

Impact of Training Programs on Awareness and Practice of Lifestyle Modifications among Hypertensive Patients attending Outpatient Clinic of the University College Hospital, Ibadan, Nigeria

ABSTRACT

Aim: This study sought to investigate the impact of training programs on hypertensive patients' awareness and practice of lifestyle modifications in out-patient clinics of the University College Hospital (UCH) Ibadan, Nigeria.

Methodology: The study design was a cross-sectional survey conducted at the out-patient clinics of the University College Hospital (UCH), Ibadan, Nigeria. This setting was chosen due to the accessibility of hypertensive patients receiving regular care and follow-up. The sample size comprised 274 hypertensive patients attending the out-patient clinics for regular hypertension management. A simple random sampling method was employed to select study participants, ensuring a fair representation of the target population. A structured questionnaire was used to collect data from the participants and results were analysed using SPSS.

Results: Findings indicate that the training programs greatly increased awareness of hypertension and lifestyle factors affecting hypertension for most participants (74.42%), with all participants recommending the programs. A significant majority of participants (95.74%) reported being on hypertension medication, while nearly all (99.22%) had received some form of training or counselling on lifestyle modification for hypertension management. Notably, all participants reported having made lifestyle changes following the training programs, with the majority rating the effectiveness of the programs as highly effective (57.36%). Further analysis indicated a statistically significant relationship between the effectiveness of the training programs and the participants' age, sex, educational level, and occupation. The most frequent lifestyle modification post-training was dietary changes, with 54.65% of participants reporting that they always engage in a healthy diet for hypertension management. However, the frequency of engagement in other lifestyle modifications, such as regular physical activity and weight management, was not as high. The majority of participants reported significant improvements in hypertension symptoms following the lifestyle modifications.

Conclusion: These findings demonstrate that targeted training programs can significantly enhance hypertensive patients' awareness and practice of beneficial lifestyle modifications, thus improving health outcomes. Further, the study underscores the need for such training programs to be tailored according to the age, sex, educational level, and occupation of the patients to maximize their impact.

Keywords: Awareness and practice; hypertension; lifestyle modification; training programs

1. INTRODUCTION

Hypertension, also known as high blood pressure, remains a substantial public health concern globally, contributing significantly to

cardiovascular diseases (CVDs) such as stroke and heart attack [1]. Nigeria, Africa's most populous country, has a high burden of hypertension, with an estimated prevalence rate of 28.9% among adults [2]. This condition,

compounded by the increasing urbanization and changes in lifestyle, is a major concern in Nigeria's health sector.

Lifestyle modifications are well-established non-pharmacological interventions for the prevention and management of hypertension [3]. These modifications encompass a balanced diet, regular physical activity, maintaining a healthy weight, stress management, limiting alcohol intake, and abstaining from smoking. Evidence supports that these modifications can lead to significant reductions in blood pressure and related cardiovascular risks [4].

However, knowledge and practice of these lifestyle changes are often lacking among hypertensive patients, particularly in low- and middle-income countries like Nigeria [5]. This gap necessitates interventions like training programs to enhance patients' awareness and enable them to implement the necessary modifications. However, evidence of the impact of such interventions in a Nigerian context, particularly among patients attending outpatient clinics, is sparse.

The University College Hospital (UCH), Ibadan, Nigeria, is a premier medical institution that serves a wide demographic. Outpatient clinics in UCH cater to numerous hypertensive patients, providing an excellent opportunity for implementing and assessing training interventions focused on lifestyle modifications.

While previous research has considered the impact of health education and counselling on lifestyle modifications among hypertensive patients in Nigeria [6], there is a paucity of studies exploring the effectiveness of structured training programs within a hospital setting. Moreover, these studies have generally failed to assess patients' awareness and practice of individual lifestyle modifications, nor have they considered demographic factors that may influence the effectiveness of training interventions.

Given these research gaps, the present study aims to assess the impact of training programs on awareness and practice of lifestyle modifications among hypertensive patients

attending outpatient clinics at UCH, Ibadan. The research will examine patients' demographics, awareness and understanding of hypertension and lifestyle factors, the impact of training programs, and factors affecting the effectiveness of these training interventions

2. METHODOLOGY

2.1 Study Design and Setting

The study design was a cross-sectional survey conducted at the out-patient clinics of the University College Hospital (UCH), Ibadan, Nigeria. This setting was chosen due to the accessibility of hypertensive patients receiving regular care and follow-up.

2.2 Study Participants and Sampling

The sample size was determined following the guidelines of Bland and Altman [7]. This comprised of two hundred and seventy-four (274) hypertensive patients attending the out-patient clinics for regular hypertension management. A simple random sampling method was employed to select study participants, ensuring a fair representation of the target population.

2.3 Data Collection

A structured questionnaire was used to collect data from the participants. The questionnaire contained four sections: demographic information, awareness on hypertension and lifestyle factors, impact of training programs on hypertension and factors affecting the effectiveness of training programs. The questionnaires were administered by well-trained research assistants who provided clarification when necessary. Prior to the main study, the questionnaire was pre-tested on a small number of hypertensive patients to ensure its clarity and relevance.

2.4 Data Analysis

The data was analyzed using descriptive statistics (frequency, percentage) for categorical variables. Chi-square tests were performed to explore the associations between the effectiveness of training programs and demographic factors. A p-value of less than 0.05 was considered statistically significant. All

analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 25.

2.5 Ethical Consideration

This study was conducted following the ethical principles of the Declaration of Helsinki [8]. Written informed consent was obtained from all participants before their enrolment in the study. Participants' information was kept confidential and anonymous.

3. RESULTS

A total of two hundred and seventy-four (274) questionnaires were administered to respondents of which two hundred and fifty-eight (258) were valid. This was due to irregular, incomplete and inappropriate responses to some questionnaires. These 258 questionnaires were validated for the analysis. The results for the demographic distribution of the respondents are presented in Table 1. The largest proportion of the participants were above 60 years old, accounting for 37.21% of the total sample, participants aged 51-60 years constituted the second largest group, comprising 31.01% of the sample. The age groups below 20 and between 21-30 years had the lowest representation, with 1.94% and 3.88%, respectively. Female participants outnumbered males, making up 62.40% of the total sample, male participants accounted for 37.60% of the sample. The majority of participants were married (51.94%), the widowed participants constituted 21.71% of the sample, single participants made up 8.91%, while those who were divorced or separated accounted for 17.44%. The majority of participants had attained secondary education (50.76%), tertiary education was the second most prevalent category, representing 33.33% of the sample, participants with primary education accounted for 10.47%, a small proportion (5.43%) reported having no formal education. The largest group of participants were unemployed, comprising 34.50% of the sample, self-employed individuals constituted 30.62% of the participants, retirees made up 22.87%, civil servants and students had the lowest representation, with 6.98% and 5.04%, respectively.

The responses of participants on the awareness on hypertension and lifestyle factors are presented in table 2. The majority of participants (24.81%) reported being diagnosed with hypertension for 10 years or more, participants with a diagnosis ranging from 4 to 9 years had similar frequencies, accounting for 20.16% to 19.77% of the sample, participants diagnosed within the past year had the lowest representation, at 20.16%. The vast majority of participants (95.74%) reported being on medication for hypertension, only a small proportion (4.26%) stated that they were not on any medication. Almost all participants (99.22%) reported receiving training or counselling on lifestyle modification for managing hypertension, only a very small number (0.77%) stated that they had not received any training or counselling. The participants' attendance in training programs varied: the highest frequency was reported for attending 1 training program (28.52%), followed by 3 programs (23.83%), the lowest frequency was for attending more than 5 programs (3.91%). The majority of participants (74.42%) reported that the training programs greatly increased their understanding of hypertension, a significant proportion (24.03%) stated that their understanding somewhat increased, a negligible percentage reported no change in their understanding of hypertension. The majority of participants (53.88%) rated their awareness of lifestyle factors that affect hypertension as low, moderate awareness was reported by 30.23% of participants, only a small percentage reported very high (3.49%) or high (6.20%) awareness levels. After attending the training programs, a significant increase in awareness was observed: the majority of participants (72.87%) reported high awareness levels, awareness was rated as very high by 21.71% of participants, only a few participants reported moderate awareness, while none reported low or very low awareness. All participants (100.00%) indicated that they would recommend the training programs to other hypertensive patients. The most common frequency of attending outpatient clinics for hypertension management was every 2-3 months (53.10%), once a month was the second most common frequency, reported by 25.97% of participants,

every 4-6 months was the frequency for 20.93% of participants.

All participants (100.00%) reported being aware of lifestyle modifications for managing hypertension. The majority of participants (97.29%) reported being very aware that a healthy diet, including low sodium, low fat, and more fruits/vegetables, is a lifestyle modification for managing hypertension, a small proportion (2.71%) reported moderate awareness. The majority of participants (80.62%) reported being very aware that regular physical activity is a lifestyle modification for managing hypertension, a smaller percentage reported moderate awareness (18.99%), and only one participant reported somewhat awareness (0.39%). Awareness regarding weight management as a lifestyle modification for managing hypertension varied: The most common awareness level reported was somewhat aware (33.33%), moderate awareness was reported by 29.07% of participants, a significant proportion reported being very aware (19.77%), while 17.83% were not aware. The majority of participants (46.90%) reported being very aware that stress management is a lifestyle modification for managing hypertension, moderate awareness was reported by 31.40% of participants, somewhat aware and not aware were reported by 16.66% and 5.04% of participants, respectively. The majority of participants (51.94%) reported being very aware that limiting alcohol consumption is a lifestyle modification for managing hypertension, moderate awareness was reported by 18.99% of participants, somewhat aware and not aware were reported by 20.93% and 8.14% of participants, respectively. The majority of participants (36.43%) reported being very aware that quitting smoking is a lifestyle modification for managing hypertension, moderate awareness and somewhat awareness were reported by 17.05% and 30.23% of participants, respectively, a smaller proportion reported not being aware (16.28%).

The responses of participants on the impact of training programs on hypertension are presented in table 3. All the respondents had attended training programs or workshops

focused on lifestyle modification for hypertension management. None of the respondents reported that the training programs were not effective. The majority of individuals found the programs to be highly effective (57.36%), while 38.37% considered them effective. A smaller proportion (4.26%) stated that the programs were somewhat effective. All respondents (100%) indicated that the training programs did provide them with practical strategies and guidance for implementing lifestyle modifications. Similarly, 100% of the respondents reported making changes to their lifestyle following the training programs. The majority of respondents (54.65%) reported always engaging in a healthy diet for managing hypertension, suggesting a high level of adherence to dietary recommendations. Smaller proportions reported engaging in a healthy diet often (32.95%), sometimes (7.36%), rarely (5.04%), or never (0.00%). A significant portion of the respondents (53.49%) reported engaging in regular physical activity sometimes, while 31.01% engaged in it rarely. Smaller proportions engaged in physical activity often (9.69%), never (3.49%), or always (2.33%). Respondents reported varying frequencies of engaging in weight management for managing hypertension. The most common responses were sometimes (37.98%) and often (27.91%), followed by rarely (13.95%), always (15.89%), and never (4.26%). The respondents reported engaging in stress management for managing hypertension at different frequencies: sometimes (29.46%) and often (28.29%) were the most common responses, followed by always (36.05%), rarely (6.20%), and never (0.00%). A significant proportion of respondents (76.74%) marked "not applicable," indicating that they didn't consume alcohol. Among those who did, 17.05% reported sometimes limiting alcohol consumption, while smaller proportions reported often (5.04%) or always (1.16%) limiting it. None reported never limiting or not applicable. A majority of respondents (78.68%) marked "not applicable," indicating that they were non-smokers. Among smokers, the responses varied, with 8.91% sometimes abstaining from smoking, 8.53% always abstaining, and smaller proportions

occasionally abstaining (3.88%) or never abstaining (0.00%). Most respondents (75.19%) expressed being very confident in maintaining the lifestyle changes in the long term. A smaller proportion reported being confident (22.09%), while only a few respondents expressed being not very confident (2.71%) or not confident at all (0.00%). The majority of respondents (77.91%) reported experiencing significant improvement in their hypertension symptoms following the lifestyle modifications. Additionally, 19.77% reported some improvement, while a small number reported no change (2.33%). No respondents reported experiencing any worsening of symptoms.

The results presented in Table 4 provide information on the factors affecting the effectiveness of training programs in improving awareness and practice of lifestyle modifications for managing hypertension. The table shows that there is a statistically significant association between age and the effectiveness of training programs ($\chi^2 = 6.036$, $p = 0.041^*$). As age increases, the proportion of respondents who reported the training programs as highly effective also increases.

The results indicate a statistically significant association between sex and the effectiveness of training programs ($\chi^2 = 7.152$, $p = 0.027^*$). Female respondents reported higher effectiveness ratings compared to male respondents. There is no statistically significant association between marital status and the effectiveness of training programs ($\chi^2 = 1.672$, $p = 0.618$). The results indicate a statistically significant association between educational level and the effectiveness of training programs ($\chi^2 = 9.382$, $p = 0.042^*$). Respondents with secondary and tertiary education reported higher effectiveness ratings compared to those with no formal education or primary education. Similarly, there is a statistically significant association between occupation and the effectiveness of training programs ($\chi^2 = 7.156$, $p = 0.048^*$). Retirees, self-employed individuals, and unemployed respondents reported higher effectiveness ratings compared to students and civil servants. There is no statistically significant association between the duration of hypertension diagnosis and the effectiveness of training programs ($\chi^2 = 2.161$, $p = 1.054$).

Table 1: Demographic Information of Participants

Demographic Information	Frequency (258)	Percentage (%)
Age (in years)		
Below 20	5	1.94
21 – 30	10	3.88
31 – 40	23	8.91
41 – 50	44	17.05
51 – 60	80	31.01
Above 60	96	37.21
Sex		
Male	97	37.60
Female	161	62.40
Marital Status		
Single	23	8.91
Married	134	51.94
Widowed	56	21.71
Divorced/Separated	45	17.44
Educational Level		
No Formal Education	14	5.43
Primary Education	27	10.47
Secondary Education	131	50.76

Tertiary Education	86	33.33
Occupation		
Students	13	5.04
Self-Employed	79	30.62
Civil Servants	18	6.98
Unemployed	89	34.50
Retiree	59	22.87

Table 2: Awareness on Hypertension and Lifestyle Factors

Variable	Frequency (258)	Percentage (%)
How long have you been diagnosed with hypertension?		
Less than 1 year	52	20.16
1 – 3 years	39	15.12
4 – 6 years	52	20.16
7 – 9 years	51	19.77
10 years and above	64	24.81
Are you currently on any medication for hypertension?		
Yes	247	95.74
No	11	4.26
Have you received any training or counselling on lifestyle modification for managing hypertension?		
Yes	256	99.22
No	2	0.77
If yes, how many training programs have you attended in the past year?		
1	73	28.52
2	43	16.80
3	61	23.83
4	47	18.36
5	22	8.59
More than 5	10	3.91
Did the training programs increase your understanding of hypertension?		
Greatly increased	192	74.42
Somewhat increased	62	24.03
No Change	04	1.55
Somewhat decreased	00	0.00
Greatly decreased	00	0.00
How would you rate your awareness of lifestyle factors that affect hypertension before attending the training(s)?		
Very high	09	3.49
High	16	6.20
Moderate	78	30.23
Low	139	53.88
Very low	16	6.20
How would you rate your awareness of lifestyle factors that affect hypertension after attending the training(s)?		
Very high	56	21.71
High	188	72.87

Moderate	14	5.43
Low	00	0.00
Very low	00	0.00
Would you recommend these training programmes to other hypertensive patients?		
Yes	258	100.00
No	00	0.00
How frequently do you attend outpatient clinics for hypertension management?		
Once a month	67	25.97
Every 2-3 months	137	53.10
Every 4-6 months	54	20.93
Once a year	0.00	0.00
Less than once a year	0.00	0.00
Are you aware of lifestyle modifications for managing hypertension?		
Yes	258	100.00
No	00	0.00
Are you aware that healthy diet (e.g., low sodium, low fat, more fruits/vegetables) is a lifestyle modification for managing hypertension?		
Not aware	00	0.00
Somewhat aware	00	0.00
Moderately aware	7	2.71
Very aware	251	97.29
Are you aware that regular physical activity is a lifestyle modification for managing hypertension?		
Not aware	00	0.00
Somewhat aware	1	0.39
Moderately aware	49	18.99
Very aware	208	80.62
Are you aware that weight management is a lifestyle modification for managing hypertension?		
Not aware	46	17.83
Somewhat aware	86	33.33
Moderately aware	75	29.07
Very aware	51	19.77
Are you aware that stress management is a lifestyle modification for managing hypertension?		
Not aware	13	5.04
Somewhat aware	43	16.66
Moderately aware	81	31.40
Very aware	121	46.90
Are you aware that limiting alcohol consumption is a lifestyle modification for managing hypertension?		
Not aware	21	8.14
Somewhat aware	54	20.93
Moderately aware	49	18.99
Very aware	134	51.94
Are you aware that quitting smoking is a lifestyle modification for managing hypertension?		
Not aware	42	16.28
Somewhat aware	78	30.23
Moderately aware	44	17.05
Very aware	94	36.43

Table 3: Impact of Training Programs on Hypertension

Variable	Frequency (258)	Percentage (%)
Have you attended any training programs or workshops specifically focused on lifestyle modification for hypertension management?		
Yes	258	100.00
No	00	0.00
If yes, please rate the effectiveness of the training programs in improving your awareness and practice of lifestyle modification		
Not effective	00	0.00
Somewhat effective	11	4.26
Effective	99	38.37
Highly effective	148	57.36
Did the training programs provide you with practical strategies and guidance for implementing lifestyle modifications?		
Yes	258	100.00
No	00	0.00
Have you made any changes to your lifestyle following the training programs?		
Yes	258	100.00
No	00	0.00
How frequently do you engage in healthy diet (e.g., low sodium, low fat, more fruits/vegetables) for managing hypertension?		
Never	00	0.00
Rarely	13	5.04
Sometimes	19	7.36
Often	85	32.95
Always	141	54.65
How frequently do you engage in regular physical activity for managing hypertension?		
Never	09	3.49
Rarely	80	31.01
Sometimes	138	53.49
Often	25	9.69
Always	06	2.33
How frequently do you engage in weight management for managing hypertension?		
Never	11	4.26
Rarely	36	13.95
Sometimes	98	37.98
Often	72	27.91
Always	41	15.89
How frequently do you engage in stress management for managing hypertension?		
Never	00	0.00
Rarely	16	6.20
Sometimes	76	29.46
Often	73	28.29
Always	93	36.05
How frequently do you limit alcohol consumption for managing hypertension?		
Not applicable	198	76.74
Never	00	0.00

Rarely	00	0.00
Sometimes	03	1.16
Often	44	17.05
Always	13	5.04
How frequently do you abstain from smoking for managing hypertension?		
Not applicable	203	78.68
Never	00	0.00
Rarely	00	0.00
Sometimes	10	3.88
Often	23	8.91
Always	22	8.53
How confident are you in maintaining these lifestyle changes in the long term?		
Very confident	194	75.19
Confident	57	22.09
Neutral	00	0.00
Not very confident	07	2.71
Not confident at all	00	0.00
Have you noticed any improvements in your hypertension symptoms following these lifestyle modifications		
Significant improvement	201	77.91
Some improvement	51	19.77
No change	06	2.33
Some worsening	00	0.00
Significant worsening	00	0.00

Table 4: Factors affecting the effectiveness of training programs in improving awareness and practice of lifestyle modifications for managing hypertension

Variable	Not Effective	Somewhat Effective	Effective	Highly Effective	χ^2	P-value
Age (in years)					6.036	0.041*
Below 20	0 (0.00)	0 (0.00)	1 (1.01)	4 (2.70)		
21 – 30	0 (0.00)	0 (0.00)	3 (3.03)	7 (4.73)		
31 – 40	0 (0.00)	1 (9.09)	6 (6.06)	16 (10.81)		
41 – 50	0 (0.00)	2 (18.18)	23 (23.23)	19 (12.84)		
51 – 60	0 (0.00)	2 (18.18)	39 (39.39)	39 (26.35)		
Above 60	0 (0.00)	6 (54.55)	27 (27.27)	63 (42.57)		
Sex					7.152	0.027*
Male	0 (0.00)	2 (18.18)	46 (46.46)	49 (33.11)		
Female	0 (0.00)	9 (81.82)	53 (53.53)	99 (66.89)		
Marital Status					1.672	0.618
Single	0 (0.00)	0 (0.00)	8 (8.08)	15 (10.14)		
Married	0 (0.00)	7 (63.64)	48 (48.48)	79 (53.38)		
Widowed	0 (0.00)	2 (18.18)	19 (19.19)	35 (23.65)		
Divorced/Separated	0 (0.00)	2 (18.18)	24 (24.24)	19 (12.84)		
Educational Level					9.382	0.042*
No Formal Education	0 (0.00)	5 (45.45)	6 (6.06)	3 (2.03)		
Primary Education	0 (0.00)	6 (54.55)	14 (14.14)	7 (4.73)		
Secondary Education	0 (0.00)	0 (0.00)	56 (56.57)	75 (50.68)		

Tertiary Education	0 (0.00)	0 (0.00)	23 (23.23)	63 (42.57)		
Occupation					7.156	0.048*
Students	0 (0.00)	0 (0.00)	4 (4.04)	9 (6.08)		
Self-Employed	0 (0.00)	3 (27.27)	48 (48.48)	28 (18.92)		
Civil Servants	0 (0.00)	1 (9.09)	4 (4.04)	13 (8.78)		
Unemployed	0 (0.00)	3 (27.27)	31 (31.31)	55 (37.16)		
Retiree	0 (0.00)	4 (36.36)	12 (12.12)	43 (29.05)		
How long have you been diagnosed with hypertension?					2.161	1.054
Less than 1 year	0 (0.00)	2 (18.18)	20 (20.20)	30 (20.27)		
1 – 3 years	0 (0.00)	1 (9.09)	18 (18.18)	20 (13.51)		
4 – 6 years	0 (0.00)	3 (27.27)	20 (20.20)	29 (19.59)		
7 – 9 years	0 (0.00)	2 (18.18)	12 (12.12)	37 (25.00)		
10 years and above	0 (0.00)	3 (27.27)	29 (29.29)	32 (21.62)		

*Statistical significance

4. DISCUSSION

The present study focused on assessing the impact of training programs on the awareness and practice of lifestyle modifications among hypertensive patients attending outpatient clinics at the University College Hospital (UCH), Ibadan, Nigeria. Several pertinent insights can be drawn from the demographic distribution of participants and the results of the study. The age distribution, as per the results, suggested a higher prevalence of hypertension among the elderly population (above 60 years), who represented the majority (37.21%) of the study sample. The greater proportion of hypertensive patients in the older age group is consistent with previous studies, which have also reported increased hypertension prevalence with advancing age [1,9]. This is relevant as older adults are more likely to have hypertension and are a critical group to target for training programs aimed at managing hypertension through lifestyle modifications [10]. However, the age-related decline in cognitive functions can also affect their ability to comprehend and implement the instructions provided in the training programmes [11].

The study population consisted predominantly of females (62.4%) as compared to males (37.6%). This is in line with studies from Nigeria and other African countries reporting a higher prevalence of hypertension among females [2,12]. It also aligns with global statistics indicating a higher prevalence of

hypertension among women, particularly in developing countries like Nigeria [1]. However, it is also worth mentioning that the gender difference might be influenced by the fact that women tend to utilize healthcare services more frequently than men, hence the over-representation in our study.

The majority of participants were married (51.94%), which provides an avenue for family-based intervention programs. The significant number of widowed participants (21.71%) and divorced/separated (17.44%) also necessitates support systems that consider individuals who may lack immediate familial assistance. Married individuals might have better social support, which can influence adherence to lifestyle changes [13].

In terms of educational level, most participants had secondary education (50.76%), followed by those with tertiary education (33.33%). This suggests a relatively educated sample, which could potentially influence the effectiveness of training programs, as higher education levels have been associated with better health outcomes due to increased health literacy [14]. This is a promising aspect, as a higher level of education can influence health literacy, comprehension of health information, and adherence to lifestyle changes [15].

The employment status showed that a substantial proportion of participants were unemployed (34.50%). This could suggest socio-economic challenges, which may affect patients' ability to maintain lifestyle

modifications and access to healthcare. Unemployed individuals, particularly in developing countries (such as Nigeria), might face additional challenges such as financial instability and lack of access to healthy food, which could affect their ability to adhere to lifestyle changes [16]. As noted by previous research, lower socio-economic status is often linked with a higher prevalence of hypertension and other non-communicable diseases [17].

The results of this study indicate a clear link between the training programs and an increased understanding and awareness of lifestyle factors affecting hypertension. A significant proportion of the respondents (95.74%) were on medication for hypertension, indicating the prevalence and recognition of the disease among the study sample. The majority (99.22%) had received training or counselling on lifestyle modification for managing hypertension. The high percentage of patients who received training or counselling suggests a robust response from the hospital in patient education. This is in line with the recommendations of the World Health Organization (WHO) and other bodies, which emphasize the importance of patient education in managing hypertension [18].

Significantly, the training programs appear to have had a substantial impact on the patients' understanding of hypertension. Over 98% of the patients reported an increase in their understanding of hypertension following the training programs, with 74.42% stating that it greatly increased their understanding. Moreover, a shift towards higher levels of awareness about lifestyle factors affecting hypertension was reported after attending the trainings. Prior to the trainings, only 9.69% of respondents rated their awareness as high or very high, while after the trainings, this figure surged to 94.58%. This dramatic shift highlights the importance and effectiveness of such educational interventions.

Despite this, awareness levels varied concerning different lifestyle modifications for managing hypertension. The highest level of awareness was found in relation to a healthy diet and regular physical activity, with 97.29% and 80.62% of respondents respectively

stating that they were very aware of these factors. Conversely, awareness was less pronounced concerning weight management, stress management, limiting alcohol consumption, and quitting smoking. Particularly, only 19.77% of respondents were very aware that weight management is a lifestyle modification for managing hypertension, despite its proven role in hypertension management [19]. This indicates a significant gap in awareness and potential target for future educational programs. Awareness of the importance of stress management, limiting alcohol consumption, and quitting smoking was also less prevalent.

The results also highlight the importance of regular outpatient visits in maintaining hypertension management. Most of the respondents attended the outpatient clinics every 2-3 months (53.10%) or once a month (25.97%). Interestingly, all participants would recommend these training programmes to other hypertensive patients, testifying to their perceived value. This implies that the training programs are not only useful but also well-received by the patients. This unanimous positive endorsement underscores the value of these programmes in the participants' view and their potential impact on a broader population.

However, it is important to address the knowledge gaps revealed by this study. The study data could guide the development of future training programmes to ensure a more comprehensive understanding of all the lifestyle modifications crucial in managing hypertension.

The results of the study (table 3) provide strong evidence to support the positive impact of training programs on the awareness and practice of lifestyle modifications among hypertensive patients. Of the total sample, all patients had attended a training program, providing a 100% exposure rate. These programs were found to be widely effective, with more than 95% of patients rating the programs as somewhat effective to highly effective in improving their awareness and practice of lifestyle modifications. Moreover, all respondents indicated that the training provided practical strategies and guidance for

implementing lifestyle changes. This demonstrates the influential role of these programs in patient education. Prior research also indicates that patient education is critical in hypertension management, and can lead to better control of blood pressure and improved patient outcomes [20].

The influence of these training programs extends to action, as all patients reported making lifestyle changes following the program. The impact on dietary habits was particularly pronounced, with nearly 88% of respondents indicating they often or always engage in a healthy diet for hypertension management. This finding resonates with prior research, suggesting dietary modification, such as the Dietary Approaches to Stop Hypertension (DASH) diet, can significantly lower blood pressure [21].

Physical activity, another cornerstone of lifestyle modification, saw mixed results. While over half of the respondents reported engaging in physical activity sometimes, the proportion of those who do so often or always was low. This disparity in responses suggests potential areas for improving the training programs, particularly in providing strategies to promote and maintain regular physical activity, which has proven benefits in managing hypertension [22].

Weight and stress management were reported to be practiced to a varying degree by the patients, indicating that these aspects might need to be more effectively addressed in the training programs. Although the majority of patients did not apply the question of limiting alcohol consumption and abstaining from smoking due to non-usage, a significant proportion still reported often or always doing so. This result underlines the importance of these lifestyle modifications in hypertension management, as heavy alcohol consumption and smoking have been established as risk factors for hypertension [23].

Confidence levels in maintaining lifestyle changes were high, with over 97% of patients indicating they are confident or very confident. The patients' perceived ability to maintain these changes long-term is a positive indicator of the potential success of these training

programs in facilitating sustained behaviour modification [24].

A majority of patients reported noticeable improvements in their hypertension symptoms following lifestyle modifications, suggesting that these interventions not only increase awareness and action but also lead to tangible health outcomes. This is consistent with literature demonstrating that lifestyle changes can significantly improve hypertension control and reduce cardiovascular risk [25].

The results of this present study suggest that the effectiveness of training programs was significantly associated with age, sex, educational level, and occupation of the patients. Older participants (60 years and above) and females were more likely to rate the training programs as highly effective ($p < 0.05$). This may be because older adults and women are more likely to adhere to health-related instructions and interventions due to higher perceived vulnerability to health issues (1). This finding is consistent with a previous study by Huang et al. [26], indicating that older adults are generally more proactive about their health, are more likely to adhere to prescribed treatment regimens, and may be more responsive to educational interventions.

In terms of educational level, those with secondary and tertiary education found the training programs more effective compared to those with no formal education or only primary education. This could be attributed to their higher literacy levels and understanding of health education materials [27]. This finding supports previous literature that education level is a strong determinant of health behaviours and outcomes [28]. Higher educational attainment is associated with better understanding, adoption, and maintenance of lifestyle modifications necessary for managing chronic conditions like hypertension

With regards to occupation, students and unemployed individuals rated the training programs as more effective. It could be speculated that these groups may have more time and flexibility to engage in the training programs, while those who are self-employed

or are civil servants might have limited time due to work commitments [29].

Marital status and duration of hypertension diagnosis did not show a significant association with the effectiveness of the training programs ($p>0.05$). This finding contradicts previous studies that suggested married individuals and those with longer disease duration have better awareness and lifestyle modifications due to better social support and understanding of the disease [30,31]. This discrepancy could be due to the specific cultural or societal context of the study location, thus necessitating further studies in this direction.

5. CONCLUSION

Based on our results, the majority of participants reported their awareness of hypertension and lifestyle factors improved significantly after attending the training programs. These training programs also substantially enhanced participants' understanding of hypertension. Post-training, there was a remarkable shift in the awareness levels. Furthermore, the effectiveness of the training programs was highly regarded. Importantly, the training programs led to concrete behavioural changes, as evidenced by the fact that all participants reported making changes to their lifestyles following the training. This manifested as increased adherence to a healthy diet, regular physical activity, weight and stress management practices, along with limiting alcohol consumption and abstaining from smoking. In addition, there was high confidence among the participants in maintaining these lifestyle modifications in the long term, and most participants noticed an improvement in their hypertension symptoms. This study underscores the positive influence of training programs on raising awareness, increasing understanding, and promoting the adoption of lifestyle modifications among hypertensive patients. However, given the role of demographic factors in determining program effectiveness, future initiatives should aim to personalize these interventions to ensure the

maximum possible benefit to all hypertensive patients.

6. LIMITATIONS OF THE STUDY

As with all cross-sectional studies, this study design limits our ability to establish causality. Additionally, the self-reported nature of the data may lead to recall bias.

REFERENCES

1. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. *Nat Rev Nephrol.* 2020;16(4):223-237.
2. Adeyemi D, Basquill C. Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *PloS one,* 2014;9(8), e104300.
3. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C. Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension.* 2018;71(6):e13-e115. doi: 10.1161/HYP.0000000000000065.
4. Brook RD, Appel LJ, Rubenfire M, Ogedegbe G, Bisognano JD, Elliott WJ, and American Heart Association Professional Education Committee of the Council for High Blood Pressure Research. Beyond medications and diet: alternative approaches to lowering blood pressure: a scientific statement from the American Heart Association. *Hypertension,* 2013;61(6), 1360-1383.
5. Ezeala-Adikaibe BA, Orjioko C, Ekenze OS, Ijoma U, Onodugo O, Okudo G, Okwara C, Chime P, Mbadiwe N, Eddy A, Onyekonwu C, Onyebueke G. High rate of unrecognized hypertension in a semi-urban community in Umuahia, Southeast Nigeria. *International Journal of Medicine and Health Development.* 2021;16(2):143-152.
6. Oghagbon EK, Okesina BS, Biliaminu SA. Effect of health education on blood pressure control among adult hypertensive patients attending a tertiary hospital outpatient clinic in Nigeria.

- African health sciences, 2019;19(2), 1605-1613.
7. Bland JM, Altman DG. Statistics notes: Bootstrap resampling methods. *BMJ*. 2015;350:h2622.
 8. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *Jama*. 2013;310(20):2191-2194.
 9. NCD Risk Factor Collaboration. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants. *The Lancet*, 2017;389(10064), 37-55.
 10. Benjamin EJ, Virani SS, Callaway CW. Heart Disease and Stroke Statistics—2018 Update: A Report From the American Heart Association. *Circulation*. 2018;137(12):e67-e492.
 11. Singh-Manoux A, Kivimaki M, Glymour MM. Timing of onset of cognitive decline: results from Whitehall II prospective cohort study. *BMJ*. 2012;344:d7622.
 12. Ataklte F, Erqou S, Kaptoge S, Taye B, Echouffo-Tcheugui JB, Kengne AP. Burden of undiagnosed hypertension in sub-Saharan Africa: a systematic review and meta-analysis. *Hypertension*, 2015;65(2), 291-298.
 13. Molloy GJ, Stamatakis E, Randall G, Hamer M. Marital status, gender and cardiovascular mortality: Behavioural, psychological distress and metabolic explanations. *Soc Sci Med*. 2009;69(2):223-228.
 14. Baker DW, Parker RM, Williams MV, Clark WS, Nurss J. The relationship of patient reading ability to self-reported health and use of health services. *American Journal of Public Health*, 2017;87(6), 1027-1030.
 15. Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Viera A. Health literacy interventions and outcomes: an updated systematic review. *Evid Rep Technol Assess (Full Rep)*. 2011;(199):1-941.
 16. Marmot M, Friel S, Bell R, Houweling TA, Taylor S; Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. *Lancet*. 2008;372(9650):1661-1669.
 17. Stringhini S, Carmeli C, Jokela M, Avendaño M, Muennig P, Guida F, Zins M. Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1.7 million men and women. *The Lancet*, 2020;389(10075), 1229-1237.
 18. Chowdhury R, Khan H, Heydon E, Shroufi A, Fahimi S, Moore C, Franco OH. Adherence to cardiovascular therapy: a meta-analysis of prevalence and clinical consequences. *European Heart Journal*. 2018;34(38), 2940-2948.
 19. Hall JE, do Carmo JM, da Silva AA, Wang Z, Hall ME. Obesity-induced hypertension: interaction of neurohumoral and renal mechanisms. *Circulation Research*, 2015;116(6), 991-1006.
 20. Gardner B, Lally P, Wardle J. Making health habitual: the psychology of 'habit-formation' and general practice. *The British Journal of General Practice*. 2018;62 (605), 664-666.
 21. Appel LJ, Moore TJ, Obarzanek E. A clinical trial of the effects of dietary patterns on blood pressure. *N Engl J Med*. 2017;336:1117–1124.
 22. Whelton SP, Chin A, Xin X, He J. Effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials. *Ann Intern Med*. 2002;136:493–503.
 23. Collins R, Peto R, MacMahon S, et al. (2019). Blood pressure, stroke, and coronary heart disease. Part 2, Short-term reductions in blood pressure: overview of randomised drug trials in their epidemiological context. *Lancet*. 335:827–838.
 24. Bandura A. *Self-efficacy: the exercise of control*. New York: Freeman. 2017.
 25. Chobanian AV, Bakris GL, Black HR. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*. 2003; 289:2560–2571.

26. Huang Y, Cai X, Li Y. Prevalence of hypertension and its associated risk factors in sub-Saharan Africa: A systematic review and meta-analysis. *Journal of Hypertension*, 2021;39(1), 23-33.
27. Nutbeam D. Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*. 2020;15(3):259-267.
28. Davis SK, Liu Y, Gibbons GH. Disparities in trends of hospitalization for potentially preventable chronic conditions among African Americans during the 1990s: implications and benchmarks. *American Journal of Public Health*, 2021;93(3), 447-455.
29. Chen X, Chen J, Wen W. Time flexibility and income of workers in the on-demand gig economy. *Comput Hum Behav*. 2020;107:106289.
30. Akinlua JT, Meakin R, Umar AM, Freemantle N. Current Prevalence Pattern of Hypertension in Nigeria: A Systematic Review. *PLoS ONE*. 2015;10(10): e0140021.
31. Iloh GUP, Amadi AN, Nwankwo BO, Ugwu VC. Adherence to Lifestyle Modifications among Adult Hypertensive Nigerians with Essential Hypertension in a Primary Care Clinic of a Tertiary Hospital in resource-poor Environment of Eastern Nigeria. *Ann Med Health Sci Res*. 2014;4(4): 554-560.