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Literature Review of the Prevalence of Hypertension at Gulu University, Gulu City, Acholi Subregion, Northern Uganda

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Abstract

Hypertension is a significant public health problem worldwide. The purpose of this study is to examine the prevalence, knowledge, attitude, and practice about hypertension at Gulu University, Gulu city, Gulu district, Acholi subregion, Northern Uganda. A literature search on hypertension was done. It showed that, in Uganda, a representative number of 17,777 adult patients' data were analyzed from January 2014 to February 2024. The epidemiological data on awareness of hypertension was found to be at 8%. Of this, 18.3% of the people with hypertension had it under control. The results of the findings were promising. Hypertension is an important public health challenge in Uganda particularly in Northern Uganda where Gulu University falls. In comparison with the two regions of Central Uganda and Northern Uganda, there was a significant number of populations that were not aware of their condition. Those diagnosed were on treatment but the treatment was not adhered to due to stock outs of medicines. Therefore, Measures are required to prevent hypertension, improve awareness, treatment and control within the community, especially at Gulu University where research has never been done.

Keywords

Prevalence, Hypertension, Blood Pressure, Knowledge, Attitude, Practices, Cross Sectional Studies

1. Introduction

According to WHO 2023 publication [1], hypertension is the global leading

cause of premature deaths, contributing to about 7.5 million deaths, of which about 12.8% makes the total incidence of all deaths. The global burden of hypertension is a significant public health concern, with an estimated 1.28 billion people affected worldwide [2]. In the United States, hypertension prevalence has been increasing, with a current estimated prevalence of 34.5% among adults [3]. Despite the availability of effective treatments, hypertension control rates remain suboptimal, with only 44% of hypertensive adults achieving control [4]. Hypertension is a major risk factor for cardiovascular disease, and its impact is evident across all ages [5]. Effective management of hypertension requires a multifaceted approach, including lifestyle modifications and pharmacological treatment [6]. Lifestyle modifications such as dietary changes and physical activity are essential for hypertension management [7]. Pharmacological treatment options include diuretics, beta blockers, and other agents [8]. The impact of hypertension on cardiovascular disease is significant, with a 2-fold increase in risk [9]. However, the prevalence of hypertension is reported to be on a serious rise in low-income countries compared to developed countries. The number of individuals diagnosed with hypertension among the population is extrapolated to be rising rapidly each day, and its risk of causing mortality remains a great public health concern. In Uganda, the age standardized prevalence of hypertension was found to be 27.2% (95% CI 25.9 - 28.5) similar amongst females at 27.7% and males at 26.4% [7]. Hypertension prevalence is noted to increase with age almost tripling at 35 - 44 years to 45 - 54 years (4.7% to 12.4%). The prevalence continues to increase with age with nearly half (25.2%) of all people aged 75 years having it and over reporting hypertension. According to WHO guidelines, hypertension is diagnosed when

Table 1. Definition of hypertension.

Location	Threshold
Office	$\frac{140}{90}$ mmHg
Home	$\frac{135}{85}$ mmHg
24-hour ambulatory monitoring	
24-hour average	$\frac{130}{80}$ mmHg
Day time average	$\frac{135}{85}$ mmHg
Night time average	$\frac{120}{70}$ mmHg

Source: (International Society of Hypertension, 2020).

measured on two different days, and the systolic blood pressure reading on both days is ≥ 140 mmHg and diastolic blood pressure reading on both days is ≥ 90 mmHg. The International Society of Hypertension guidelines of 2020 defines hypertension according to **Table 1**.

The National Institute for Health and Care Excellence (NICE, 2019) provides guidelines for management of hypertension, to treat adults who have hypertension to a standard blood pressure target (less than 140/90 mmHg) to reduce the risk of all cause and cardiovascular mortality and to consider treating adults who have hypertension to a lower blood pressure target (less than 135/85 mmHg), to reduce the risk of complications such as myocardial infarction [1]. According to NICE guidelines of 2019, the threshold for diagnosing hypertension remains 140/90 mmHg on clinic blood pressure [1]. The British Heart Society considers normal BP to be between 90/60 mmHg and 120/80 mmHg, pre-hypertension between 120/80 mmHg and 140/90 mmHg, stage one hypertension when BP is between 140/90 mmHg and 160/100 mmHg in the clinic or 135/85 mmHg to 150/95 mmHg at home, stage two hypertension when the BP is between 160/100 mmHg and 180/120 mmHg in the clinic or over 150/95 mmHg at home and stage three hypertension when the systolic BP is over 180 mmHg or the diastolic BP is over 120 mmHg [2].

The hypertension prevalence is associated with older age, genetic predisposition, being overweight or obese, physical inactivity, high salt intake and alcohol consumption [3]. Epidemiological evidence strongly suggests a close relationship between high body mass index (BMI) and hypertension. According to the Framingham heart study, the probability of developing hypertension is nearly triple in obese women compared to those with normal weight [4]. There are several types of hypertension and the common ones include primary hypertension, secondary hypertension, and resistant hypertension, isolated systolic and malignant hypertension. Primary hypertension develops as a result of environmental or genetical causes, diet, lifestyle and age [5]. Pediatricians have been taught to look for primary hypertension causes such as kidney disease, renovascular hypertension, coarctations of the aorta, pheochromocytoma and others [6]. Secondary hypertension has multiple etiologies including renal, vascular and endocrine [7]. Primary hypertension is also referred to as essential hypertension and accounts for 90% - 95% of the adult cases. Secondary hypertension accounts for about 2% to 10% of adult cases, but is also seen in children [6].

Apart from being a silent killer, at particular levels, signs and symptoms can show such as: light headedness, palpitation, nose bleed, blurred vision, shortness of breath, nausea, or vomiting (WHO, 2023) [1]. In Uganda, a few surveys have found the possible causes of hypertension as being overweight, too much salt consumption, physical inactivity, drinking too much alcohol, smoking, stress, older age and genetics [8]. Uganda Clinical Guidelines of 2023 recommend reg-

ular physical exercise, reduction of salt intake, health diet, stopping smoking and periodic screening of blood pressure as the major preventive remedies for hypertension [9]. Hypertension, if not managed properly, can lead to heart attack, heart failure, kidney failure, eye problems, and metabolic syndrome, changes in memory or understanding and dementia [1]. A raised systolic blood pressure is a powerful independent risk factor for cardiovascular mortality and death from all causes [10] (**Table 2**).

Table 2. Showing categorization of hypertension.

	Systolic blood pressure	Diastolic blood pressure
Normal blood pressure	<120 mmHg	<80 mmHg
Elevated blood pressure	120 - 129 mmHg	<80 mmHg
Stage 1	130 - 139 mmHg	80 - 89 mmHg
Stage 2	≥140 mmHg	≥90 mmHg
Hypertension crisis	>180 mmHg	>120 mmHg

Source: (NICE, 2019).

Hypertension being reported as a major global health problem that affects approximately 1.13 billion people, indicates that, 1% - 2% of this population has hypertensive crisis, and this is becoming a major health issue in low-income countries. Hypertension crisis (HTN-crisis) is an acute, severe rise in blood pressure that can be diagnosed in patients with BP ≥ 180/120 mmHg. There are two types of HTN-crisis, the first being HTN emergency which was described by Volhard and Fahr in 1914, and denotes BP ≥ 180/120 mmHg characterized by serious vital organ damage, mostly in the heart, brain, kidneys, eyes, lungs and blood vessels. This phenomenon requires rapid diagnosis and appropriate management to reduce end-stage organ damage. Hypertension crisis can therefore be explained basing on the organs involved such as in aortic dissection, acute hypertensive pulmonary edema, acute myocardial infarction, acute renal failure, hypertensive encephalopathy, acute coronary syndrome, and stroke and hypertensive retinopathy. It has consequences on different organs, and accounts for 36% of cardiovascular conditions including acute heart failure, 24% of cerebral infarction, and 16% of hypertensive encephalopathy, 12% of acute coronary syndrome, 4.5% of eclampsia, 4% of intracerebral hemorrhage and 2% of aortic dissection. The second type is hypertension urgency is defined as a severe acute increase in BP without evidence of acute organ damage. Hypertension emergency-related death is estimated to be ≥ 79% annually and it is assumed to be the reason for increased morbidity, mortality and disability [7].

2. Objective of the Study

The purpose of this study is to examine the prevalence, knowledge, attitude and practice of hypertension at Gulu University, Gulu City, Acholi Subregion, Northern Uganda.

3. Methodology

A literature review was conducted in accordance with the preferred reporting items for literature reviews reporting guidelines. This study was undertaken by looking at publications from January 2014 to February 2024. Two researchers (Prof. Lamwaka Alice Veronica PhD and Mboowa John Bosco) conducted a literature search independently in PubMed, Google scholar, BMJ and MEDLINE data bases with the aid of a combination of search terms related to hypertension, prevalence, blood pressure, knowledge, attitude, practice, awareness and university students. Then a search of reference lists of the included studies were done to complement our searches.

Studies needed to be of primary investigations based on a generally representative sample of university students and providing numerical prevalence estimates of hypertension for them to be included in this literature review. Only studies that investigated hypertension prevalence, knowledge, attitude, and practices among adults (aged 18 and above) were included, those published in English language; peer-reviewed articles, including cross sectional studies, cohort studies, case control studies and randomized controlled trials were taken into consideration. The studies conducted in any setting, including community, clinic, or hospital settings, and those published between January 2010 and February 2024 were included in the study.

Meanwhile, studies that focused solely on hypertension treatment and management, and those that only examined knowledge, attitude, or practices related to a specific aspect of hypertension (e.g., salt intake or physical activity) were excluded. Other studies conducted among special populations (e.g. pregnant women, children, or individuals with comorbidities), editorials, commentaries, and opinion pieces, studies with a sample size less than 100 participants were also excluded. We also excluded studies which handled clients with a high risk of bias, as assessed using the Cochrane risk of bias tool or the Newcastle-Ottawa Scale.

Literature selection was done using the type of study designs, publication dates, population characteristics and language. We employed comprehensive literature search tools by utilizing multiple databases, search engines and gray literature to minimize publication bias. We also selected studies using clear inclusion and exclusion criteria to reduce selection bias.

We also critically looked at the quality assessment to evaluate study quality and risk of bias using standardized tools (e.g., Cochrane risk of bias tool, Newcastle Ottawa scale). The required information on the data was extracted using a

systematic and transparent approach to extract clean data, thus reducing errors and bias.

Our study focused on heterogeneity to assess and address heterogeneity among all the previous research studies using subgroup analyses, sensitivity analyses and meta-regression. The language bias mitigation was done by including studies in multiple languages, and by the use of translation services while sticking to the English language as the main language of communication.

Our main funding source consideration was also done by considering this research work as part of ongoing operational research at Gulu University to prevent bias on study outcomes. This particular study design focused on diversity by incorporating various study designs to minimize methodological bias, and by ensuring reflexivity and transparency, a regularly agreed position to reflect on potential biases and report them transparently was used.

The literature review process involved defining research questions, using search terms by identifying relevant key words and MeSH terms such as hypertension, blood pressure, management programs, intervention, control and outcomes.

However, the selection of appropriate data bases including PubMed, Scopus, Web of Science, Cochrane Library and EMBASE were taken care of separately.

Our selection of inclusion and exclusion criteria were done as described in the methodology section.

In our research design of setting of search strategy using a combination of search terms, MeSH terms and filters (e.g. publication date, language) to search data bases, we were able to enrich our findings through information obtained in recent research work carried out by other scientists up to 2024.

Our data analysis was amazing, whereby, data extraction that was relevant from included studies matched standardized format, including study characteristics, population, intervention, outcome and results. We carried out quality assessment to evaluate the quality and risk of bias in individual studies using various tools. This was meant to perform data synthesis using meta-analysis and narrative synthesis. The presenting findings including the summary effect size using 95% confidence interval and heterogeneity metrics brought out clearly what we were looking for.

In this study, the discussion and interpretation of results were done by discussing the implications and highlighting the limitations of the study.

Data extraction: Data were independently extracted from the included articles by two researchers (Prof. Lamwaka Alice Veronica PhD and Mboowa John Bosco). The gathered information included the title, authors, year in which the article was published, year of investigation. Of importance was also the study location (country, region, districts and city), study design, sample size, and the number of participants who were found with hypertension. We also considered participants who were aware of their diagnosis and those who were on medication. The areas of study location were designated as Northern Region of Uganda,

Gulu district, Acholi subregion and Gulu University.

Results: The literature searches found a total of 14 articles and were included in our write up, which provided results on prevalence, knowledge, attitude and practice of hypertension, eleven articles provided information on prevalence and three articles provided information on knowledge and awareness about hypertension. In Uganda, the data on prevalence of hypertension was noted not to be uniform. In 2015, a study was carried out about epidemiology of hypertension in Uganda [8] and found out that a total of 1033 out of the 3906 participants were found to have hypertension giving an overall prevalence of 26.4%. The prevalence was found to be highest in central Uganda at 28.5%, followed by the Eastern region at 26.4%, Western region at 26.3% and low in Northern Uganda at 23.3%. Out of the studies conducted in Northern Uganda in 2018 [7] they found out that the prevalence of hypertension was 34.3% in central Uganda, followed by West Nile region at 24.1% and then 22.0% in Northern region. In Northern region, the prevalence of hypertension was noted to be 4.3% in Gulu city, 16.7% in Acholi subregion had it but it was not diagnosed.

There were no data available on the prevalence, knowledge, attitude and practices on Hypertension amongst Gulu University Students. Below is the graphical representation of the situation: (Figures 1-4).

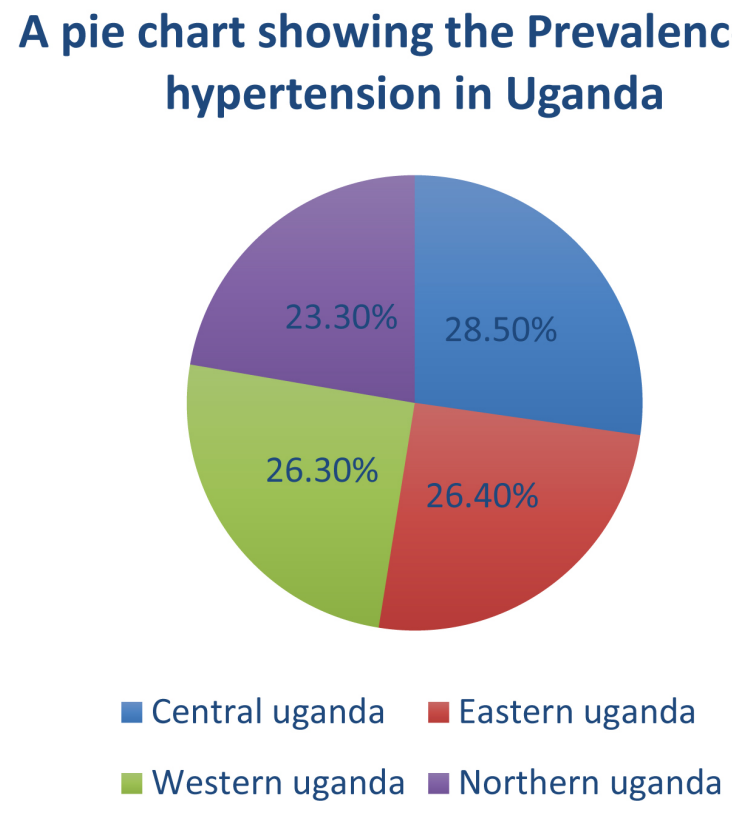

Figure 1. Prevalence of hypertension in Uganda.

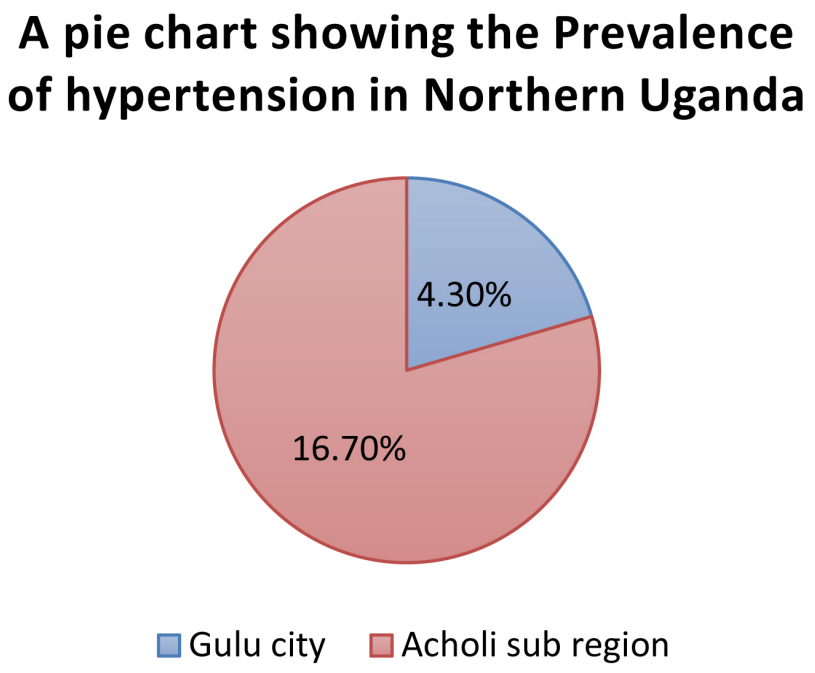

Figure 2. Prevalence of hypertension in Northern Uganda.

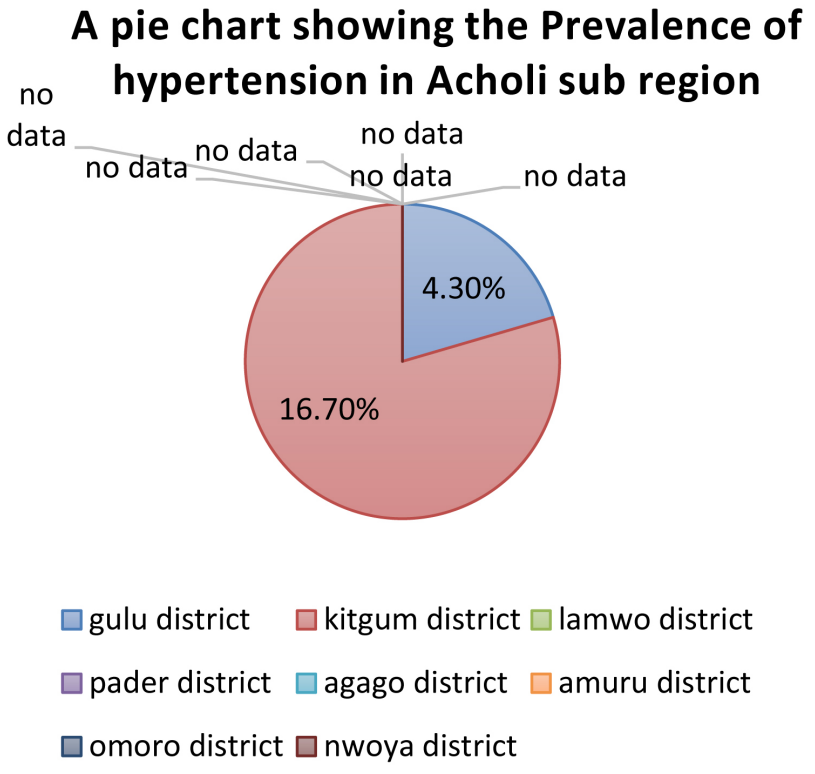

Figure 3. Prevalence of hypertension in Acholi subregion.

That lack of information about the prevalence, knowledge, attitude and practices of hypertension at Gulu University prompted the researchers to look at the

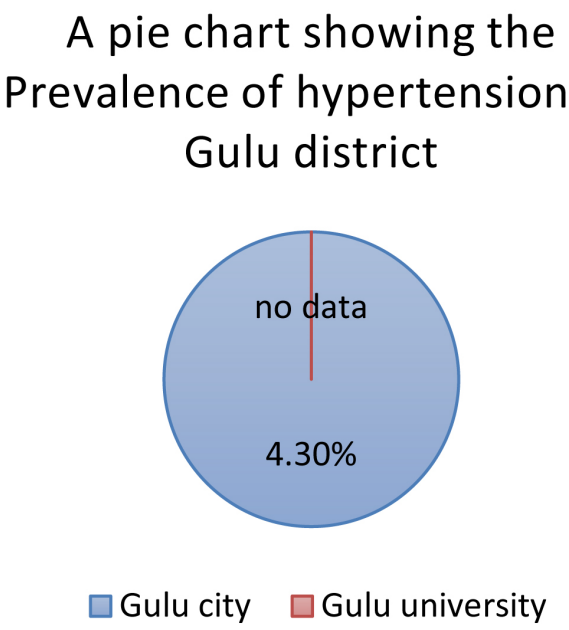

Figure 4. Prevalence of hypertension in Gulu district.

situation amongst Gulu University students. In the study, 500 students were contacted and interviewed. The survey revealed that out of 500 students, 350 (70%) had heard of hypertension, but only 150 (30%) knew that it was a risk factor for cardiovascular disease. When asked about their attitude towards hypertension, 200 (40%) students believed that hypertension was a serious health problem, while 250 (50%) thought it was not a personal concern.

Regarding practices, only 100 (20%) of the students reported regularly that they had their blood pressure checkup. Of the 500 students who participated in the study, 300 (60%) reported engaging in physical activity to manage stress. The majority of the students (400, 80%) reported consuming a diet high in salt and sugar. The researchers, therefore, concluded that, these findings indicates a significant gap in knowledge, attitude and practices regarding hypertension among Gulu University students and that further research and follow up is required.

4. Discussion of Results

Hypertension still remains the major risk factor for cardiovascular disease and cause of death in developing countries including Uganda.

The findings of this study highlighted a significant gap in knowledge, attitude, and practices regarding hypertension among university students at Gulu University, Northern Uganda. Despite hypertension being a major public health concern, only 30% of students knew that it was a risk factor for cardiovascular disease. This lack of knowledge is a concern, as it may lead to delayed diagnosis and treatment, resulting in complications such as heart disease and stroke. Further studies needs to be carried out amongst other universities to inform policy

and harmonise the results of the findings.

The attitude of students towards hypertension was also a concern to the Researchers. This is because we noted that only 40% of students who participated in the study, believe that it was a serious health problem. The lack of interest in seeking knowledge about this serious health condition that is globally known to affects good health in various ways, may lead to a lack of motivation to engage in preventive behaviours, such as, regular blood pressure checks and healthy lifestyle choices.

The practices of students regarding hypertension were also found to be suboptimal, with only 20% of the students reporting regularly for blood pressure checks and 60% of them engaging in physical activity to manage stress. The majority of students that participated in the study (320, 80%) reported consuming a diet high in salt and sugar, which has been implicated for increase of blood pressure and cardiovascular disease risk. These findings were consistent with previous studies, which showed a lack of knowledge and awareness about hypertension among young adults [11].

In Gulu city, Gulu district, in a study that was conducted from St. Mary's hospital Lacor, Gulu district, about incidence of preeclampsia and retention to prenatal care within their facility, they found out that the prevalence of women who developed preeclampsia was 4.3% (N = 43) [2]. The prevalence of hypertension was found to be less than 1%, compared to rates of 225 and 30% in the general population. Again, according to the study conducted at Gulu district Out Patient Departments [3], a similar pattern was obtained. The Researchers therefore concluded that, this result is a slightly high percentage, compared to other studies and WHO standards. This study can be a bias, since the study was conducted from a hospital setting. This means that only those who visited the facility were screened, and this phenomenon, might have left out many people in the community with undiagnosed condition. Looking at Gulu Regional Referral Hospital as a teaching hospital for Gulu University, we noted that none of the students who were studying at Gulu University at that time visited the hospital and that at Gulu University none of the students delivered from the hospital by the time the study was conducted.

It should be noted that, the Acholi subregion consists of eight districts, that is, Gulu district, Kitgum, Lamwo, Pader, Agago, Amuru, Omoro and Nwoya district. The prevalence of hypertension in the subregion has been reported mostly in Gulu district and Kitgum district. In Kitgum district, a study conducted on undiagnosed individuals with hypertension who were market vendors in Kitgum Central Market, brought out remarkable results and showed that the prevalence of undiagnosed HTN as was 16.7%. The study also importantly noted that 16 (40%) out of the 40 participants with HTN were below 40 years [9].

At this rate, this prevalence brings out a pattern of an alarming trend by observing that most of the Students at Gulu University originate from these regions, and, vending might have been their source of income, and yet coinci-

dentally, most of them are below 40 years of age. According to data available from Uganda census 2014, the most productive age by Uganda's index is 15 to 35 years, and this key information has empowered the Researchers to try and look deeply and design a KAP study among the students at Gulu University. No data base was found in regards to KAP studies at Gulu University apart from this particular piece of research work.

We also noted that no studies at all have been conducted in the districts of Lamwo, Pader, Agago, Amuru, and Nwoya about hypertension, hence, the prevalence remains unclear, and yet, most students of Gulu University originate from these districts. There is therefore urgent need to carry out studies on prevalence, knowledge, attitude and practice in these districts. The studies can inform policy so that mass mobilization can be done for screening and implementation at all health facilities and training and teaching institutions. The communities who live in Northern Uganda can therefore freely gain access to the gazetted health facilities voluntarily in order to get screened for hypertension as well as gain appropriate knowledge. In addition, there have been reported cases of Gulu university students collapsing and dying in the University field play ground while on practice, and yet, the cause of their death remains unknown and still under investigation.

Northern region is one of the four regional centres in Uganda, with a population of about 7,988,139 people [12] [13]. It is one of the regions that have reported the lowest prevalence of hypertension, based on few studies that have been conducted in the region and reported.

According to the findings from the study conducted on geographic differences in the prevalence of hypertension in Uganda, they found out that the prevalence of hypertension in Northern Uganda was 22.0%, indicating a low prevalence as compared to 34.3% in the central region and 24.1% in the west Nile region [8] [10] [14].

This shows that hypertension is highly distributed in Uganda and many people including the young adults are at an increased risk of developing hypertension. This compares well with the global trend [3] [11]. The prevalence of hypertension has slightly reduced in Northern region particularly after the insurgency when the community, who were in displacement camps returned back home and began eating well. Northern Uganda is known for having a rich culture with diversity of very rich nutritious cuisine of balanced diet, a nutritional availability of traditional foods such as the Malakwang and other local vegetables e.g., cabbage and pumpkins, which have been scientifically proven to hold very high food values, vitamins and minerals. The indigenous people of Acholi subregion believe in using food as their medicine and their medicine is the food which they eat daily. During the Insurgency of the Lord`s Resistance Army (LRA) that produced great suffering to the people, they could not tend to their family food gardens, and this phenomenon, caused food shortages that affected the nutritional status of the people in the region. The

majority of the people who live in Northern Uganda rely on agriculture and agricultural products.

It has been speculated that the lack of proper dieting could have been the cause of multiple health conditions in the area including a rise in hypertension [12] [13]. Before the insurgency, the reported cases of hypertension in the region was less than 10 and this was often managed from Mulago National Referral Hospital. However, anecdotal evidence showed, there is need to conduct new prevalence and KAP studies about hypertension in this region, since there are no new studies done that can be extrapolated. Professor Otim Andrew Marcel, a retired Ugandan endocrinologist carried out a country wide sampling in 1972 and found out that there were no cases of hypertension in Northern Uganda.

Another study conducted on the epidemiology of hypertension in Uganda also found out that, out of the 3906 participants, the prevalence of hypertension in Northern region was at 23.3% compared to Central Uganda that was at 28.5%, Eastern region at 26.4%, and Western region at 26.3%, and compared to the prevalence of 26.4% and 25.8% in urban and rural areas respectively [8] [13] [15].

The study also found out that only 7.7% of participants with hypertension were aware of their high blood pressure. This indicates that most of the people (92.3%) were unaware of their diagnosis, calling for immediate attention, and more research and policy action [16].

The prevalence of hypertension was reported to have declined between 2015 and 2018 by 1.3% in Northern region, and this is speculated to be contributed by the hard work of the people meeting their own nutritional needs [17]. However, these studies are old, hence, need to conduct new studies on prevalence, knowledge, attitude and practice about hypertension in Northern Uganda especially at Gulu University where no study has ever been done.

5. Potential Study Limitations

This study was conducted only amongst 500 students. This is a small sample size which is not representative of the general population, however, the research met the objectives of the study, amongst the selected group of 500 students who met the inclusion criteria.

The Cross-sectional design used for the study was a snapshot in time and did not follow students over a period of time, thus limiting the ability to draw causal inferences. There was a need to make follow up to validate the study further.

Our self-reported data on the students' knowledge, attitude, and practices were self-reported, which may be subject to bias and inaccuracies.

There was not enough generalization of reporting whereby, the study was conducted at a single university in Northern Uganda, which may not be representative of other universities or populations.

In reality, there should have been a control groups to compare with the intervention group, these phenomena became a limiting factor on the ability to de-

termine the effectiveness of the intervention.

We had a short survey instrument. The Short survey instruments that were instituted may not have been comprehensive enough to capture all aspects of students' knowledge, attitude and practices regarding hypertension.

We also think that Social desirability bias should have been introduced, whereby, the students may have responded in a way that they thought was socially acceptable, which could be the case rather than their true beliefs or practices.

The research was well designed, however, well as we tried our best to meet the objectives, a lack of objective measures to control reporting may have caused biases since the study relied on self-reported data and did not include objective measures such as blood pressure readings or physical activity logs.

We noted that there was Limited demographic information whereby, the study may not have collected sufficient demographic information to fully understand the characteristics of the students surveyed. Due to migration despondence normally tend to hide their identity for fear of discrimination and stigma.

6. Conclusion

Hypertension is an important public health problem in both low income and middle-income countries, and most of the individuals in the communities who have it, are not aware of their condition.

Recommendation

There is therefore need to put preventive measures in place at a population level, through increased awareness campaigns, health education, mass screening for hypertension using routine blood pressure checks, in order to combat the development of the disease, increase awareness and its control within the population. Adherence to therapy and diet must be addressed at the government policy levels as well as at the grass roots.

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diligently to collect, analyze and interpreted the data. Their dedication and commitments to excellence have made this study a success.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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