

## HYPERTENSION AWARENESS AND KNOWLEDGE: A HEALTH EDUCATION HYPERTENSION INTERVENTION STUDY OF ADULTS IN MBAITOLI LGA IMO STATE NIGERIA

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### ABSTRACT

One of the most prevalent non-communicable disorders that affect public health worldwide is hypertension. In developing countries, the prevalence of sickness is increasing, particularly in several sub-Saharan African nations where the pace of increase in non-communicable diseases is almost at the point of overtaking that of communicable diseases. The goal of the current study was to find out how health education interventions affected the prevalence of undiagnosed hypertension in people in Mbaitoli LGA, Imo State, Nigeria. The control group and the intervention were both included in the study's two-arm design. Six communities were chosen at random from the LGA and divided into three communities each for the control and intervention groups. The World Health Organization's paradigm for noncommunicable illnesses called for the intervention group to receive counseling, an educational intervention, and hypertension control. This includes three-hour didactic lecture sessions that are followed by engaging group exercises and activities. The sessions, which took place six times a week for six months, were led by doctors and nurses. Raising awareness of undetected hypertension and teaching people how to adopt a healthy lifestyle that can lower the prevalence of undiagnosed hypertension were the goals. The control group just received a brief, thirty-minute health presentation about hypertension. Both groups underwent baseline and post-intervention evaluations, and descriptive and inferential methods, such as logistic regression, chi-square testing, and the t-test, were used to analyze the data.

The result shows that hypertension rate only reduces slightly in the control group but recorded significantly reduction in the intervention group (35.9% to 27.9%,  $P=0.04$ ). the mean SBP was not significant at the control group (Baseline:  $143.2 \pm 9.8$ , post-intervention:  $142.7 \pm 9.5$ ) but reduced significantly ( $P < 0.0001$ ) for the intervention group (Baseline:  $141.5 \pm 11.8$ ; post-intervention:  $132.7 \pm 8.9$ ). There was a significant rise in mean knowledge at for the intervention group (Baseline:  $5.21 \pm 1.86$ ; post-intervention:  $7.93 \pm 2.72$ ;  $P < 0.0001$ ). The study is a clear indication that many adults are vulnerable to the burdens of undiagnosed hypertension and an organized health educational intervention programmes on undiagnosed hypertension targeting knowledge improvement to minimize the burden of hypertension in the society.

**KEYWORDS:** Hypertension, Awareness, Knowledge, Mbaitolu.

### INTRODUCTION

One of the most prevalent non-communicable diseases of public health concern worldwide is hypertension, which is linked to an increased risk of cardiovascular morbidity and mortality due to environmental, economic, and genetic factors.<sup>[1]</sup> Around the world, hypertension is a major cause of premature death in adults, with up to two-thirds of those affected living in low- and middle-income countries. It has been deemed one of the biggest health issues for low- and middle-income countries and continues to play a

significant role in the development of numerous chronic diseases, such as diabetes and renal failures. In certain high-income countries, hypertension is a problem among adults, as well. For example, it has been estimated that nearly half of adult Americans suffer from it. Hypertension has been ranked very high by the Global burden of illness study as the major cause of lost years of quality of life. It is responsible for the global annual mortality of up to 10.7 million and its global disease loads amounts of 20.9%.<sup>[2]</sup>

The blood pressure in the arteries will be higher when hypertension or high blood pressure occurs, which means the heart has to work more than usual to pump blood through the blood vessels. Blood pressure appeared to follow a circadian rhythm, peaking in the morning shortly after waking and arising, according to other research that examined the factors causing blood pressure changes in humans throughout the day.<sup>[3]</sup>

The risky thing about hypertension is that it can develop gradually without anyone noticing, even if the patient has not been diagnosed. Many people may not even be aware that they have hypertension as it develops into complications because it can start as an asymptomatic condition. This asymptomatic feature of hypertension makes it a serious disease of considerable health issues since many people with the condition may not be initially aware that they have the disease and also may not seek medical help. As a result, a large number of people worldwide suffer from undetected hypertension.<sup>[4]</sup>

According to disability-adjusted life years, hypertension is the disease with the highest worldwide burden, whether it is diagnosed or not.<sup>[5]</sup> It is an age linked disease that affects up to two third of the elderly and also among individuals who are living sedentary lifestyle without participating on some physical exercise to lower the risk of the disease.<sup>[6]</sup>

Adult hypertension has a significant detrimental effect on people's quality of life and the economy.<sup>[7]</sup> People who have high blood pressure are more prone to cognitive and neurological problems. Particularly in many sub-Saharan African countries, where the rate of increase in non-communicable diseases is almost to the point of overtaking that of communicable diseases, the burden of disease is increasing in developing countries. More than 20 million individuals in sub-Saharan Africa suffer with hypertension, which continues to be a major cause of hospitalization and death. The estimated prevalence of hypertension in Africa is 60.8% (59.8–61.8) in females and 41.8% (40.8–42.8) in males.<sup>[8]</sup>

The financial burden of hypertension on health systems is substantial. High blood pressure accounted for almost 10% of worldwide health spending in 2001. In low- and middle-income countries (LMICs), where a higher prevalence of diseases is observed, the cost burden has been quite substantial. According to a recent study, while BP has increased in LMICs over the past 40 years, it has reduced in high-income nations.<sup>[9]</sup>

Regretfully, up to 46% of hypertensive individuals worldwide do not yet have a diagnosis. There have been reports linking undetected hypertension to factors like gender, physical activity, tobacco use, and being overweight. Undiagnosed hypertension has also been linked to a lack of awareness.<sup>[10]</sup> According to a report, the prevalence of untreated hypertension in seven Latin American cities ranges from 24.0% to 47.0%. Whereas the

reported percentage of untreated hypertension in the United States ranged from 3.3% to 8.3%.<sup>[11]</sup>

Undiagnosed hypertension rates range from 50.4% to 59.9% in the majority of Asian and African nations. The worldwide burden of diseases has increased due to the prevalence of untreated hypertension. It was anticipated to have increased from 4.5% to 7% between 2000 and 2010 alone, and by 2025, it was expected to reach 1.6 billion persons.<sup>[12]</sup> According to projections, the sub-Saharan African region's burden of cardiovascular illnesses caused by untreated hypertension is expected to treble by 2030. It has also been stated in a meta-analysis research that a number folks within the sub-Saharan Africa region have undiagnosed, untreated, or inadequately treated hypertension, leading to the increase in cardiovascular disease burden in the region.<sup>[13]</sup>

The rising number of older adults in the population and the rise in unhealthy lifestyle choices in the majority of African and other developing countries have been linked to the disease's rising prevalence and associated consequences in the sub-Saharan region.<sup>[14]</sup>

Most of the time, people mistakenly attribute some avoidable deaths and disease loads that can be linked to complications from undetected hypertension to other factors, like witchcraft. This leads to an increase in the prevalence of the condition and an increase in the cost of managing and treating it.<sup>[15]</sup>

It is anticipated that this study will fill the knowledge gap regarding the prevalence and risk factors of undiagnosed hypertension in Mbaitoli Local Government Area, Nigeria, and, more importantly, highlight ways to address the disease's increasing rate. Despite all the gaps in knowledge and inadequate preventive practices that contribute to the burden of undiagnosed hypertension at the population level, studies have not yet been well articulated to enable it to receive the proper considerations that it deserves.

## MATERIALS AND METHODS

### Area of Study

This study was performed in Mbaitoli Local Government Area (LGA) in Imo State Nigeria. Mbaitoli LGA was created in 1976 and has its headquarters at Nwaorieubi.

### Study Design

The study was as a community based interventional participatory research initiative study involving adults in Mbaitoli Local Government Area. It was a designed as a 6-month experimental study involving pre-intervention (baseline) to post-intervention assessment on knowledge and lifestyle adjustment for preventive practices intervention targeting hypertension risk factors. Measurements were taken at baseline, and later after at least 6 months after the intervention has been deployed.

### Population of Study

The study population comprised of adult males and females in Mbaitoli LGA Imo State. The adult in the LGA is about 29567 which are made up of adult males and females residing within the LGA.

### Sample Size And Sampling Method

#### Sample size

The study sample size (n) was calculated using Cochran method which is an appropriate sample size technique for a study of this nature (Cochran, 1963). The formula is given as follows;

$$n = \frac{Z^2 \times p(1-p)}{e^2}$$

n = required sample size

Z = standard normal at confidence level at 95%

p = known prevalence of hypertension

e = margin of error at

A meta analysis study (Ogah, *et al*; 2012), gave the pooled prevalence of hypertension in Nigeria as 22.5%. 50% for undiagnosed hypertension. Going by this prevalence, it can be suggested that a sample size of 268 participants would be appropriate for a study of this kind (see sample size calculation below).

Z = confidence level at 95% (standard value Z = 1.96 from table)

p = known prevalence of hypertension (at 11.2% = 0.112)

e = margin of error at 5% (standard value of 0.05)

$$\text{Formula, } n = \frac{Z^2 \times p(1-p)}{e^2}$$

$$n = \frac{1.96^2 \times 0.226 (1-0.226)}{0.05^2}, n = \frac{3.8416 \times 0.174375}{0.0025}$$

$$n = \frac{0.669878}{0.0025}$$

n = 267.95 (or 268, by approximation)

Thus to allow for 10% attrition gives a sample size of not less than 290 participants was obtained. This study therefore used a total sample size of 290 participants deemed adequate enough to power the study.

### Sampling method

Random sampling technique was used in this study. The LGA of study was divided into nine autonomous communities that make up the LGA and five of the autonomous communities were randomly selected which represents more than 50% of the number of the communities that make up the LGA. The selected communities include Ifakala, Mbieri, Ubomiri, Umunoha, Orodoo, and Ogwa.

At each study community, systematic sampling technique was applied to obtain the required sample size. The adults in the community were invited in a town hall meeting center through their community heads. The participants were required to enter their names in a book register upon arrival. The register was used to establish the required sampling number in the systematic sampling. Then the number of people that attended was used to divide the required sample size in each community to obtain the selection interval used in selecting those that participated in the study.

Sampling and assessment were performed two times in the selected communities comprising of baseline sampling and assessment and the post intervention sampling and assessments.

### Instruments for Data Collection

The blood pressure levels of respondents were examined using an electronic sphygmomanometer. A standard weight scale (in kilograms) was used for weight measures and a meter stand use for height measurement.

One type of questionnaire booklet was designed and administered to respondents as well as oral interviews to non literate respondents. The questionnaire was divided into sections A to D.

Section A part of the questionnaire contained the biodata of respondents such as age, gender, marital status, educational qualification. This section contained four (4) open and closed ended questions.

On Section C, the various biological and lifestyle factors of hypertension were assessed from respondents. They include; family history, level of salt consumption, physical activity, smoking, dietary pattern, level of alcohol consumption, use of oral contraceptive.

Section B was used to investigate the knowledge about hypertension, while section D what on the lifestyle preventive practices about the disease. The information contained in both sections were assessed at both at pre and post intervention study period to establish the effects of the study intervention on awareness and perception about the disease

### Validation of Instruments

The questionnaire instrument was validated through face validity. The questionnaire was carefully constructed to meet the requirements of the study and was approved by the study supervisor. The instruments used for measurements in this study were up to the standard recommended by health professionals. For instance, Sphygmomanometer was used to assess the measurement of blood pressure, while weight scale and tape were respectively used for weight and height. These instruments were not validated since they are already

certified instruments and have been in use for a long period of time.

To assess the knowledge and of hypertension, lifestyle modification and control practices, the study adopted a modified structured questionnaire from World Health Organization (WHO), on Hypertension Knowledge-Level Scale (HK-LS). Questions on knowledge of hypertension were modified and adapted from the validated questionnaires. For this study, a mean knowledge score of at least half the maximum obtainable scores for hypertension; 6.0 was considered to indicate adequate knowledge while a score less than that was considered to indicate poor knowledge.

Physical activity was assessed using the Short International Physical Activity Questionnaire Form (IPAQ-SF). Based on the IPAQ-SF, respondents were required to indicate frequency and duration of walking, moderate intensity, vigorous-intensity and sitting activity performed for at least 10 min duration per session in the last seven consecutive day period. The questions were asked for during the pre- and post-intervention phases. The use of the IPAQ-SF was justified considering that it has been successfully validated in a Nigerian study, Having less than 150 min of moderate-intensity physical activity per week, less than 75 min of vigorous-intensity physical activity per week, or a combination of both was used to identify physical inactivity as recommended in the World health organization 2020 guidelines on physical activity.

#### Reliability of Instrument

The HK-LS study tool is a global standardized tool which was designed and reported by Sultan *et al.* in 2012. It was not checked for reliability since its reliability and content validity of the scale were obtained as 0.82 and 60.3% respectively. Other contents of the questionnaire instrument was tested for reliability which was performed through pilot testing.

An initial sample of only 25 randomly selected participants was obtained from the LGA but from the communities that were not included in the study. The questionnaire was administered to the selected sample and the process was repeated after 5 days. The two results obtained were scaled and tested for reliability using Cronbach alpha, a reliable coefficient of 0.84 was obtained. Instrument used for diagnosis of blood pressure as well as instruments for measurement of weight and height were not assessed for reliability. This is because, the instruments have earlier been in use and certified reliable.

#### Ethical Considerations/ Informed Consent

The ethical approval of this study was obtained from the school of Health Ethical Committee, Imo State University, Owerri, Nigeria. This study has the approval of the department of public health, Imo state University Owerri. Also, an approval was obtained from the Mbaitoli LGA authorities. An oral informed consent was also obtained

from the participants before they were allowed to participate in the study.

#### Data Collection

Data collection was performed by the study researcher assisted by trained research assistants. The first step was the assessment of eligibility, followed by actual data collection. For eligible participants, the study aim was explained to them, followed by verbal request to be part of the study. The study data collection was performed at two different periods of three months gap each. The first period was for baseline data collection performed at pre-intervention study stage, while the second period was on post intervention data collection.

The participants were randomly sampled at baseline and their status for undiagnosed hypertension were assessed followed by data collection for other information. After the intervention sessions which lasted the three months, a post intervention assessment was conducted for undiagnosed hypertension and on the participants and further data collection relating to awareness, perception, control practices of hypertension were repeated in the study group to establish the effect of intervention in the study area. Same participants were used at post intervention but those that were lost to follow up were replaced with data of similar characteristics obtained from the same study population. Data collection within each period takes up to a month to be completed.

In terms of steps followed in data collection, data were obtained in a questionnaire, followed by clinical measurements and anthropometric measurements. It was collected only on eligible participants that approved their consent to be part of the study.

#### Data Collection through Questionnaire

The questionnaire was administered to respondents after an informed consent was obtained. The literate respondents were allowed to fill the questionnaire themselves but the non-literate respondents were assisted by translating the questions in their local language and their responses were filled. Each questionnaire takes about 5 minutes to be completed. Sociodemographic information as well as information on awareness, and lifestyle correlates of hypertension was obtained from the questionnaire.

#### Statistical analysis

Statistical data analysis was performed using Microsoft Office Excel 2010 and IBM Data obtained were coded and analyzed using the Statistical Package for Social Science (SPSS) software version 27 (IBM corp. released 2012. IBM SPSS statistics for windows, version 27 Armonk, NY: IBM Corp). All tests were performed at 5% level of significance. In all, probability value (p) was used to interpret whether the factors are significant or not; hence  $p < 0.05$  were considered significant.

## RESULTS

### Prevalence of Undiagnosed HBP among control Group and Intervention groups

Figure 1 is a compound bar pie chart which clearly showed the estimated prevalence of hypertension among adults in Mbaitoli LGA at baseline and post intervention stages of the study. Figure 4.2 which represents the estimated prevalence among the control group shows that among the total of 290 participants assessed at baseline, a total of 114 (39.3%) were found to be hypertensive while the remaining 176 (60.6%) do not have hypertension in the baseline data for the study area.

On the other hand, the figure also shows that the hypertensive rate reduced slightly during post intervention assessment. A total of 108 (37.2%) were found hypertensive (Non-hypertensive = 182 or 62.8%). It therefore implies that the prevalence rate for hypertension only reduced slightly (by 2.1%) from baseline (pre-intervention) to post-intervention (39.3% to 37.2% respectively). The change in hypertension was not found statistically significant in the control group ( $P = 0.608$ ,  $\chi^2 = 0.263$ ).

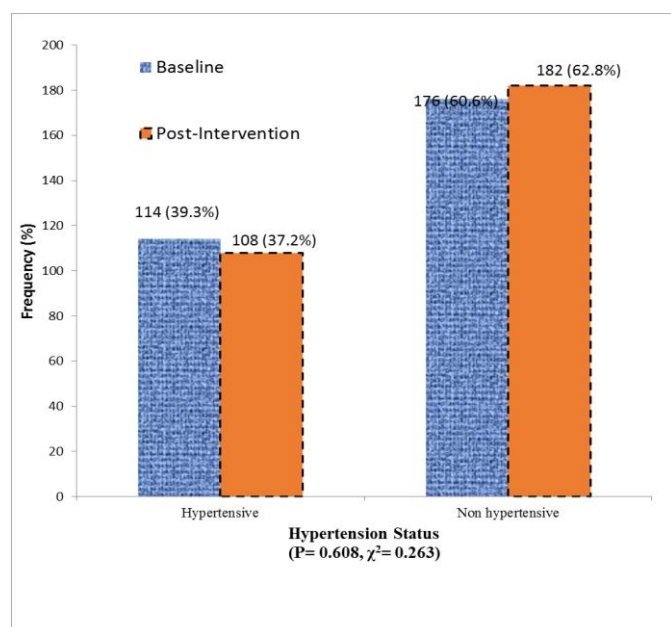


**Figure 1: Prevalence of undiagnosed HBP among adults in Mbaitoli (control group).**

### Prevalence of Undiagnosed HBP among Intervention groups

The intervention group which is represented with figure 4.3 which shows that, out of the total number of 290 study participant used in the study, 186 (64.1%) were found to be non-hypertensive while 104 (35.9) were found to be hypertensive at baseline. During post intervention, a total of 81 (27.9%) person were found hypertensive and 209 (72.1%) were non-hypertensive (normative). It therefore implies that prevalence of undiagnosed hypertension among adults in the study area which was found to be 35.9% at pre-intervention (baseline), but reduced to

27.9% at post intervention indicating a difference of 8.0% reduction in hypertension rate achieved a result of the study intervention, which is more than 2.1% reduction difference found in the control group. Unlike the case of the control group, the change in hypertension at intervention group from baseline to post-intervention was found to be significant at 5% level of significant ( $P = 0.042$ ,  $\chi^2 = 4.20$ ).

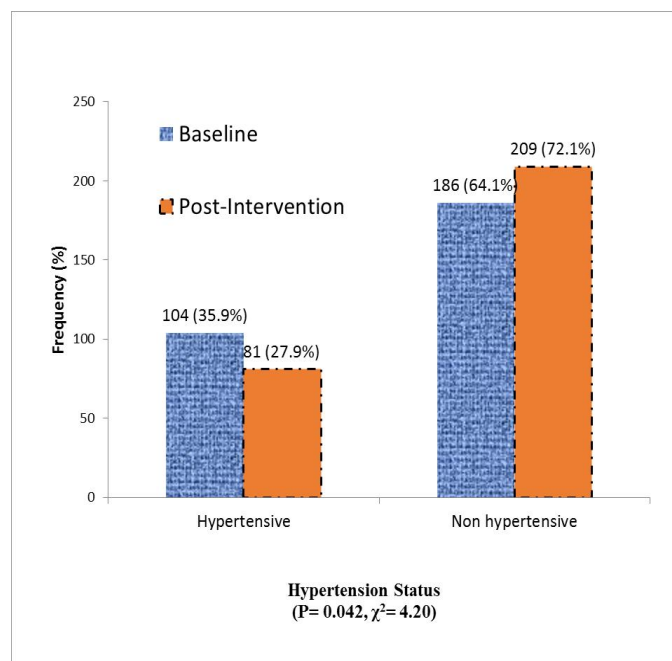


**Figure 2: Prevalence of undiagnosed HBP among adults in Mbaitoli (Intervention Group).**

### Hypertension Awareness and knowledge

Table 1 represents the distribution for awareness of hypertension among the study group. All the participants in both the control group and the intervention group responded positively (100%) that they have heard of hypertension. It means that hypertension is a household name in the area, indicating that many are likely to be faced with the burden of the disease in the study area.

Among those who showed awareness that hypertension can grow undiagnosed and unnoticed were 194 (66.9%) in the control group and 188 (64.8%) in the intervention group.

On source of awareness there seems to be large responses on several sources of information in both groups of study.

**Table 2: Distribution for awareness of hypertension among the study group.**

| Awareness                                                         | Control     | Intervention Group |
|-------------------------------------------------------------------|-------------|--------------------|
| <b>Heard of Hypertension</b>                                      |             |                    |
| Yes                                                               | 290 (100%)  | 290 (100%)         |
| No                                                                | 0 (0.0%)    | 0 (0.0%)           |
| Total                                                             | 290         | 290                |
| <b>Aware that Hypertension can grow undiagnosed and unnoticed</b> |             |                    |
| Yes                                                               | 194 (66.9%) | 188 (64.8%)        |
| No                                                                | 96 (33.1%)  | 102 (35.2%)        |
| Total                                                             | 290         | 290                |

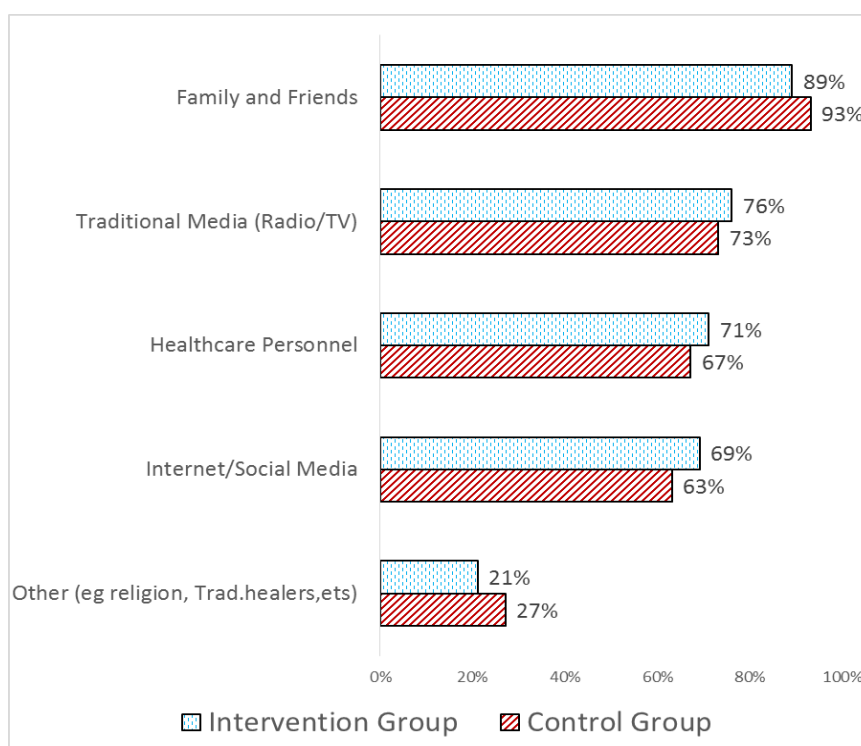
**Figure 3: Distribution for Source of Awareness about hypertension among the study group (Multiple responses were considered).**

Table 3. is the distribution for knowledge of hypertension on definition, causes or risk factors of the disease, symptoms, complications and prevention techniques. Those that showed knowledge of the definition of hypertension from baseline to post-intervention (pretest to posttest) were 67.9% to 72.8% at the control group. There was also an observable increase in knowledge in the control group from pretest to posttest. The knowledge increased at posttest for the control group in most of the items: High diastolic or systolic blood pressure indicates increased blood pressure (67.9% to 72.8%), cause and risk factors of HBP (Age: 60.3% to 75.9%; stress: 69.7% to 79.3%; smoking: 41.0% to 51.0%, etc).

Also increase in knowledge was observed in some of the symptoms at posttest such as in headache (83.1% to 93.1%) and Lack of symptoms (39.3% to 53.1%). Knowledge about complications of HBP increased in all the

mentioned complications at posttest except in stroke that remained the same. The assessment on HBP preventive knowledge recorded improvements at posttest for reduction in salt intake, reduction of fatty foods intake, exercise, smoking and avoidance of excessive alcohol intake.

Knowledge seems to have increased from pretest to posttest for the control group in some of the aspects of knowledge assessed in the study. While some increased reasonably, others recorded slow increase. However, since the study intervention was not introduced to this group of people, it may mean that certain increase in knowledge about undiagnosed hypertension observed may have been triggered by the assessment at baseline. It is possible that some who were assessed at baseline went further to search for some knowledge about the disease on their own.

**Table 3: Distribution for knowledge of hypertension in the study area at Pretest and Posttest for control group.**

| Knowledge                                                                            | Control Group |      |          |      |
|--------------------------------------------------------------------------------------|---------------|------|----------|------|
|                                                                                      | Baseline      | %    | Posttest | %    |
| <b>High diastolic or systolic blood pressure indicates increased blood pressure.</b> |               |      |          |      |
| TRUE                                                                                 | 197           | 67.9 | 211      | 72.8 |
| FALSE                                                                                | 24            | 8.3  | 21       | 7.2  |
| Don't know                                                                           | 69            | 23.8 | 58       | 20.0 |
| <b>Knowledge of the causes /Risk Factors of HBP</b>                                  |               |      |          |      |
| old age                                                                              | 175           | 60.3 | 220      | 75.9 |
| Stress                                                                               | 202           | 69.7 | 230      | 79.3 |
| drug abuse                                                                           | 214           | 73.8 | 214      | 73.8 |
| Hereditary                                                                           | 120           | 41.4 | 129      | 44.5 |
| Smoking                                                                              | 119           | 41.0 | 148      | 51.0 |
| Obesity                                                                              | 134           | 46.2 | 166      | 57.2 |
| Excessive alcohol intake                                                             | 131           | 45.2 | 153      | 52.8 |
| don't know                                                                           | 77            | 26.6 | 61       | 21.0 |
| <b>Knowledge of Symptoms of HBP</b>                                                  |               |      |          |      |
| Headache                                                                             | 241           | 83.1 | 270      | 93.1 |
| Dizziness                                                                            | 230           | 79.3 | 230      | 79.3 |
| Lack of symptoms                                                                     | 114           | 39.3 | 154      | 53.1 |
| Poor vision                                                                          | 157           | 54.1 | 129      | 44.5 |
| <b>Knowledge of Complications of HBP</b>                                             |               |      |          |      |
| Stroke                                                                               | 219           | 75.5 | 219      | 75.5 |
| Heart failure                                                                        | 167           | 57.6 | 221      | 76.2 |
| Loss of sight                                                                        | 118           | 40.7 | 218      | 75.2 |
| Kidney Failure                                                                       | 186           | 64.1 | 216      | 74.5 |
| Death                                                                                | 109           | 37.6 | 232      | 80.0 |
| <b>HBP PREVENTION Knowledge</b>                                                      |               |      |          |      |
| Reduction in salt intake                                                             | 225           | 77.6 | 245      | 84.5 |
| Reducing intake of fatty foods                                                       | 133           | 45.9 | 142      | 49.0 |
| Avoiding excessive intake of alcohol                                                 | 102           | 35.2 | 132      | 45.5 |
| Avoiding smoking                                                                     | 96            | 33.1 | 155      | 53.4 |
| Regular exercise                                                                     | 126           | 43.4 | 146      | 50.3 |
| Taking antihypertensive (drugs)                                                      | 196           | 67.6 | 218      | 75.2 |
| Avoiding anxiety                                                                     | 135           | 46.6 | 154      | 53.1 |

Table 4 is the distribution for knowledge of hypertension on definition, causes or risk factors of the disease, symptoms, complications and prevention techniques at pretest and posttest for the study intervention group. Those that showed knowledge of the definition of hypertension from baseline to posttest were 64.8% to 83.1%. It was noticed that the proportion that do not know the causes of hypertension got reduced at posttest as well as the change in knowledge on risk factors of the disease. For instance, the responses for old age as a risk factor of HBP recorded a difference of 26.2% (66.9% to 93.1%) at post intervention which is higher than 15.6% (60.3% to 75.9%) found in the control group. The largest increase among the intervention group was on hereditary which increased from 45.2% to 98.3% during post intervention.

The knowledge of the symptoms of hypertension recorded high response on Headache and dizziness in both the baseline and post intervention assessments. The knowledge for lack of obvious symptom increased tremendously for the intervention group from 45.5% at baseline to 92.1% at post-intervention. Also poor vision increased at the intervention group from 50% at baseline to 94.8% at post intervention.

The responses for the knowledge of complications of hypertension, showed high improvement in knowledge at posttest on loss of sight (75.2% to 93.8%). Also, high increase in knowledge was found from baseline to post intervention on the intervention group for death (39.3% to 93.4%) and heart failure (56.2% to 92.8%) complications.

Concerning the knowledge of preventive techniques on hypertension, increase in Knowledge was recorded in terms of salt intake and taking antihypertensive drugs. those who identified avoiding smoking increased from 36.2% 74.8% (baseline to post intervention) but knowledge of reduction on fatty foods showed slight increase (42.4% to 56.9%).

Clearly improvements in knowledge were found at posttest. In comparison to the improvement found in the control group, statistical test is expected to show whether changes in knowledge between both groups at pre and posttest are significant.

**Table 4: Distribution for knowledge of hypertension in the study area at Pretest and Posttest for Intervention Group.**

| Knowledge                                                                            | Intervention Group |      |          |      |
|--------------------------------------------------------------------------------------|--------------------|------|----------|------|
|                                                                                      | Baseline           | %    | Posttest | %    |
| <b>High diastolic or systolic blood pressure indicates increased blood pressure.</b> |                    |      |          |      |
| TRUE                                                                                 | 188                | 64.8 | 241      | 83.1 |
| FALSE                                                                                | 36                 | 12.4 | 26       | 9.0  |
| Don't know                                                                           | 66                 | 22.8 | 23       | 7.9  |
| <b>Knowledge of the causes /Risk Factors of HBP</b>                                  |                    |      |          |      |
| old age                                                                              | 194                | 66.9 | 270      | 93.1 |
| Stress                                                                               | 212                | 73.1 | 279      | 96.2 |
| drug abuse                                                                           | 190                | 65.5 | 269      | 92.8 |
| Heredity                                                                             | 131                | 45.2 | 285      | 98.3 |
| Smoking                                                                              | 102                | 35.2 | 265      | 91.4 |
| Obesity                                                                              | 131                | 45.2 | 283      | 97.6 |
| Excessive alcohol intake                                                             | 126                | 43.4 | 271      | 93.4 |
| don't know                                                                           | 84                 | 29.0 | 41       | 14.1 |
| <b>Knowledge of Symptoms of HBP</b>                                                  |                    |      |          |      |
| Headache                                                                             | 233                | 80.3 | 287      | 99.0 |
| Dizziness                                                                            | 230                | 79.3 | 278      | 95.9 |
| Lack of symptoms                                                                     | 132                | 45.5 | 267      | 92.1 |
| Poor vision                                                                          | 145                | 50.0 | 275      | 94.8 |
| <b>Knowledge of Complications of HBP</b>                                             |                    |      |          |      |
| Stroke                                                                               | 219                | 75.5 | 278      | 95.9 |
| Heart failure                                                                        | 163                | 56.2 | 269      | 92.8 |
| Loss of sight                                                                        | 218                | 75.2 | 272      | 93.8 |
| Kidney Failure                                                                       | 175                | 60.3 | 264      | 91.0 |
| Death                                                                                | 114                | 39.3 | 271      | 93.4 |
| <b>HBP PREVENTION Knowledge</b>                                                      |                    |      |          |      |
| Reduction in salt intake                                                             | 235                | 81.0 | 275      | 94.8 |
| Reducing intake of fatty foods                                                       | 123                | 42.4 | 165      | 56.9 |
| Avoiding excessive intake of alcohol                                                 | 117                | 40.3 | 194      | 66.9 |
| Avoiding smoking                                                                     | 105                | 36.2 | 217      | 74.8 |
| Regular exercise                                                                     | 118                | 40.7 | 204      | 70.3 |
| Taking antihypertensive (drugs)                                                      | 177                | 61.0 | 238      | 82.1 |
| Avoiding anxiety                                                                     | 117                | 40.3 | 197      | 67.9 |

The effect of the study intervention on knowledge about hypertension in the study area is represented with table 5. The table shows that all the knowledge factors were found significant at both the control group and the intervention group except on the meaning of hypertension, where the control group could not show any difference in mean

between baseline data and the post intervention data ( $P=0.5869$ ,  $t=0.544$ ). The baseline and the post intervention data differ significantly ( $P=0.034$ ,  $t=2.123$ ) with a difference mean of 0.8.

The overall summary of the results indicates that knowledge was gained in both the control group and the intervention group. However, while the knowledge score of only 0.85 was gained in the control group, a higher knowledge score of 2.72 was gained in the intervention group.

On the knowledge of the causes and risk factors of hypertension, the mean difference gained in knowledge was 3.5 between baseline and intervention compared to 0.6 score in the control group. Similar significant mean difference were obtained in other knowledge items such as knowledge of symptoms of hypertension (mean difference = 3.1), knowledge of complications of hypertension (mean difference= 3.2) and the knowledge of prevention strategies for hypertension (mean difference= 2.4).

**Table 5: Effects of Study Intervention on Knowledge about Hypertension.**

| Knowledge                                | Baseline<br>Mean ± St. dev | Post-<br>Intervention<br>Mean ± St. dev. | Mean<br>Difference | T      | P value |
|------------------------------------------|----------------------------|------------------------------------------|--------------------|--------|---------|
| <b>Meaning of HBP</b>                    |                            |                                          |                    |        |         |
| Control Group                            | ± 4.22                     | 4.0 ± 4.63                               | 0.2                | 0.544  | 0.5869  |
| Intervention Group                       | 3.9 ± 3.71                 | 4.6 ± 5.24                               | 0.8                | 2.123  | 0.034   |
| <b>knowledge of Causes/ Risk Factors</b> |                            |                                          |                    |        |         |
| Control Group                            | 5.1 ± 1.60                 | 5.7 ± 1.94                               | 0.6                | 4.063  | 0.001   |
| Intervention Group                       | 5.0 ± 1.61                 | 8.5 ± 2.86                               | 3.5                | 18.160 | <0.0001 |
| <b>knowledge of Symptoms</b>             |                            |                                          |                    |        |         |
| Control Group                            | 6.4 ± 2.09                 | 6.8 ± 2.26                               | 0.4                | 2.213  | 0.027   |
| Intervention Group                       | 6.4 ± 1.86                 | 9.5 ± 0.28                               | 3.1                | 28.066 | 0.0001  |
| <b>knowledge of Complications</b>        |                            |                                          |                    |        |         |
| Control Group                            | 5.5 ± 1.60                 | 7.6 ± 0.22                               | 2.1                | 22.14  | <0.0001 |
| Intervention Group                       | 6.1 ± 1.50                 | 9.3 ± 0.17                               | 3.2                | 36.076 | <0.0001 |
| <b>Prevention strategies</b>             |                            |                                          |                    |        |         |
| Control Group                            | 5.0 ± 1.66                 | 5.9 ± 1.49                               | 0.9                | 6.825  | <0.0001 |
| Intervention Group                       | 4.9 ± 1.63                 | 7.30 ± 1.22                              | 2.4                | 20.07  | <0.0001 |
| <b>Overall Summary</b>                   |                            |                                          |                    |        |         |
| Control                                  | 5.13 ± 1.90                | 5.98 ± 2.13                              | 0.85               | 5.071  | <0.0001 |
| Intervention Group                       | 5.21 ± 1.86                | 7.93 ± 2.72                              | 2.72               | 14.058 | <0.0001 |

Considering that there were knowledge gained at both in the control group and the intervention group. the output contained in table 4.10 is the summary analysis comparison for knowledge (control verses intervention group) at baseline and post intervention to explain the differences in the gained knowledge at both study groups during baseline study and post intervention study.

The table shows that at baseline, the mean value for knowledge found to be slightly higher among the intervention group (mean = 5.21) compared to the control group (mean = 5.13). The difference in the two means was quite small (Baseline mean difference= 0.08) and was not found significant (P=0.609, t=0.5124, 95% CI = 0.227, 0.387).

At post intervention, significant difference was found between the overall mean knowledge in the control compared to that of the intervention group. The mean higher in the intervention group (mean = 7.93) than in the control group (5.98) at a difference of 1.95, which was found to be highly significant (P< 0.0001, t = 9.612, 95% CI = 1.552, 2.348). It therefore implies that though both the study education intervention given to the intervention communities and the health talk offered to the control group communities had significant effects in the knowledge about hypertension, the intervention also has significant impact in terms of knowledge gained.

**Table 6: Summary Comparison for knowledge (control verses intervention group) at baseline and post intervention.**

| Summary           | Control Group      | Intervention Group  | Mean Difference | t      | P value | 95% CI |       |
|-------------------|--------------------|---------------------|-----------------|--------|---------|--------|-------|
|                   | Mean $\pm$ St. dev | Mean $\pm$ St. dev. |                 |        |         | Lower  | Upper |
| Baseline          | 5.13 $\pm$ 1.90    | 5.21 $\pm$ 1.86     | 0.08            | 0.5124 | 0,609   | 0.227  | 0.387 |
| Post Intervention | 5.98 $\pm$ 2.13    | 7.93 $\pm$ 2.72     | 1.95            | 9.612  | <0.0001 | 1.552  | 2.348 |

**P: Probability, CI: confidence interval, t: t distribution value, st. dev: standard deviation**

The distribution for lifestyle preventive practices against hypertension at pre and post intervention is contained in table 7. The table shows that no reasonable increase was observed in salt consumption pattern for those that consume little in the control group (remained at 24.5% at posttest).

Daily physical exercise even reduced slightly from 26,2% to 25.9% among the control group. Also, those that do not engage in physical exercise only increased by 0.4% in the

control group (12.1% to 13.4%). Current smokers reduced by 1% in the control group (10.0% to 9.0%). Those consuming fruits and vegetable for more than servings per day increased by little from 22.4% to 23.1% in the control group.

The non-alcohol consumers in the study area only shifted from 16.2% to 17.6% in the control group which is quite small. Also, everyday consumption of alcohol recorded a slow reduction at the group from 37.2% to just 34.8%.

**Table 7: Distribution for Lifestyle Preventive Practices against Hypertension at Pre and Post Intervention in the Study Area.**

| Preventive Practices                                                                 | Control Group |      | Posttest |      |
|--------------------------------------------------------------------------------------|---------------|------|----------|------|
|                                                                                      | Baseline      | %    |          | %    |
| <b>Salt consumption Pattern</b>                                                      |               |      |          |      |
| Little                                                                               | 71            | 24.5 | 71       | 24.5 |
| Moderate                                                                             | 184           | 63.4 | 194      | 66.9 |
| Excess                                                                               | 35            | 12.1 | 25       | 8.6  |
| Total                                                                                | 290           | 100  | 290      | 100  |
| <b>Physical Exercise of at least 3 hrs eg running, riding bicycle, swimming, etc</b> |               |      |          |      |
| Daily                                                                                | 76            | 26.2 | 75       | 25.9 |
| Weekly                                                                               | 101           | 34.8 | 91       | 31.4 |
| Monthly                                                                              | 67            | 23.1 | 87       | 30.0 |
| None                                                                                 | 35            | 12.1 | 36       | 12.4 |
| Total                                                                                | 290           | 100  | 290      | 100  |
| <b>Cigarette Smoking</b>                                                             |               |      |          |      |
| Current                                                                              | 29            | 10.0 | 26       | 9.0  |
| Past Smoker                                                                          | 17            | 5.9  | 20       | 6.9  |
| None                                                                                 | 244           | 84.1 | 244      | 84.1 |
| Total                                                                                | 290           | 100  | 290      | 100  |
| <b>Fruits /vegetable intake patterns</b>                                             |               |      |          |      |
| < one serving per day                                                                | 63            | 21.7 | 57       | 19.7 |
| One serving per day                                                                  | 162           | 55.9 | 166      | 57.2 |
| > one serving per day                                                                | 65            | 22.4 | 67       | 23.1 |
| \Total                                                                               | 290           | 100  | 290      | 100  |
| <b>Alcohol Intake (at least a pint)</b>                                              |               |      |          |      |
| None                                                                                 | 47            | 16.2 | 51       | 17.6 |
| Some days                                                                            | 135           | 46.6 | 138      | 47.6 |
| Everyday                                                                             | 108           | 37.2 | 101      | 34.8 |
| Total                                                                                | 290           | 100  | 290      | 100  |

The distribution for lifestyle preventive practices against hypertension at pre and post intervention is contained in table 4.12 for the intervention group. The table shows that those that consume little salt increased from 26.6% to 39% at post-intervention in the intervention group, while those that consume excessive salt reduced from 10% to 3.1%. Also, daily physical exercise increased from 26, 2% to 36.9% among the intervention group. Those that do not engage in physical exercise decreased up to 10% (13.8% to 3.8%) among the intervention group. Current smokers

reduced from 9% to 4.1% in the intervention group. Those consuming fruits and vegetable for more than servings per day increased from 21% to 30% in the intervention group.

The non-alcohol consumers in the study area increased from 17.6% to 28.6% among the group. Also, everyday consumption of alcohol recorded a large reduction at the intervention group from 40.7% to just 7.2%.

**Table 8; Distribution for Lifestyle Preventive Practices against Hypertension at Pre and Post Intervention in the Study Area.**

| Preventive Practices                                                                 | Intervention Group |      |          |      |
|--------------------------------------------------------------------------------------|--------------------|------|----------|------|
|                                                                                      | Baseline           | %    | Posttest | %    |
| <b>Salt consumption Pattern</b>                                                      |                    |      |          |      |
| Little                                                                               | 77                 | 26.6 | 113      | 39.0 |
| Moderate                                                                             | 184                | 63.4 | 169      | 58.3 |
| Excess                                                                               | 29                 | 10.0 | 9        | 3.1  |
| Total                                                                                | 290                | 100  | 290      | 100  |
| <b>Physical Exercise of at least 3 hrs eg running, riding bicycle, swimming, etc</b> |                    |      |          |      |
| Daily                                                                                | 76                 | 26.2 | 107      | 36.9 |
| Weekly                                                                               | 93                 | 32.1 | 126      | 43.4 |
| Monthly                                                                              | 81                 | 27.9 | 46       | 15.9 |
| None                                                                                 | 40                 | 13.8 | 11       | 3.8  |
| Total                                                                                | 290                | 100  | 290      | 100  |
| <b>Cigarette Smoking</b>                                                             |                    |      |          |      |
| Current                                                                              | 26                 | 9.0  | 12       | 4.1  |
| Past Smoker                                                                          | 19                 | 6.6  | 23       | 7.9  |
| None                                                                                 | 245                | 84.5 | 255      | 87.9 |
| Total                                                                                | 290                | 100  | 290      | 100  |
| <b>Fruits /vegetable intake patterns</b>                                             |                    |      |          |      |
| < one serving per day                                                                | 72                 | 24.8 | 35       | 12.1 |
| One serving per day                                                                  | 157                | 54.1 | 168      | 57.9 |
| > one serving per day                                                                | 61                 | 21.0 | 87       | 30.0 |
| \Total                                                                               | 290                | 100  | 290      | 100  |
| <b>Alcohol Intake (at least a pint)</b>                                              |                    |      |          |      |
| None                                                                                 | 51                 | 17.6 | 83       | 28.6 |
| Some days                                                                            | 121                | 41.7 | 186      | 64.1 |
| Everyday                                                                             | 118                | 40.7 | 21       | 7.2  |
| Total                                                                                | 290                | 100  | 290      | 100  |

The effects the study intervention on lifestyle adjustments for prevention of undiagnosed hypertension in the study area is presented in table 8. For the control group, no evidence of significant difference was established in this study as the baseline data could not differ significantly with the post-intervention data ( $P=0.8422$ ,  $t=0.199$ ). However, significant difference was in the intervention group between baseline data and the post intervention data ( $P=0.0394$ ,  $t=2.132$ ). This indicates that the intervention has effect on lifestyle adjustments for hypertension prevention in the study community.

None of the lifestyle factors was found significant in the control group in this study ( $P>0.05$ ). Significant lifestyle factors in the intervention group include physical exercises, ( $P=0.0048$ ,  $t=2.831$ ), fruit and vegetables intake ( $P=0.001$ ,  $t=2.400$ ) and alcohol intake ( $P<0.0001$ ,  $t=5.688$ ). The mean was found higher in the post intervention (5.34) compared to the control (4.27). It therefore means that peoples were encourage to engaged in physical exercises in the study area as a result of the study intervention. Similarly, the result indicates that the study group increased their consumptions rate for fruits and vegetables as being motivated by the intervention. This is because, the mean for intake of fruit and vegetables

increased at post intervention (6.74), compared to baseline (6.89) For alcohol intake, the post intervention (ie.4.93) was higher than the baseline mean (ie 4.72) and the mean difference of 2.6 was found between the baseline and post intervention for the study intervention group, which was found significant.

## DISCUSSION

The study demonstrated the effectiveness of combined health education, counseling and BP management intervention on outcome measures such as Systolic blood pressure (SBP), diastolic blood pressure (DBP) and body mass index (BMI) for undiagnosed blood pressure. The study yielded significant effects in mean reduction in SBP, DBP and BMI at post intervention. This finding is consistent with the reported finding on the impact of education and counseling on SBP, DBP and BMI.<sup>[17]</sup> Therefore the study has succeeded in making an addition to the growing evidence on the effectiveness of interventions using health education and counseling strategies in hypertension prevention and control in especially for low-income countries.

The study also demonstrated the effectiveness of combined health education interventions in knowledge about undiagnosed hypertension and hypertension preventive practices. The findings from the present study indicates that the study combined educational, counseling and management strategies intervention had a contributory effects to knowledge about undiagnosed hypertension and other disease outcomes. Having equipped knowledge about undiagnosed hypertension and its preventive strategies is an obvious motivating necessity for lifestyle adjustments and other forms of precautionary measures of blood pressure control against hypertension in adults.<sup>[18]</sup>

The study achieved an effective significant increase in knowledge between baseline and post intervention compared to the control group where the intervention was not deployed. It therefore implies that the study participants were ready and willing to embrace hypertension knowledge and preventive practices when properly introduced and implemented. This finding is consistent with reports from other studies that achieved higher knowledge of hypertension and preventive practices against the disease at post. It therefore affirms the importance of showing support for health educational interventions at community-level to reach a larger proportion of the high-risk population. This is important considering knowledge improvement is an associating factor for good blood pressure control.<sup>[19]</sup>

However, knowledge was also gained in the control group due to health talk offered to the group. It therefore indicates the need to improve the knowledge hypertension in the study area. On the other hand, the present study finds significant difference in gained knowledge between control group and intervention group. Hence, it means the

health talk is not sufficient but more intervention such as combined education, counseling and management strategies are required for adequate knowledge of the disease.<sup>[20]</sup>

In the index study, no evidence of significant difference was established in this control group on lifestyle adjustment factors between baseline and post-intervention test. The baseline data could not differ significantly with the post-intervention data in the control group while significant difference was obtained in the intervention group for all the lifestyle adjustment factors assessed. Thus is a clear indication for the effects of the study intervention on lifestyle adjustments for hypertension prevention. Going by this finding, adult individuals are encourage engaging in physical exercises, reduced salt consumption, increased their consumptions rate for fruits and vegetables quitting smoking and reduce alcoholic intake. This is in line with some earlier reports on lifestyle adjustment in prevention and management of hypertension.<sup>[21]</sup>

Therefore the study demonstrated that the burden of undiagnosed hypertension among adults in the communities could be less with well organized health educational intervention targeting to generate knowledge and achieve lifestyle modifications needed to bring down the prevalent of hypertension.

## CONCLUSION

Although the prevalence of undiagnosed hypertension is on the rise among adults in rural and semi-urban areas, the results of this study would raise awareness among Nigerian adults about undiagnosed hypertension and the importance of maintaining good health to sustain the nation's economy. Since prevention is always preferable to cure, appropriate measures such as an efficient public education program and participation from all adults would greatly reduce the risk of hypertension and other disease complications.

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