

Short Research Article

TO DETERMINETHE PATHOGENESIS AND PREVENTIVE STRATEGIES OF HYPERTENSION-INDUCED KIDNEY FAILURE AMONG HYPERTENSIVE PATIENTS IN THE TAMALE TEACHING HOSPITAL, GHANA.

ABSTRACT.

Background: Blood pressure is the force used by circulating blood, against the walls of the major blood vessels in the human body. High blood pressure or hypertension is when the pressure in the blood is elevated [1]. Each year an estimated 41 million people die from non-communicable diseases (NCDs) accounting for about 70% of all deaths globally [2].A predicted number of 1.13 billion individuals worldwide have hypertension with about two-thirds being those living in the low- and middle-income countries[1].

Objective: The aim of this study was to unravel the pathogenesis and preventive strategies of hypertension-induced kidney failure among hypertensive patients in the Tamale Teaching Hospital, Ghana.

Methods: The study employed the Analytical cross-sectional study with quantitative method approach of data collection. A convenience sampling technique was used to select the 200 study participants who were diagnosed of hypertension for more than 6 months. The data was collected using a structured questionnaire. Data were examined using the SPSS program IBM version 24. Descriptive statistics, including proportions, frequencies, and cross-tabulations, were used to summarize the study variables. Logistic regression analysis was used to identify factors associated with hypertension-induced kidney failure. A p value of <0.05 was considered statistically significant.

Results: A total of 200 respondents were included in the analysis and there were more men 126(63.0%) than women 74(37.0%).19.0% have been diagnosed hypertension-induced kidney failure, with nearly two-thirds identifying hypertension-induced kidney failure as lifelong disease. The common risk factors in developing hypertension-induced kidney failure identified by the participants were; Aging (75.0%), poor eating habits (70.0%), smoking (60.0%), and excessive alcohol consumption (49.5%).

Conclusion: Increasing age, obesity, level of education and physical activity were found to be significantly associated with hypertension-induced kidney failure, indicating opportunities for health education and other prevention measures. Sincere efforts are needed to increase the awareness of hypertension through continuous group education courses in the primary health care centers and hospitals.

INTRODUCTION

Hypertension is detected when there is a sustained elevation of the blood pressure usually with the systolic above 140mmhg and or diastolic above 90mmhg taken at least two different times and at least 6hour interval. It is sometimes called the silent killer because people who have it mostly do not show symptoms and when they do, the effect of the continuous rise in pressure is seen on the target organs of the body such as the heart, kidneys, eyes and brain [1].

According to Staessen, Wang, Bianchi & Birkenhager, [3], Hypertension is estimated to affect more than one-fourth of the world's adult population. The incidence and prevalence of chronic kidney disease (CKD) is also on the rise with more than 20 million people being affected in the United States alone as reported by World Health Organization [1]. The frequent concurrence of hypertension and kidney failure, all of which are also important cardiovascular risk factors, may reflect a common underlying mechanism [4]. One such mechanism that is becoming more and more recognized is the far reaching impact of the fetal environment [4]. Most patients with Chronic Kidney Disease or renal failure have hypertension [4]. Elevated blood pressure (BP) is an established risk factor for the development and progression of kidney failure [5]. Control of BP to evidence-based targets with appropriate antihypertensive agents has the potential of preventing some of the serious consequences of CKD [5].

Chronic Kidney Disease (CKD) is characterized by a progressive decline of kidney function over time [1]. It is diagnosed by observing indicators of kidney damage via imaging and/or decreased levels renal function that are below certain cutoff points of Glomerular Filtrate Rates (eGFR) estimated from serum creatinine concentration) [6]. Levey et al. [7] defined CKD as a reduced kidney function characterized by an eGFR of 60ml/min per 1.73m² or a urinary albumin-to-creatinine ratio of 430mg/g, and, classified into 5 stages of renal function from mild to end-stage renal disease [7]. As kidney function deteriorates, it leads to a build-up of large amounts of waste in the blood and

increases the risk of problems such as anaemia, hypertension, nerve damage and weak bones, according to the National Kidney Foundation [6]. In studies from the United States, Europe, Asia, and Australia chronic kidney disease (CKD) affects between 5% and 15% of the adult population, making this a major public health problem [8]. The more severe stages of CKD are a major risk factor for cardiovascular disease as well as for more severe renal failure (CKD stages 4 and 5)[9]. Although CKD is common in tropical Africa, there are few data on predictors of the disease and little is known about progression in patients with this disease. Previous studies from Africa show hypertension as a predictor of CKD with a proportion of 18.4%[10].

Africa has the considerable prevalence of hypertension-associated CKD (estimated glomerular filtration rate [eGFR] < 60 ml/min) globally with West Africa being the most affected region (15%) compared to Southern Africa (3%) [11]. Amongst people with hypertension of African ethnicity, West Africans have also been found to be at highest risk of ESRD [12]. On the African continent, major factors contributing to CKD progression include genetic predisposition and other co-morbidities such as hypertension and Diabetes, which affects approximately 14%-17 % [12]. Studies have noted that sustained elevation of hypertension is associated with CKD or progression to CKD both in people with hypertension and other populations [13]. However, there remains a paucity of long-term research exploring this relationship in African with only one study evaluating it specifically as a possible risk factor for CKD progression [14]. African (blacks) with hypertension more commonly develop renal insufficiency compared to Caucasians this was highlighted in a study conducted in West Africa by World Health Organization in the year 2018.

In Ghana, Chronic non-communicable diseases have become major causes of disability and deaths [13]. Hypertension and renal diseases represent a significant proportion of the non-communicable disease burden. Urban hypertension prevalence was at 32.3%, while rural prevalence, 27% [13]. Prevalence rates of major risk factors for non-communicable diseases especially poor diets, overweight/obesity, physical inactivity and alcohol over-consumption are high [15]. Available records indicate that hypertension-related Kidney failure prevalence has been rising with the spate of rural–urban migration and associated changes to lifestyle and dietary choices [16]. A number of factors such as positive perception of obesity, more sedentary lifestyles, excessive consumption of high-calorie diets, genetic predisposition, high intake of salt, and increasing life-expectancy have been cited for this disturbing trend [13]. Without urgent attention, the current epidemic of hypertension-

related CKD in the country is expected to worsen [18]. It is therefore against this background that this study was done to unravel the pathogenesis and preventive strategies of Hypertension-induced Kidney Failure among hypertensive patients in the Tamale Teaching Hospital, Ghana.

METHODS

Study Location and Setting

The study was conducted in the Tamale Teaching hospital in Tamale. The Tamale Metropolis was established under legislative instrument (L.I) 1801 of 2004. It is one of the six Metropolitan Assemblies in the country and the only Metropolis in the Northern part of Ghana. It is also the capital of the Northern region. The Tamale Metropolis is one of the 26 districts in the Northern Region of Ghana. The Metropolis has a total estimated land size of 646.90180sqkm [19]. There are 115 communities in the metropolis. The population of Tamale Metropolis, according to the 2010 Population and Housing Census, is 233,252 representing 9.4 percent of the region's population. Males constitute 49.7 percent and females represent 50.3 percent [19].

Study Design

Cross-sectional study design was employed for this study, using the quantitative approach, alongside retrospective information that were retrieved from folders.

Target population and Sample size

The target population of study were adults, both males and females from 18 years and above, residing in Tamale, Ghana with diagnosis of hypertension. This study was a cross-sectional survey of hypertensive patients aged over 18 attending Tamale Teaching Hospital in Tamale, Ghana. The required sample size was determined using the formula for sample size in sampling for proportions [20] with the following assumptions: 95% confidence level, 5% margin of error, 13% hypertension-induced kidney failure prevalence rate in Ghana [18], and a corresponding undiagnosed rate of 87%. With 10% of the sample size for non-response or incompleteness of questionnaire. Thus, an estimated 200 participants were recruited into the study.

Inclusion/Exclusion criteria

The study included all out and inpatients diagnosed with Hypertension or CKD, and are aged 18 and above. This is because the study is focused on adult CKD patients. Males and females who were

below the age of 18 years, the physically disabled, pregnant and breastfeeding women, critically sick patients were excluded from the study.

Sampling procedure

Convenience sampling was employed in the study. The sampling technique was used to select hypertensive patients at the Outpatient department, Medical ward and the renal unit of the Tamale Teaching Hospital.

Data collection technique

Guided interviews were conducted by using a semi-structured questionnaire that contained both closed and open-ended questions. The questionnaire was initially pre-tested and refined to enhance accuracy and completeness of data collected. All questions contained in the questionnaire have been presented in various Tables, under the respective results subsections, with the frequency of responses to each question. The questionnaire consisted of four parts and numbered alphabetically (A, B, C and D). The first part collected data on study population's socio-demographic characteristics. The second contained questions on hypertension-induced Kidney Failure prevalence. The third part looked at pathogenesis of the hypertension-induced Kidney Failure and the fourth part was on preventive measures related to hypertension-induced Kidney Failure. Questions related to socio-demographic characteristics included inter alia questions about age and age range, sex, marital status, level of education, occupation, religion, nationality, National Health Insurance status, source of funding for treatments, occupation, monthly income and known comorbid conditions. In addition, clinical and anthropometric information were obtained from the folders of respondents. Some of these include glomerular filtrate rates, serum creatinine levels, blood pressure readings, as well as number of medications taken, and whether or not they are on hemodialysis treatment.

Data analysis and presentation

Data analysis was conducted using the Statistical Package for the Social Sciences, SPSS software (version 20, IBM Corp., USA). Data were analysed by descriptive statistical methods, and presented in frequency/percentage distribution Tables. Associations were explored using Chi-squared cross-tabulation. Significance level was set at $p < 0.05$.

Ethical Considerations

An Introductory Letter was obtained from the Head of the Department of Medicine which was submitted to the ethical review board of the hospital, for permission to be granted to engage patients in the study. Each participant gave informed written consent, and had the choice to opt out of the study if they wanted to do so at any time during the study. Participants were assured of confidentiality and anonymity throughout the study.

RESULTS

Socio-demographic characteristics of respondents

A total of 200 respondents were included in the analysis and there were more men 126(63.0%) than women 74(37.0%). The mean age of the respondents was 59.8 (\pm 5.7) years and the largest proportion (61.0%) aged 50-59 years with the majority (54.0%) being males. About 23.0% had never been married before. Of those who had married before, 68.0% were currently together, 7.0% have been separated and 2.0% were widowed. The majority 98(49.0%) of the sample had high school education (i.e. Junior high school and Senior high school) and the highest proportion (37%) were self-employed. Females were more likely to be unemployed compared to males. With respect to income status, the highest 65(32.5%) proportion of the participants indicated they earned GHC. 501.00 - GHC 1000.00 as their monthly income whereas the least of them 43(21.5%) earned GHC. 100.00 - GHC 500.00 monthly.

Table 1. Socio-demographic of respondents in Tamale Metropolis

<i>Demographic characteristics</i>		Frequency (%)
Sex	Male	126(63.0)
	Female	74(37.2)
Age (years)	19 – 29	18(9.0)
	30 – 39	31(15.5)
	40 – 49	44(22.0)
	50 – 59	85(42.5)
	60+	22(11.0)
Employment Status	Employed	63(31.1)
	Self-employed	91(45.5)
	Unemployed	46(23.0)
Marital status	Married	136(68.0)
	Single	42(21.0)
	Divorced	14(7.0)
	Co-habiting	4(2.0)
	Widow	4(2.0)

Religion	Christian	80(40.0)
	Muslim	109(54.5)
	Traditional	10(5.0)
	Other	1(0.5)
Educational status	None / Primary	50(25.0)
	JHS/SHS	98(49.0)
	Tertiary	52(26.0)
Income (GHC.)	100 – 500	23(12.5)
	501 – 1,000	65(32.5)
	1,001 -1,500	50(25.0)
	1,501-2,000	41(21.5)
	>2,000	21(10.5)

A small proportion of the respondents 25(12.5%) were smokers, majority 13 of them indicated that they smoke two sticks per day. With regards to alcohol intake, more than two- third of the respondents 139 (69.5%) do not take alcohol. However, 50(25%) of the participants engage in daily exercise. Shown in Table (2). In the study sample, 70(35%) were obese whereas 8(4%) underweight. This is shown in figure 1

Table 2. Lifestyle Characteristics among Respondents.

Lifestyle Characteristics	Status		P-Value
	Yes n (%)	No n (%)	
<i>Smokes</i>	25(12.5)	175(87.5)	< 0.013
<i>Alcohol</i>	61(30.5)	139(69.5)	< 0.003
<i>Exercise</i>	105(35.0)	195(65.0)	< 0.456

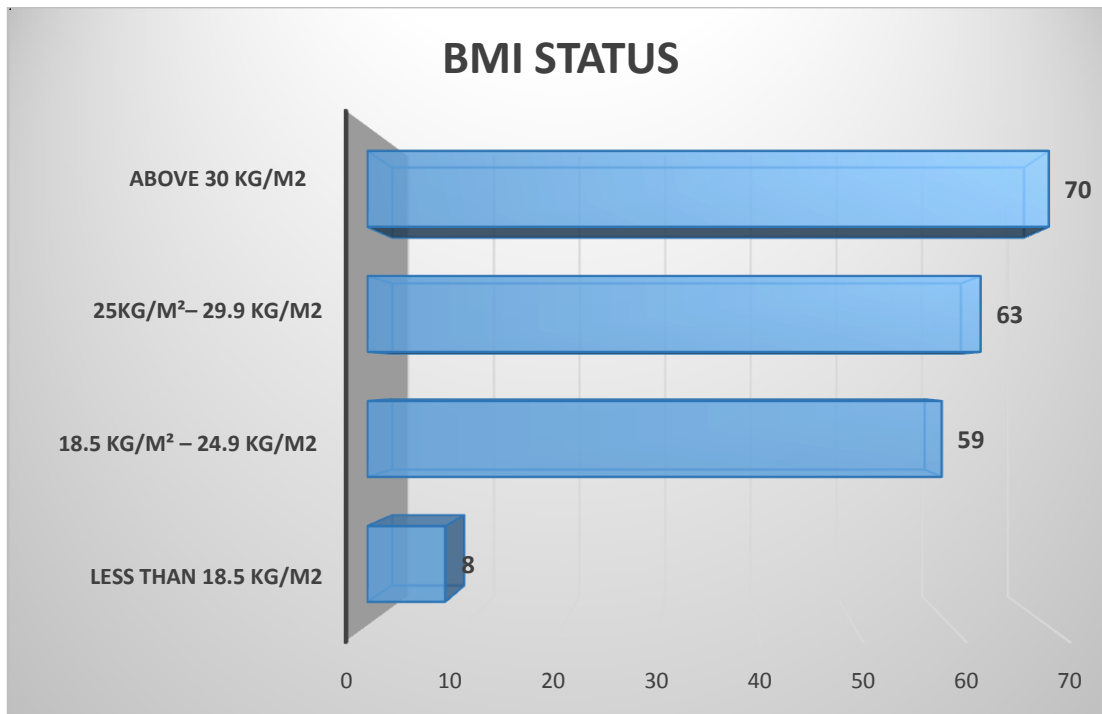


Fig 1. Prevalence of Hypertension-induced Kidney Failure among respondents.

The mean score for prevalence of hypertension-induced kidney failure among hypertensive patients in the Tamale Metropolis was 3.1, \pm .45 SD. Majority 88(44.0%) of the respondents verbalized their hypertensive status as stage 3. Respondents were asked how long they have been battling with hypertension, majority 90(45.0%) of them reported between 5-10 years. Among the respondents interviewed, 38 (19.0%) has been diagnosed of hypertension-induced kidney failure. Among these participants the highest proportion 20(52.6%) indicated that they were told by the doctor. Nearly half 18(47.3%) of the respondents with hypertensive-induced kidney failure verbalized that they were diagnosed in between 1 to 5 years. Majority 15(39.5%) of them reported their CKD status as stage 4. However only 6(15.8%) of the 38 respondents with hypertensive-induced kidney failure are on hemodialysis. The highest proportion 126(63.0%) of the individual have not heard about kidney transplant. Among those who have heard about it, majority 38(51.3%) of them have been diagnosed with hypertension-induced kidney failure. Respondents were asked about their family history with chronic kidney disease, 49(24.5%) indicated that they have family history of the disease however, 33(16.5%) did not know. Approximately 70% of the respondents think that Kidney Failure is a lifelong disease whiles 25(12.5%) did not know. Half of the participants believed that Kidney Failure has a cure.

Table 3. Prevalence of Hypertension-induced Kidney Failure.

Variables	Frequency N=200	Percent %
What is your hypertensive status		
<i>Hypertensive Stage 1</i>	14	7.0
<i>Hypertensive Stage 2</i>	57	28.5
<i>Hypertensive Stage 3</i>	88	44.0
<i>Hypertensive Stage 4</i>	41	20.5
For how long have you had hypertension		
<i>Less than 1 year</i>	13	6.5
<i>1 to 5 years</i>	42	21.5
<i>5 to 10 years</i>	90	45.0
<i>More than 10years</i>	55	27.5
Have you been told you have of hypertension-induced kidney failure?		
<i>Yes</i>	38	19.0
<i>No</i>	162	81.0
If Yes, Who told you about it N=38		
<i>Doctor</i>	20	52.6
<i>Pharmacist</i>	9	23.7
<i>Nurse</i>	7	18.4
<i>Other</i>	2	5.2
If Yes, how many months/ years ago N=38		
<i>Less than 1 year</i>	3	7.9
<i>1 to 5 years</i>	18	47.4
<i>5 to 10 years</i>	11	28.9
<i>More than 10years</i>	5	13.2
What is the name of the stage of CKD are you diagnosed of N=38		
<i>CKD Stage 1</i>	7	18.4
<i>CKD stage 2</i>	4	10.5
<i>CKD stage 3</i>	8	21.1
<i>CKD stage 4</i>	15	39.5
<i>CKD stage 5</i>	4	10.5
Are you on Hemodialysis		
<i>No</i>	32	84.2
<i>Yes</i>	6	15.8
Do you think that Kidney Failure is a lifelong disease		
<i>Don't know</i>	35	17.5
<i>No</i>	25	12.5
<i>Yes</i>	140	70.0
Do you think that Kidney Failure has a cure		
<i>Don't know</i>	34	17.0
<i>No</i>	66	33.0
<i>Yes</i>	100	50.0
Have you heard of Kidney Transplant		

<i>Don't know</i>	54	27.0
<i>No</i>	106	53.0
<i>Yes</i>	40	20.0
Family History of Chronic Kidney Failure		
<i>Don't know</i>	33	16.5
<i>No</i>	118	49.0
<i>Yes</i>	49	24.5

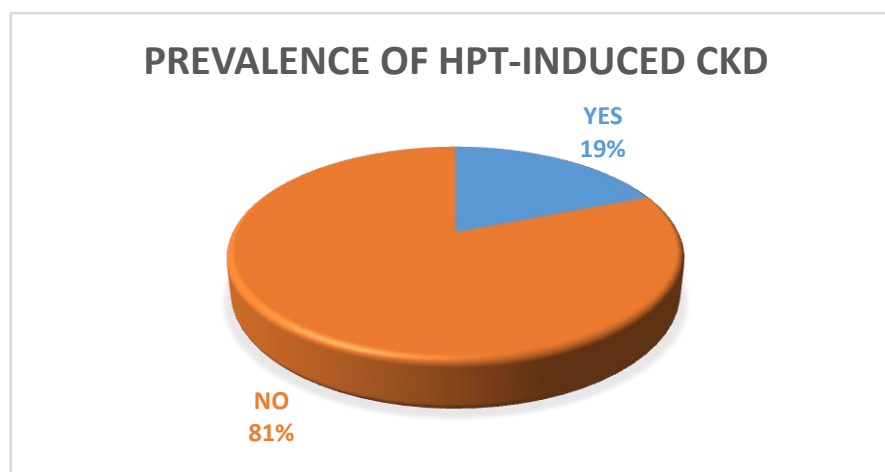


Fig 2. Pathogenesis of hypertension-induced kidney failure.

Regarding the pathogenesis of hypertension-induced kidney failure, half (50%) of the respondents strongly agreed that high blood pressure can constrict the blood vessels, in the kidneys, while 25% of them strongly disagreed to this statement. The narrowing of blood vessels reduces blood flow to the kidney, 151(75.5%) of the respondents were in agreement to this statement. More than two thirds 140(70.0%) of the participants agreed and strongly agreed that if your kidneys' blood vessels are damaged, they may no longer work properly. The highest proportion 150(75%) of the respondents were in support that poor treatment to hypertension may contribute to kidney failure. 145(72.5%) of them agreed that hypertension, and Diabetes are the major cause of Kidney failure.

Table 4: Pathogenesis of Hypertensive induced-kidney failure (likert scale).

Variable	SA	A	D	SD
High blood pressure can constrict the blood vessels, in the kidneys.	100(50.0%)	35(17.5%)	15(7.5%)	50(25.0%)
The narrowing of blood vessels reduces blood flow to the kidney.	95(45.5%)	56(28.0%)	39(19.0%)	10(20.0%)

If your kidneys' blood vessels are damaged, they may no longer work properly.	65(32.5%)	75(37.5%)	40(20.0%)	20(10.0%)
Poor treatment to hypertension may contribute to kidney failure.	110(55.0%)	40(20.0%)	25(12.5%)	25(12.5%)
Hypertension, and Diabetes are the major cause of Kidney failure.	80(40.0%)	65(32.5%)	30(15.5%)	25(12.5%)

SD= Strongly Agree, A= Agree, D=Disagree, SD= Strongly Disagree

Prevention strategies of hypertension-induced kidney failure.

Majority 115(57.5%) of the respondents affirmed that it is very important to take antihypertensive in order to keep the kidneys under control. More than half (58%) believe that changing lifestyle help to prevent Kidney Failure. Approximately 110(55.0%) believed that Kidney Failure is not avoidable part of aging. Respondents were further asked of the measures to control hypertension-induced kidney failure. The highest proportion (62.5%) of the participants indicated regular exercise as the most important measure in controlling hypertension-induced kidney failure. Nearly two thirds (65.5%) of the participants indicated that taking medications regularly or managing hypertension also helps in controlling hypertension-induced kidney failure, however 62(31.0%) of the participants indicated that having enough rest, eating well 75(37.5%), not smoking 95(47.5%), avoiding alcohol 100(50.0%), regular check-ups 80(40.0%) are the preventive strategies for hypertensive-induced kidney failure.

Table 5.Awareness of the preventive strategies ofHypertension-induced Kidney Failure.

Variable	Responses	
	Frequency(N=176)	Percent (%)
<i>How important do you think taking your antihypertensive is to keeping kidneys under control</i>		
Yes	115	57.5
No	65	32.5
Don't Know	20	10.0
<i>Can changing lifestyle help to prevent Kidney Failure</i>		
Yes	116	58.0
No	74	37.0

<i>Don't Know</i>	10	5.0
<i>Do you think Kidney Failure is an avoidable part of aging</i>		
<i>Yes</i>	110	55.0
<i>No</i>	60	30.0
<i>Don't Know</i>	30	15.0
<hr/>		
What are the most important factors in preventing Hypertension-induced Kidney failure		
<hr/>		
<i>Managing Hypertension</i>		
<i>Yes</i>	166	83.0
<i>No</i>	34	17.0
<i>Exercising</i>		
<i>Yes</i>	156	78.0
<i>No</i>	44	22.0
<i>Alcohol cessation</i>		
<i>Yes</i>	150	75.0
<i>No</i>	50	25.0
<i>Quitting Smoking</i>		
<i>Yes</i>	140	70.0
<i>No</i>	60	30.0
<i>Reduce salt intake</i>		
<i>Yes</i>	136	68.0
<i>No</i>	64	32.0
<i>Getting a regular check-up</i>		
<i>Yes</i>	126	63.0
<i>No</i>	74	37.0
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Socio-demographic factors associated with Hypertension-induced Kidney Failure

The prevalence of hypertension-induced kidney failure among respondents with hypertension interviewed in the Tamale Metropolis. The overall prevalence of hypertension-induced kidney failure in individuals was 19.0% (95% CI). The results showed that there were no significant differences in hypertension-induced kidney failure prevalence, between males and females. Hypertension-induced kidney failure prevalence was highest among those who live in the urban areas with proportion of 84.0% as against rural areas with proportion of 16.0%. This difference in prevalence between urban was statistically significant ($p < 0.001$). The hypertension-induced kidney failure prevalence increases along with increasing age; prevalence among participants within 30 to 39 years was 40%, 40 to 49 years was 38.0% and 51 to 59 years was 50.0%, hence positive correlation between hypertension-induced kidney failure and age group was observed. Compared to those who had never been married, those who had ever been in a union had a higher proportion of hypertension prevalence,

61.5%. Significant association was also found among participants' BMI status and prevalence of hypertension-induced kidney failure.

Table 6. Prevalence of Hypertension-induced kidney failure among respondents.

<i>VARIABLE</i>	Hypertension-induced Kidney Failure		P-VALUE / χ^2
	YES (%)*	NO (%)*	
Age (years)			
19– 29	1(5.6)	17(94.4)	$\chi^2 = 27.355$ < 0.002
30 -39	3(9.7)	28(90.3)	
40 – 49	6(13.6)	38(86.4)	
50 – 59	12(14.1)	73(85.9)	
60+	16(72.7)	6(27.2)	
Gender			
Male	28(22.2)	98(77.8)	$\chi^2 = 24.741$ < 0.382
Female	10(13.5)	64(86.5)	
Total	38(19.0)	162(81.0)	
Marital status			
Married	24(17.6)	112(82.4)	$\chi^2 = 2.416$ < 1.446
Single	8(19.0)	34(81.0)	
Divorced	3(21.4)	11(78.6)	
Co-habiting	1(25.0)	3(75.0)	
Widow	2(50.0)	2(50.0)	
Total	38(19.0)	162(81.0)	
Residence			
Rural	7(14.9)	40(85.1)	$\chi^2 = 24.23$ < 0.001
Urban	31(21.2)	115(78.8)	
Total	38(19.0)	162(81.0)	
Your body mass index status			
Underweight	2(13.3)	13(86.7)	$\chi^2 = 34.741$ < 0.001
Normal body weight	16(12.8)	109(87.2)	
Obese	20(33.3)	40(66.7)	
Smoking			
Yes	23(92.0)	2(8.0)	$\chi^2 = 18.28$ < 0.001
No	15(8.6)	160(91.4)	
Total	38(19.0)	162(81.0)	
Alcohol Intake			
Yes	14(23.0)	47(77.0)	$\chi^2 = 4.23$ < 0.124
No	24(17.3)	115(82.7)	
Total	38(19.0)	162(81.0)	

DISCUSSION

Two hundred participants were involved in this study. Males were more as compared to females. This results is similar to a study conducted in Nigeria which showed that, out of 240 participants, 52.5% were men. This trend could be attributed to male dominance and the zeal to partake in research study [21]. This study was conducted in advantaged urban area where formal education is high and more than two-thirds of the participants were educated beyond primary school. The population of the

metropolis offers a pool of individuals from diverse backgrounds, race socioeconomic status, and ages.

The prevalence of hypertension-induced kidney failure was 38(19.0%) among participants with hypertension, comparable to the national prevalence of 13.0% [18]. Among participants who are hypertensive-induced kidney failure, majority (42.6%) were at the age of 60 years and above this is consistent a research study conducted by Agyeman and Ofori [13] in Ghana in the year 2019. Participants with hypertensive-induced kidney failure were significantly older than those without the disease in this study. Age has been shown to be an independent predictor of CKD [22]. Those with CKD were also mainly males as female gender was protective. There is evidence suggesting that males have a higher predilection for CKD. Male gender is also associated with faster progression of CKD [22]. Chronic Kidney Disease was more prevalent among older people as observed in this study. This is in line with [4] who reported that, the prevalent rate of hypertension and kidney disease increases with increasing age in all adults. Clearly, hypertension-induced kidney failure prevalence increased with advancement in age and this aligns with what previous studies have shown [13; 23]. Even though hypertension-induced kidney failure prevalence reported in this study was relatively low, more than one-third (40%) were at CKD stage 4. This indicates a high proportion of people that are at high risk of ESRD and possibly undergoing hemodialysis. It is important to develop primary intervention strategies that target both the high and the low risk groups. Hypertension-induced kidney failure was also found to be more prevalent among those with higher wealth status and those living in urban areas. Research has shown that socioeconomic status may shape the lifestyles of individuals and which may predispose them to hypertension and possibly complications of the disease [24]. This is contrary to a meta-analysis, which showed that low socioeconomic status is associated with higher chronic kidney failure [7]. High alcohol intake and smoking are risk factors of chronic kidney disease, in this study high proportion of the participants who smoke and take alcohol have high prevalence of hypertension-induced kidney failure. This study is congruent to a study conducted in Ghana by Awuah and others [24] and also in Nigeria by [10].

Regarding the pathogenesis of the condition as indicated by the participants, 67.5% of the participants were in agreement to the statement 'high blood pressure can constrict the blood vessels, in the kidneys', 70.5% of the participants also believed that narrowing of blood vessels reduces blood

flow to the kidney. Majority of the participants in this current study also both agreed and strongly agreed that if your kidneys' blood vessels are damaged, they may no longer work properly. Poor treatment to hypertension may contribute to kidney failure was also affirmed by three-fourths of the participants. 72.5% of the participants indicated their agreement to the statement that hypertension, and Diabetes are the major cause of Kidney failure. These findings are in congruent to studies conducted in Ghana [13; 24], Nigeria [10] and USA [3].

Majority 115(57.5%) of the respondents affirmed that it is very important to take antihypertensive in order to keep the kidneys under control. They believe that one can protect his or her kidneys by preventing or managing health conditions that cause kidney damage, such as diabetes and high blood pressure. They also believe that changing lifestyle help to prevent Kidney Failure. Approximately 110(55.0%) believed that Kidney Failure is not avoidable part of aging. These findings are similar with those conducted in Ghana among patients with chronic kidney disease at the Komfo Anokye Teaching Hospital by [13]. However this finding is in contrast to a study conducted in rural area in Nigeria [7;10] where many of the participants did not know that managing disease like hypertension and Diabetes helps improve the health of the kidney and may prevent Kidney failure. More than half of the participants correctly identified preventive strategies for hypertension including managing hypertension (83.0%), exercising (78.0%), alcohol cessation (75.0%), quitting smoking (70.0%), reduce salt intake (68.0%), and regular check-ups (63.0%). These findings are in line with a research study conducted in Ghana by Ibrahim et al., [17] however in a study by He and Whelton [5], less than half of the participants were able to identify the preventive strategies for Kidney Failure. Individuals, who are deemed at risk for CKD, may be able with awareness to slow down the stages of developing ESRD by researching proposed medical therapies to change the course of the disease. Primary Care Physicians play a major role in preventing the progression of CKD to ESRD by teaching the importance of controlling blood pressure through diet, exercise, and medication as well as monitoring the use of medication that may be labeled as being nephrotoxic (i.e. non-steroidal anti-inflammatory agents). Lifestyle changes may also be modified to help slow down the progression of ESRD that include decreasing the body mass index to less than 24.9 and ceasing tobacco usage (i.e. smoking). Preventable risk of CKD that includes specific modifications is management of hypertension, diabetes and associated CVD by following medical treatment protocols as prescribed [15]. There are evidenced-based practices that have been identified as being successful in slowing

down the progression of CKD to ESRD [21]. By controlling blood pressure through the use of an angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB), and by controlling glycemic levels, there is a significant decrease in the progression of the stages in CKD [6]. Physical activity is also considered an evidenced-based practice for individuals diagnosed with hypertension and diabetes [14]. Healthy lifestyle modification that includes eating the right diet, exercising and getting regular medical exams can help prevent chronic as well as non-communicable disease, reducing the health cost burden of individual [22]. No matter which treatment modality the individual chooses, the results will be directly related to self-care and adherence to the prescribed treatment plan [11].

CONCLUSION AND RECOMMENDATION

This study observed a prevalent rate of 19.0% for hypertension-induced kidney failure, with nearly two-thirds identifying hypertension-induced kidney failure as lifelong disease. Majority of participants in the metropolis had high knowledge on risk hypertension-induced kidney failure. Age, obesity, physical activity, smoking and residence were found to be significantly associated with hypertension-induced kidney failure whiles gender, religion, occupation, ethnicity, residence, alcohol intake and smoking were not significantly associated with it.

The most vulnerable populations (e.g., African Americans) should be targeted for education to prevent the development of CKD. Sincere efforts are needed to increase the awareness of kidney failure through continuous group education courses in the primary health care centers and hospitals. Special health education and promotional programs through the media can play an important role in this aspect. Insufficient attention to health education by health care practitioners and lack of motivation for health education services should be addressed.

LIMITATION OF THE STUDY

Conducting research on pathogenesis and preventive measures of hypertension-induced Kidney Failure among adults aged 18 years and above comes with some challenges which must be taken into account when interpreting the study finding. Cross sectional study has inherent limitation such as memory bias but the effect of this on the finding of the study was minimized by using probes to aid memory.

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QUESTIONNAIRE

A. SOCIODEMOGRAPHIC

1. Age (years): a) 19-29years [] b) 30-39years [] c) 40-49years [] d) 50-59years []
e). 60+years []
2. Gender: [] Male [] Female
3. Religion: [] Christian [] Islam [] Traditional [] Others; specify _____
4. Ethnicity: _____
5. Place of residence: [] Rural [] Urban
6. Marital Status: [] Married [] Single [] Divorced [] Co-habiting []Widow

7. Educational Level: Primary JHS Secondary/Technical/Vocational
 Tertiary None
8. Employment Status: Unemployed Self Employed Employed
9. Occupation: _____
10. Income: Ghc100- Ghs500 Ghc500 -Ghc1000 Ghc1000 – Ghc1500
 Ghc1500-Ghs2000 >Ghc2000
11. Do you smoke cigarette? Yes No.
12. Do you take alcohol? Yes No.
13. Do you exercise? Yes No.
14. BMI Status.....
- A). Less than 18.5 Kg/m² B). 18.5 – 24.9 Kg/m² C). 25-29.9 Kg/m²
D). Above 30 Kg/m²
15. High Salt intake Yes No.

SECTION B: PREVALENCE OF HYPERTENSIVE-INDUCED KIDNEY FAILURE

16. What is your hypertensive status? A). Stage 1 B). Stage 2 C). Stage 3
17. For how long have you had hypertension? A). Less than 1 year B). 1 to 5 years C). 5 to 10 years D). More than 10years
18. Have you ever been told that you have Kidney Failure? Yes No
19. If Yes, Who told you about it? A). Doctor B). Pharmacist C). Nurse D) other
20. If Yes, how many months/ years ago? A). Less than 1 year B). 1 to 5 years C). 5 to 10 years D). More than 10years
21. What is the name of the stage of CKD are you diagnosed of? CKD stage 1 CKD stage 2
CKD stage 3 CKD stage 4 CKD stage 5
22. How dangerous is Kidney Failure to your health? Extremely Somewhat
 Not At All Don't Know
23. Would lowering high blood pressure improve a person's health? Yes No
 Somewhat Don't Know
24. Have you heard of Kidney Transplant? Yes No
25. Family History of Chronic Kidney Failure? YES NO
26. Do you think that Kidney Failure is a lifelong disease?
A. Yes B. No C. Don't Know
27. Do you think that Kidney Failure has a cure?
A. Yes B. No C. Don't Know

SECTION C: RISK FACTORS AND PATHOGENESIS OF HYPERTENSION-INDUCED CKD

28. Which of the following do you think may lead to hypertension-induced kidney failure. Tick [√] in the table below

RISK FACTOR	YES	NO	DON'T KNOW
Excessive alcohol consumption			
Excessive smoking			
Poor eating habits			
Physical inactivity			
Age of a person			
Other diseases like Diabetes			
Race of person (blacks)			

29. Which of the following do you think are the cause of hypertension-induced kidney failure? Tick [√] in the table below.

Pathogenesis /Causes	SA	A	D	SD
High blood pressure can constrict the blood vessels, in the kidneys.				
The narrowing of blood vessels reduces blood flow to the kidney.				
If your kidneys' blood vessels are damaged, they may no longer work properly.				
Poor treatment to hypertension may contribute to kidney failure.				
Hypertension, and Diabetes are the major cause of Kidney failure.				

D. PREVENTION OF HYPERTENSION-INDUCED CKD

30. How important do you think taking your antihypertensive is to keeping kidneys under control? [] Very Important [] Somewhat Important [] Not At All Important

31. Can changing lifestyle help to prevent Kidney Failure?

Yes [] No [] Don't Know []

32. Do you think Kidney Failure is an avoidable part of aging?

Yes [] No [] Don't Know []

33. What are the most important factors in preventing Kidney failure?

	Yes	No
Manage Hypertension /DM	[] []	
Exercising	[] []	
Alcohol cessation	[] []	
Quitting Smoking	[] []	

Reduce salt intake [] []

Losing Weight [] []

Getting a regular check-up [] []

UNDER PEER REVIEW