrowski, W., Broda, G. 2012. Knowledge about arterial hypertension in the Polish population: the WOBASZ study. *Kardiol Pol.* **70**(2): 140-6.
- Pontremoli, R.F.V., Ravera, M., Leoncini, G., Burreti, V., Bezante, G.P. 2001. Long-term effect of nifedipine GITS and lisinopril on subclinical organ damage. *J. Nephrol.*, **14**: 19-26.
- Rayner, B., Blockman, M., Baines, D.A. 2007. Survey of hypertensive practices at two community health centres in Cape Town. *S. Afri. Med. J.*, **97**(4): 280-4.
- Sabouhi, F., Babaee, S., Zadeh, A.H. 2009. Knowledge, Awareness, Attitudes and Practice about Hypertension in Hypertensive Patients Referring to Public Health Care Centers in Khor & Biabanak. *Iran J. Nurs. Midwifery Res.*, **16**(1): 35–41.
- Sallis, J.F., Hovell, M.F. 1990. Determinants of exercise behavior. In: Exercise and Sport Sciences Review. Baltimore, MD: Williams and Wilkins.
- Khanam, S. 2008. Attitudes towards health and exercise of overweight women. *J. Royal Soc.*, **128**(1): 26-30.
- Thorogood, M., Hillsdon, M., Summerbell, C. 2003. Changing behaviour [Review]. *Clin Evid*, **10**: 95-117.
- Westhoff, T.H, Schmidt, S., Grossa, V., Joppkea, M., Zideka, W., van der, G.M. 2008. The Cardiovascular Effects of Upper-Limb Aerobic Exercise in Hypertensive Patients. *J. Hypertens*, **26**(7): 2-8.
- Whelton, P.K., He, J., Appel, L.J., Cutler, J.A., Havas, S., Kotchen, T.A. 2002. Primary prevention of hypertension: clinical and public health advisory from The National High Blood Pressure Education Program. *JAMA*, **288**(15): 1882–8.
- WHO. 2003. Diet, nutrition and the prevention of chronic diseases. *Technical Report Series* 916.
- WHO. 2002. Reducing risk, promoting healthy life. World Health Report. Geneva, Switzerland.

