

**THE ROMANCE OF A SILENT KILLER:
EQUAL LOVE AND HATRED FOR ALL**

*An Inaugural Lecture delivered
at the University of Ibadan*

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By

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The Vice-Chancellor, Deputy Vice-Chancellor (Administration), Deputy Vice-Chancellor (Academic), Registrar, Librarian, Provost of the College of Medicine, Dean of the Faculty of Clinical Sciences, Dean of the Post-graduate School, Deans of other Faculties, and of Students, Distinguished Ladies and Gentlemen.

I consider it an honor to stand before you today to give this inaugural lecture on behalf of my department, the Department of Medicine and the Faculty of Clinical Science. I thank the dean, Prof. Tunde Ajaiyeoba who nominated me on behalf of the Faculty. To my knowledge, this is the fifth of its kind coming from the Department of Medicine since its inception in 1948. I therefore feel highly honored to be the fifth Lecturer from the flagship department of the College of Medicine, University of Ibadan. I salute my predecessors in this regard; they are Prof. T.I. Francis, Prof. Ayodele Falase, Prof. Adesola Ogunniyi and Prof. Solomon Kadiri.

I joined the department of medicine, University College Hospital, in 1990 for residency training and I had the honor of finishing my training in four and a half years, a feat that was uncommon in my time. I then waited for another one and a half years before I had the rare opportunity of joining the Department of Medicine in the College of Medicine, University of Ibadan; thus I transferred my services to the University on 18th March, 1996. Since then, I have been involved in research and training in my specialty of Hypertension and Nephrology, I have followed the progress in the field of hypertension/nephrology and I have paid particular attention to hypertension, its risk factors and other co-morbid factors that may work in concert with hypertension to produce hypertension complications especially, chronic kidney disease. I have also studied the problems relating to poor control of hypertension and the factors responsible for it.

Mr. Vice-Chancellor Sir, before I arrived at the title for today's lecture, I had considered a number of other titles, including "Hypertension and its Complications". I also considered "The Romance of Kidney and Hypertension: Message

from the Dead to the Living” which would aptly reflect the major content of my lecture. However, it was the title of a lecture I gave to some of my colleagues a few years ago, perhaps some of them might still remember this. I therefore thought that the best title would be something presented with a mundane flavor in view of the expected hybrid nature of my audience today, thus I chose the present title which is “THE ROMANCE OF A SILENT KILLER: EQUAL LOVE AND HATRED FOR ALL”. I am sure many people will wonder about what this title has got to do with blood pressure and hypertension, which I described here as the SILENT KILLER. And who are its consorts at the receiving end of its love and hatred? In the present title Sir, the focus is the end point of the relationship between hypertension the SILENT KILLER, and heart, brain, eyes and the kidney—all of which have been described here as its wives for the purpose of this lecture. They are also known in medical parlance as TARGET ORGANS; they all represent areas where hypertension spreads love and also hatred.

Mr. Vice-Chancellor Sir, ladies and gentlemen, it is now my pleasure to invite you all to follow my thoughts as I prepare to take you through the road map showcasing some of my modest contributions in my specialty of kidney disease and hypertension. In doing so, I shall take you through the definition of blood pressure and elevated blood pressure, the functions of the kidney and the relationship between hypertension and kidney, brain, heart and the eyes. I shall conclude by stating my views and suggestions. My experience as a physician, teacher and researcher in this great University, will be brought to bear on my conclusions.

What is Blood Pressure?

Blood pressure is essential for life and nobody could survive without it. It is generated by the force of contraction of the heart and the resistance in the vessels that carry blood round the body. Thus blood pressure is expressed mathematically as

$$\text{Blood Pressure} = \text{Cardiac Output} \times \text{Peripheral Resistance}$$

Cardiac output is the amount of blood pumped by the heart per minute while the peripheral resistance is the inertia which the blood has to overcome while flowing through the vessels. It therefore follows that any increase or decrease in cardiac output and peripheral resistance will affect blood pressure.

Normal blood pressure (table 1) is defined by the World Health Organization (WHO)¹ as systolic blood pressure (SBP) less than 140mmHg, and diastolic blood pressure (DBP) less than 90mmHg.

Table 1: 1999 WHO/ISH Guidelines

	SBPmmHg		DBPmmHg	
Optimal	<120	and	<80	
Normal	<130	and	<85	
High normal	130-139	and/or	85-89	

What is Hypertension?

Hypertension is defined as systolic blood pressure of 140mmHg and above and/or Diastolic Blood pressure (DBP) of 90mmHg and above, using the Korotkoff sound phases 1 and 5 respectively.

The WHO/ISH also classified hypertension into stages 1, 2 and 3 which is synonymous with mild, moderate and severe hypertension (table 2).

Table 2: Hypertension

	SBPmmHg		DBPmmHg	
Grade 1	140-159	and/or	90-99	
Borderline	140-149	and/or	90-94	
Grade 2	160-179	and/or	100-109	
Grade 3	180	and/or	110	
Isolated SHT	140	and	< 90	
Borderline	140-149	and	< 90	

Epidemiology of Hypertension

Hypertension affects approximately 1 billion individuals worldwide. It is one of the most important non-communicable diseases and one of the most frequent reasons for consultation, to physicians and the most frequent reason for which medications are prescribed. In spite of the increasing public awareness programme and rapidly increasing array of antihypertensive agents, hypertension remains one of the leading public health problems in many parts of the world. Arguably it is the most prevalent cardiovascular disorder the world over². The prevalence of hypertension increases with age and it appears practically in all age groups and sub-populations except in a few pockets of population who are said to be living very close to nature. It is more prevalent in blacks than in white persons. The prevalence of hypertension varies between 10 and 40 percent in different areas of the world. In the US, hypertension is the most common cardiovascular disease with a prevalence of about 20% in white and about 40% in black people².

In Africa, the story of hypertension started with a false sense of security. Some of the earliest works carried out in Africa on blood pressure measurement concluded that cardiovascular diseases and hypertension were rare in the black African population. A man called Doninson³ who studied 1,800 patients over a period of 2 years in a native Kenyan hospital in 1929, could not record a single case of hypertension in the hospital where he worked when screening for cardiovascular diseases. Another person, Vint⁴, a Pathologist corroborated Doninson's finding after studying 1000 autopsies in the late 1930s. Humphries⁵ who also worked in parts of Central, Southern and West Africa noted only a few cases of (stroke) paralysis due to cerebral hemorrhage over a period of 14-years compared to his experience in the Bahamas. He, in particular, concluded that the permanent state of hunger in which many Africans lived prevented them from developing hypertension. This belief however changed in the late 1940s when Williams, Abrahams and Alele⁶ working in sub-Saharan Africa noted that hypertensive disorders were far from being rare in the urban

populations of the cities of West Africa. Since then hypertension and its complications have remained a very formidable problem not only in the entire African continent, but also, the world over.

Various reports from Africa have subsequently put the prevalence rate of hypertension at between 7% and 20%. In the West African sub-region, the prevalence may be as high as 15% and there is a clear-cut rural and urban dichotomy with prevalence being higher in the urban regions⁷. Coming back home, Akinkugbe and Ojo in a community survey in 1969 put the prevalence rate of hypertension in the order of 8-10% in rural and 10-12% in urban populations⁷. In 1991 my unit revisited the issue of prevalence of hypertension in our community⁸. We studied urbanized workers in some selected banks and churches in Ibadan. The prevalence of hypertension of 9.3% in our study was similar to previous rates. The largest hypertension survey in Nigeria was commissioned during the Late Prof. Olukoye Ransome-Kuti's tenure as Minister of Health. The committee was chaired by Emeritus Prof. O.O. Akinkugbe. In that report, the age adjusted prevalence of hypertension was 9.2% in men and 9.3% in women⁹. The interesting thing is that they also studied prevalence in different Local Government areas of the country (table 3).

Table 3: Crude Prevalence of HTN by Local Government Areas

	M	F	OVERALL
KANO	22.5	25.1	17.7
OREDO	16.4	13.4	14.9
LAGOS M	14.1	18.2	10.7
LAGOS I	12.2	12.7	8.3
IBADAN	9.3	15.5	7.8
IKOT EPENE	10.7	9.8	7.1
NJIKOKA	18.2	12.7	5.9

Hypertension is a silent killer and has no clear cut symptoms; the risk factors that may predispose the individual to hypertension include, age, black race, genetics, use of

alcohol, stress, low birth weight, excessive salt intake, obesity, lack of exercise, sedentary lifestyle, and recently the effects of migration, job strain and marital strain.

Blood Pressure/Hypertension and the Heart

Mr. Vice-Chancellor Sir, when blood pressure remains within normal range, it spreads peace and love within the body and among the target organs, but when blood pressure becomes elevated and sustained (hypertension) it spreads hatred by damaging and wrecking havoc on them. For example, the heart requires blood supply with the aid of normal blood pressure to function effectively and it pumps same to the rest of the body. That may symbolize love, but when blood pressure becomes hypertension, it puts strains on the same heart causing it to become hypertrophied and enlarged. If hypertension is not controlled, the force against which the heart has to pump becomes deleterious to the heart and the heart eventually fails to perform its normal function of supplying blood and oxygen to the whole body. This is what the cardiologists call HEART FAILURE.

In the course of my investigating the complications of hypertension, I collaborated with colleagues in the cardiac unit in my department to study target organ damage and wall dimensions of the heart in newly diagnosed hypertensive patients in Ibadan^{10,11}. We were able to show that a number of cardiac abnormalities including systolic and diastolic dysfunctions, conduction abnormalities and left ventricular hypertrophy occur early in newly diagnosed hypertensive subjects. These findings occurred at moderately high blood pressure and suggest that complications of hypertension in the heart may have developed long before hypertension is detected in the individual. We therefore suggested that newly diagnosed hypertensives be screened early enough for cardiovascular risk factors since left ventricular hypertrophy alone predisposes the individuals to heart failure, other cardiovascular events, and sudden death.

Blood Pressure/Hypertension and the Brain

The brain requires normal blood pressure for effective, adequate and appropriate supply of blood for optimal function; this is called the perfusion pressure which is derived from the blood pressure. This is symbol of love. Cerebral perfusion pressure (CPP), is the net pressure gradient causing blood flow to the brain (brain perfusion). It must be maintained within narrow limits because too little pressure could cause brain tissue to become ischemic, and too much could raise intracranial pressure (ICP). So, under normal circumstances, cerebral blood flow is relatively constant due to protective autoregulation. Mr. Vice-Chancellor Sir, when blood pressure is high (hypertension) and remains persistently and severely elevated, it causes stroke in the brain.

Blood Pressure/Hypertension and the Eyes

Hypertension is known to cause retinopathy of different grades and when severe may cause blurring of vision due to papilledema (fig. 1 and table 4). I collaborated with my colleagues in the department of ophthalmology to assess the prevalence and pattern of hypertensive retinopathy in newly diagnosed hypertensive subjects in our clinic¹⁰. The prevalence of grade 4 retinopathy was 1.6%. This corroborates what Prof. Akinkugbe and other workers in other parts of Africa had found previously. Grade 3/4 retinopathy is a result of severe and malignant hypertension and when it occurs, it causes blurring of vision and oftentimes kidney and heart failure.

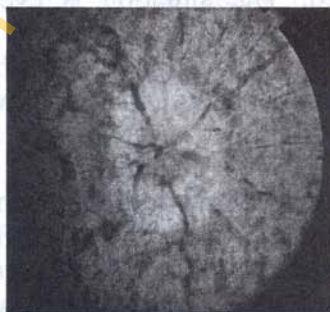


Fig. 1. Papilledema

Table 4: Retinopathy Grade (%)

▣	0	14	25.92
▣	1	11	20.37
▣	2	28	41.86
▣	3	0	0
▣	4	1	1.6
	Total	54	100

Mr. Vice-Chancellor sir, having mentioned briefly the havoc hypertension does to the heart, brain and the eyes, I shall now proceed to talk about hypertension and the kidney—my primary specialty area.

Blood Pressure/Hypertension and the Kidney

The dimension of the public health problem posed by hypertension and other cardiovascular diseases and the possibility that the disease burden may be magnified by the year 2020 in the developing nations should provide a strong rationale for special attention on definition, classification, control of blood pressure and complication of hypertension, especially in our environment. In spite of the availability of more than 75 antihypertensive agents in nine classes, the almost daily increase in the armamentarium of anti-hypertensive drugs, and enormous quality research works carried out on this important disease in the past years, the control of hypertension is at best inadequate. Thus the prevalence of hypertension with that of other cardiovascular diseases resulting from it has not been globally and consistently reduced. The situation is even worse in the developing countries where the level of blood pressure control has remained rather poor and the incidence of hypertension complications and other cardiovascular diseases remains persistently high.

In the US, about 74% of adult black Americans with hypertension are aware of their disease while 57% are on treatment and 14-25% are controlled to <140/90mmHg with medications¹². In some studies in Dakar¹³, Senegal, only 2.5% of the study populations were on treatment with a prevalence of between 7.4% and 10.2%, while in a community survey in

Ghana, only 24% of subjects were aware of their hypertension and only a third of them were on treatment¹⁴. In Nigeria, the results of a national survey showed that only a third of subjects who were hypertensive were on treatment. In Sudan, excellent blood pressure control set at <140/90mmHg stood at 46% in one study¹⁵. In South Africa, between 41 and 67% of subjects are aware of their disease and 39 to 55% are on treatment while 26-38% of them are controlled¹⁶. In Ibadan¹⁷, only 25.4% hypertensive subjects attending our hypertension clinic were controlled. Putting all these together, it is obvious that optimal blood pressure control in most hypertensive populations is lacking and this may be responsible for the persistently high prevalence of complications of hypertension in this environment.

My colleagues and I have found some interesting data concerning the control of blood pressure in this part of the world. For example, in our environment, control of blood pressure has been found to range between 25.4% and 39%¹⁸. Non-compliance is reputed to be the most common culprit responsible for this poor level of control (table 5). While trying to assess the impact of knowledge, attitude and belief of 2,285 hypertensive subjects on compliance in three Teaching Hospitals in the Southwest of Nigeria, we found that about 39% of subjects were fully controlled¹⁸. Only about 25.4% were adequately informed about hypertension thus confirming the fact that many of the subjects had very poor knowledge of the disease. Some of the reasons for non-compliance documented in that study include inability to afford the drugs due to high cost, poor knowledge of the disease and lack of access to medical care. The implication of this is that the hypertensive population needs a special public awareness programme and proper education about the disease.

Another neglected area relating to hypertension control, which may also be responsible for poor control, is resistant hypertension. We have assessed about 566 hypertensive subjects in our hypertension clinic for this condition and found out that about 5% of the poorly controlled hypertensive population had resistant hypertension¹⁹. Ensuring adherence

to treatment thus appeared to be the single most important strategy to improve hypertension control in our subjects. Education of patient should include emphasis on the importance of compliance, exercise, reduction of indiscriminate ingestion of NSAIDS, alcohol and tobacco, weight reduction, and other lifestyle modification techniques.

Table 5: Factors Responsible for Poor Blood Pressure Control

Poverty/Non-compliance	Obesity	NSAID drugs
Coffee excess	Alcohol excess	Tobacco excess
Salt excess	Kidney insufficiency	Secondary HTN
Resistant HTN	Inadequate doses	High cost
Forgetfulness	Drug interaction	
Poor knowledge of HTN	Adverse effects of drugs	Unavailable drugs
*Faith healing		

In the area of risk factors of hypertension, we have shown that bronchial asthma may be an important risk factor for hypertension; this was borne out of my contact with patients with acute severe asthma, in whom I observed an uncommon phenomenon. They often developed hypertension during the attack. This prompted some colleagues in the Chest Unit and I to study and follow up 12 patients with acute severe asthma and we subsequently studied the prevalence of hypertension among 134 asthmatic patients in the stable state²⁰. None of the patients with acute severe asthma needed to have treatment for the elevated blood pressure during the attack. But the prevalence of hypertension was subsequently found to be about 37% among people with bronchial asthma in the second study (table 6). When this is compared with the prevalence in the general population, the frequency of hypertension in patients with bronchial asthma is quite high. There is clear evidence from the study to suggest that bronchial asthma may be a risk factor for hypertension. We suggested that patients with asthma should have regular blood pressure check during follow-up clinics.

Table 6: Pattern of BP in Asthmatics

☐ Status of BP (mmHg)	Male n=21	Female n=28	M+F n=49
☐ SBP>140	1 (5%)	1(4%)	2 (4%)
☐ DBP >90	7(33%)	9(32%)	16(33%)
☐ SBP+DBP/HTN	11(52%)	16(57%)	27(55%)
☐ On RX HTN	2(10%)	2(7%)	4(8%)
☐ Total	21(100%)	28(100%)	49(100%)

In conjunction with my colleagues in the Obstetrics and Gynaecology Department, we studied prevalence and pattern of hypertension among 409 pregnant mothers while following them till delivery; the prevalence of hypertension was documented to have risen from 9.8% at booking to 26.2% at delivery²¹. Previous personal and family histories of hypertension were found to be strong determinants of hypertension in pregnancy. Hypertension in pregnancy accounts for about 12% of all maternal deaths which is about 1500 per 100,000 life births in Nigeria. It is a significant cause of morbidity and mortality in the fetus and mothers especially in developing countries. It is therefore important for our pregnant women to start antenatal care early so that they can receive appropriate care.

We found out that the prevalence of hypertension is high in our environment and that the status of blood pressure control is rather poor with non-adherence to therapy being a major factor, and poverty and high cost of drugs being the major reasons why patients cannot procure drugs in many cases. In company of others, I proceeded to assess the pattern of blood pressure control in populations where anti-hypertensive agents are given free to patients. My expectation was that since the drugs are freely available to this group of patients, the level of blood pressure control would probably be a lot higher than that of the Teaching Hospitals where patients buy their drugs out of pocket. I was very wrong!

With some collaborators at the International Institute for Tropical Agriculture (IITA), we assessed the control of blood pressure among the hypertensive population²². Out of 143 subjects, which included 135 Nigerians, 5 Caucasians, 2 Ghanaians and 1 subject from Sierra Leone; only 36% of them were fully controlled, yet they were all receiving free drugs. The factors responsible for poor control were similar to those patients managed in the Teaching Hospitals.

It then occurred to me that other factors might be much more important than just poverty and non-compliance. I therefore beamed the searchlight on the prescription patterns in some of the hypertension studies. Only about half of the hypertensive subjects in all the studies were on more than one drug treatment, some of which were not at near maximal or maximal doses²³. Indeed, it has been documented that more than 70% of subjects with hypertension will require combination therapy to achieve optimal control. The ISHIB has recommended the "15-over-10 rule." This means that any patient with a systolic blood pressure greater than or equal to 15 mm Hg and a diastolic blood pressure greater than or equal to 10 mm Hg above the desired goal should start on two medications instead of one. I therefore urge healthcare providers managing high blood pressure in our environment to start their patients who fall into this category on at least two medications in order to successfully lower their blood pressure.

An inadequate dose of anti-hypertensive medications therefore becomes important as one of the factors responsible for poor blood pressure control in our environment. Physicians should be more concerned about adequate doses of drugs in treating their patients. In addition to the above factors, a number of other possible factors are beginning to emerge. For example, the big issues of fake drugs, faith healers/faith healing and alternative medical practitioners are also competing seriously with orthodox physicians in our environment. This is presently causing a very great concern. While it may be possible to call for the ban of advertisement by the alternative medical practitioners, it will be a Herculean

task to do same to the beneficiaries and apostles of faith healing. Faith healers should be advised to leave the practice of medicine for those of us trained in the art and they should concern themselves more with winning of souls for the Lord. I believe that is their primary role. Perhaps it's time for researchers to use religious houses as avenues for blood pressure control.

Mr. Vice-Chancellor Sir, I believe by now my audience can appreciate that the combination of a high prevalence of hypertension and poor level of control in a community is a recipe for frequent complications of hypertension, cardiovascular events and death. This seems to be the situation in our own environment.

The Kidney and Hypertension

The kidneys are located retroperitoneally with their upper poles and lower poles opposite the twelve thoracic and third lumbar vertebrae respectively. The right kidney is generally lower than the left. Each adult kidney may weigh about 130-170gm and may measure about 12 by 6 by 3cm. The kidney may contain up to about 1,200,000 nephrons as the functioning unit of the kidney (fig. 2).

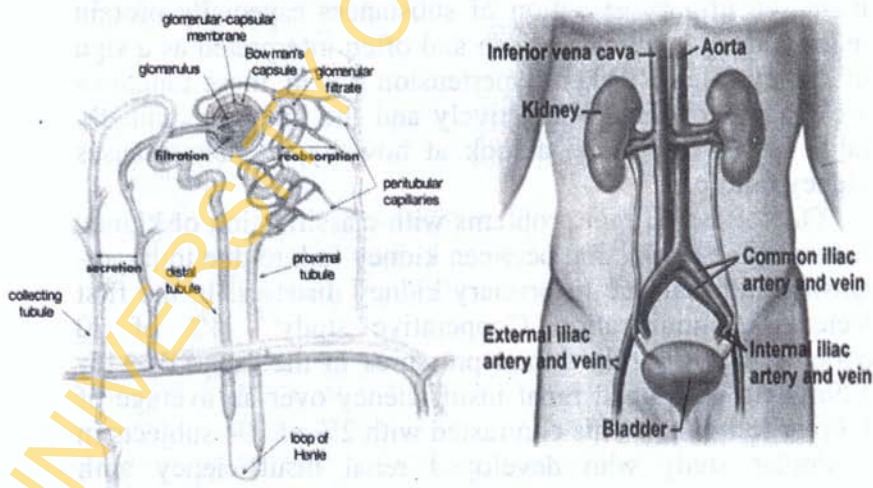


Fig. 2. Nephron & kidney positions

The kidneys receive about 25% of blood pumped by the heart. When blood pressure is normal, all the budgeted allocation of blood is delivered to the kidney and it enjoys love from blood pressure but when blood pressure is too low or too high (hypertension), the kidney gets a reduction in the allocated amount of blood with consequent damage to the vessels supplying it leading to poor kidney function over time.

The principal functions of the kidney include but not limited to the following maintenance of volume, excretion of metabolic waste products, detoxification and elimination of drugs, control of red blood cell mass through production of erythropoietin, endocrine control of mineral metabolism, and maintenance of acid/base balance. In maintaining its functions, the kidney possesses some natural barriers, which prevent it from losing many of the substances that it filters including protein. These structures are;

1. Glomerular capillary endothelium;
2. Glomerular basement membrane;
3. Visceral epithelium;
4. The messangium.

Increased urinary excretion of substances especially protein in the kidney is therefore seen and often interpreted as a sign of kidney disease. When hypertension sets in, these functions are gradually affected negatively and the kidney eventually fails. Let us now take a look at how hypertension causes kidney failure.

One of the current problems with classification of kidney failure is the distinction between kidney failure due to hypertension and that due to primary kidney diseases. In the first Veteran Administration Cooperative study²⁴, 4% of 70 patients with diastolic blood pressures in the range of 115-129mmHg developed renal insufficiency over an average of 1.3 year follow-up. This contrasted with 2% of 194 subjects in a similar study who developed renal insufficiency with diastolic blood pressures of 90-114mmHg over an average of

3.3 years follow-up period, suggesting that the level of blood pressure may determine the degree of renal insufficiency. The above facts have shown that essential hypertension causes kidney failure and that the higher the blood pressure, the more likely it is for the individual to suffer from kidney failure.

Currently in the US, kidney failure is a major expense, costing the Government, patients and insurers nearly \$20 billion in the year 2000 alone²⁵. Hypertension is a leading cause of kidney failure in the US, accounting for 25 percent (87,000) of the nearly 379,000 people treated for kidney failure in 2000. Black patients are six times more likely than whites to develop kidney failure from hypertension and it is more common in men, older individuals and people with persistently severe hypertension. Hypertension no doubt influences the progression of chronic kidney disease significantly. The stages in the progression of kidney failure from hypertension include the following:

1. The earliest stages involve a fall in renal blood flow resulting in increased renal vascular resistance but the glomerular filtration rate is preserved.
2. Renal impairment then follows with damage to glomeruli and pre-glomerular vessels leading to ischaemia and loss of glomerular function.
3. The normal loss of glomeruli, which occurs with age, also proceeds at a very faster rate in hypertensive subjects.
4. High systemic pressure is also transmitted to the glomerulus's leading to intraglomerular hypertension, hyperfiltration and damage to both glomerulus and the tubules.

Several markers of kidney involvement in hypertension have been identified. These include Hyperurecemia, N-acetyl-beta-glucosaminidase, Beta-2-microglobulin, Alpha-1-microglobulin, Alpha-2-microglobulin, serum cystatin C and microalbuminuria. Of these parameters, microalbuminuria is

the most studied. In hypertensive subjects, recent evidences suggest that microalbuminuria is prevalent in nonmalignant hypertension and may predict the development of overt proteinuria and therefore chronic kidney disease²⁶. It is well known that continuous excretion of protein in the urine increases nephrosclerosis and damage to the kidney. At the University College Hospital, Ibadan, we have studied urinary albumin excretion rate in 24 hypertensive subjects who were negative to conventional dipsticks test²⁶. The prevalence of microalbuminuria in them was about 87.5% even though their renal function was generally found to be normal. Furthermore, we also demonstrated that urinary albumin excretion is reversible in the same group of people following treatment.

In the early stage of involvement of hypertension in the kidney, the kidney appears normal. Clinical evidence of this involvement is often scanty but patients with long duration of hypertension may have vascular abnormalities consistent with nephrosclerosis in the presence of near normal kidney function. The most common vascular lesion in hypertensive renal disease is arteriosclerosis of the afferent and efferent vessels and glomerular tuft. The gross appearance of the kidney depends on the severity of hypertension and the extent of vascular changes consequent on the elevated blood pressure. In advanced cases however (fig. 3), both kidneys are coarsely granular with capsule stripping with difficulty and this is the stage signaling the development of chronic renal failure.

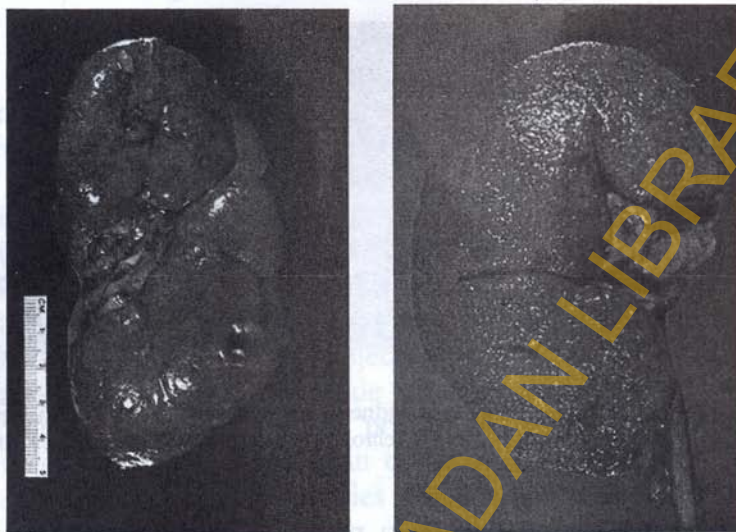


Fig. 3. Normal and hypertension kidney

At end stage, the kidneys appear shrunken. Microscopy reveals arteriosclerosis of the arcuate and interlobar arteries. The afferent and efferent vessels show fibrous thickening of the intima, fraying and splitting of the internal elastic lamina of the medium size arteries with consequent widespread narrowing of the small vessels. There is usually a concomitant thickening of the glomerular capillary tuft and the corresponding tubules become atrophic. Functional changes at this stage include initial but transient increase in glomerular filtration rate with subsequent reduction in this parameter. This is then followed by increased tubular dysfunction resulting from tubular atrophy with decreasing reabsorptive capacity and increased urinary loss of fluid. Thereafter, overt kidney failure begins. It is pertinent to say that the microscopic appearance of the "end stage kidney" is similar regardless of the cause, which is why a biopsy in a patient with chronic renal failure yields little useful information (fig. 4).



Fig. 4. Histology of end stage kidney (The cortex is fibrotic, the glomeruli are sclerotic, there are scattered chronic inflammatory cell infiltrates, and the arteries are thickened)

Hypertension occurs in many kidney diseases and it is also well known that a rise in blood pressure may be associated with kidney damage. Hypertension is therefore one of the most frequent causes of end stage kidney failure the world over. Akinsola et al²⁷ in Ile-Ife found a prevalence of about 25% while Ojogwu²⁸ in Benin found that about 43% of chronic kidney failure subjects were due to hypertension. In UCH, Ibadan, hypertension accounts for about 38.9% of all cases of end stage kidney failure²⁹ (fig. 5).

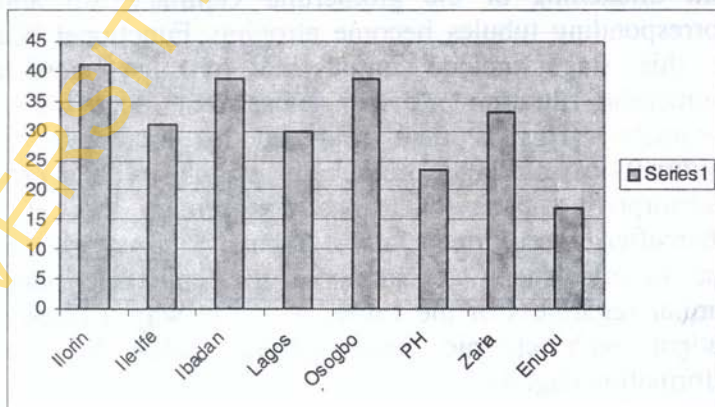


Fig. 5. HTN as a cause of CRF in Nigeria

The consequence of hypertension in the kidney is chronic kidney failure; it is characterized by progressive and irreversible loss of kidney function leading to accumulation of nitrogenous waste products of metabolism, which are normally excreted into the urine. Worldwide, the incidence increases by 6% every year with a population growth rate of 1.2 %, prevalence rate is about 295 per million populations with 89% on hemodialysis, 11% on CAPD and more than 500,000 post-transplant subjects world-wide³⁰. By 2010, dialysis population worldwide was projected to be about 2.5million (fig. 6). This is posing a major public health problem especially in African countries like Nigeria, where dialysis facilities and activities are the lowest in the world (fig. 7).³¹.

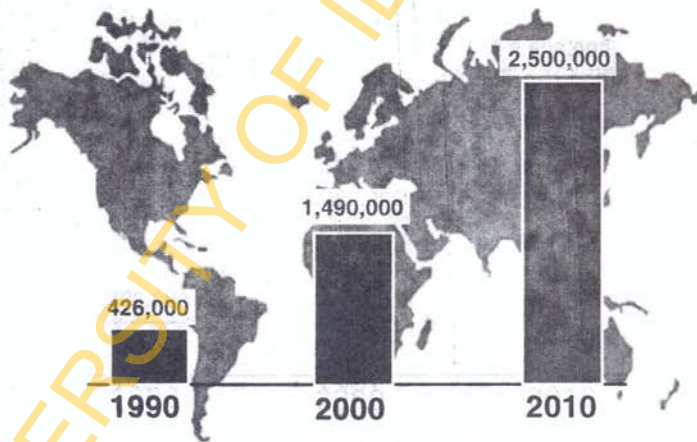


Fig. 6. Number of patients worldwide treated with chronic dialysis from 1990 to 2010 (Adapted from Lysaght, *J Am Soc Nephrol*, 2002)

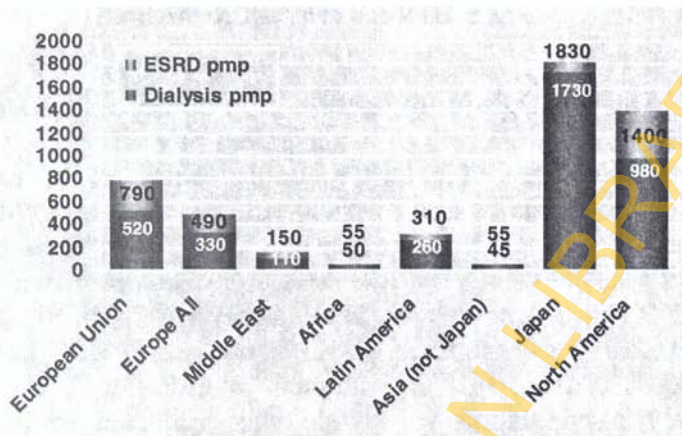


Fig. 7. ESRD & Dialysis Global Prevalence (Adapted from Moeller S, Gioberge S, Brown G. *NDT* 2002; 17: 2071-2076)

In some studies in Nigeria, end stage kidney failure accounted for between 6-12% of hospital admission, and small-scale community studies found the prevalence of chronic kidney disease in adults to range between 19% and 30%³². Even in the US, the reported prevalence of CKD stages 1-4 in the most recent NHANES (national health and nutrition examination survey) between 1999 and 2006 was 26 million out of a population base of approximately 200 million. This represented United States residents aged 20 and older adults; of these, 65.3% had CKD stage 3 or 4. Those with diabetes and hypertension had far greater prevalence of CKD (37% and 26%, respectively) compared to those without these conditions (11% and 8%, respectively).³³ In Nigeria the total number of deaths caused by CKF in and outside the hospital cannot be accurately estimated since many people with CKF do not come to the hospital for treatment. Untreated CKF by definition is universally fatal worldwide and patients with CKF represent a group of people with higher mortality compared with the general population, even when adjusted for age, race, gender and other co-morbid conditions. Mortality is highest in the older age group and diabetic patients.

Managing chronic kidney disease in Nigeria has been rather challenging. The prevalence in the country may be estimated at about 1000 per million populations and at the University College Hospital, Ibadan, more than 15 new cases are seen per month (fig. 8). The category of people affected by CKF in developing countries ranges from young to old but a substantial percentage of them are in their prime of life and often breadwinners of their families^{34,35}. Majority of them are between the ages of 20-55years. It is pertinent to note that in developed countries like the UK and the US, patient population is generally elderly compared to our situation. Apart from hypertension which is the subject of discussion today, there are other causes of CKF; these include CGN, DN, Obstructive uropathy, Polycystic kidney disease, drugs, native herbs, pyelonephritis, Sickle Cell nephropathy, Gouty nephropathy, use of mercury-containing soap and cream, and some malignant infiltrations.

<input type="checkbox"/> Demography		<input type="checkbox"/> CGN,
<input type="checkbox"/> Percentage		<input type="checkbox"/> Diabetes Mellitus,
<input type="checkbox"/> Age<20	16.4	<input type="checkbox"/> Obstructive uropathy,
<input type="checkbox"/> 21-40	53.7	<input type="checkbox"/> Polycystic kidney disease,
<input type="checkbox"/> 41-60	25.5	
<input type="checkbox"/> 61-80	4.4	<input type="checkbox"/> Drugs/Native herbs
<input type="checkbox"/> SEX Male-74, Female-26		
<input type="checkbox"/> Primary ESRD Diagnosis		<input type="checkbox"/> pyelonephritis,
<input type="checkbox"/> CGN	47.7	<input type="checkbox"/> Sickle Cell Nephropathy,
<input type="checkbox"/> HTN	38.9	<input type="checkbox"/> Gouty nephropathy
<input type="checkbox"/> DN	4.5	<input type="checkbox"/> Malignant infiltrations.
<input type="checkbox"/> Others	8.9	

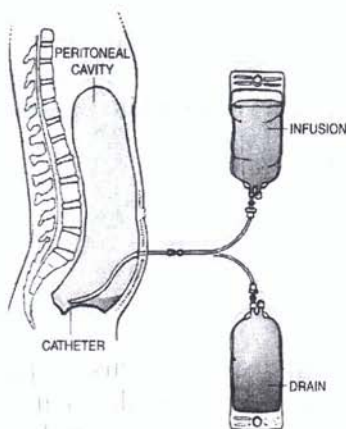
Fig. 8. Causes of CKF in Ibadan

In the hypertensive patient chronic kidney failure may present with swellings in the face, ankle/legs/abdomen, and tiredness, normal or reduced urinary output, later vomiting, drowsiness, seizure and loss of consciousness may occur. Since most sufferers of the disease cannot afford treatment, many of them are still being managed conservatively, which include renal diet in form of low protein, low

potassium/sodium diet, control of hypertension and blood sugar. However, this approach has not been very effective in our patients as most of them come late to the hospital. Dietary treatment has been shown to be helpful only in early stage of the disease. Renal replacement therapies in form of dialysis and kidney transplantation are the only effective ways of treatment for now. In Nigeria, haemodialysis did not start until the 80s although peritoneal dialysis started earlier (fig. 9). Today, almost every political zone of the country now has at least one dialysis outfit. Even with this in place, we are only able to prolong life for a few weeks and the outcome for kidney failure patients has not improved beyond the situation in the early 90s. A recent study from Port Harcourt noted a mortality rate of 83% in 3 months³⁶. The modalities of treatment e.g. dialysis and transplantation have become prohibitive in cost and a conservative estimate may be more than 1.5 million naira per year for dialysis alone. As if that is not enough, dialysis facilities remain inadequate; few machines are available per center and software spare parts are epileptic. Vascular assess for chronic dialysis is costly and good quality of life cannot be guaranteed.



(a)



(b)

Fig. 9. Dialysis type: (a) Hemodialysis; (b) Peritoneal dialysis

Experience in Nigeria has shown that a large number of patients with CKF cannot afford dialysis not to talk of transplantation^{29,35} (fig. 10). While reviewing hemodialysis performance among the first 216 patients in Ibadan, the longest dialyzed patient in our center in Ibadan so far spent only 27 months, there are very few survivors per year and the average mortality figure is as high as 87% in 3 months. This gloomy outlook is largely due to lack of fund for treatment on the part of the patients and occasionally, lack of regular supplies of dialysis software, and workers industrial actions. This is the same from Lagos to Ibadan in the West, to Kano and Maiduguri in the north, and Enugu in the East. For example, the Lagos University Teaching Hospital recorded a mortality rate of about 70% among patients with CKF between 1981 and 1986³⁷. In Ife³⁸, only 6.8% of the CKF subjects were able to dialyze for more than 12 weeks and mortality rate was about 90% in the first 3 months, while in the northern part of the country, the mortality rate is said to be comparable to the figures quoted earlier on. These challenges have worsened since most Nigerian hospitals including government hospitals demand cash before treatment is given to patients. There are therefore, formidable problems for CKF patients and their families.

3 MONTHS MORTALITY IN DIFFERENT CENTERS

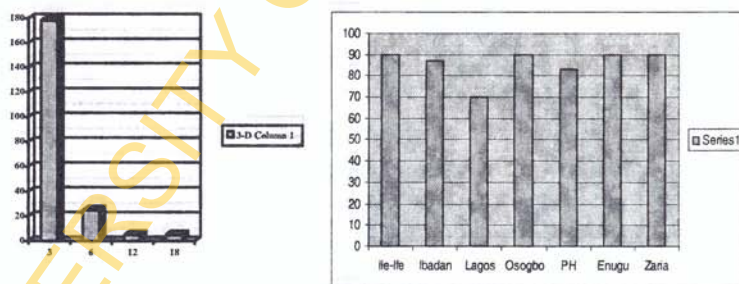


Fig. 10. Length of dialysis/mortality: UCH 1990-95/Others

The above appraisal highlights the dimension of the problems caused by the difficulty in managing end stage kidney failure in Nigeria. Elsewhere, Mr. Vice-Chancellor, kidney failure is better managed in economically developed

countries, although it is costing them a fortune. While it is obvious that dialysis alone has not helped our patients because of our peculiar situation, we started encouraging some of them who can afford kidney transplantation to seek it abroad, the number kept growing and the onus fell on us in the kidney unit to manage some of them. I therefore travelled to the UK in the year 2007, as a personal development effort, for a short training in kidney transplantation and post-transplant management at Manchester University Hospital, Manchester Royal Infirmary under Dr. Michael Picton. This self-sponsored training, on my return back to Nigeria led to the reawakening of the transplant team at the University College Hospital, Ibadan, and subsequently the first kidney transplantation in the Hospital was performed 10 months after in August 2008. The medical team was led by Prof. Solomon Kadiri and included Dr. Ayo Arije. The team of Surgeons was lead by Dr. Ayo Shonibare, our guest surgeon, Prof. Layi Shittu, Drs. Bunmi Olaopa, O.O. Akute and L.I. Okeke. The Aneasthesia team included Dr. Patience Shotumbi and Dr. Steven Oyeleke. Some of the nurses involved were Matrons Ester Babalola, Taiwo Adeleke and Monisola Oyerinde. These are some of the people who were directly involved in the procedure; there are many others that cannot be mentioned for lack of space in this lecture.

It is however an irony to note that in spite of the willingness of the UCH Management to transplant ten patients free, we have only been able to transplant two patients so far. This is a reflection of poverty and inability of available patients to maintain the kidney, and more so, donor sourcing has been a great challenge. Our first patient is a young Statistician who is self-employed but had end stage kidney disease in 2006. His sister donated a kidney to him and the University College Hospital provided for 2 months free drugs even after the free transplant. He still enjoys that gift of life from his sister. The patient subsequently got married and now has a female child to show for our effort. Our second patient is a colleague of ours who also got kidney donated to him by his younger brother. He is more than 1 year

six months post-transplant and he is currently enjoying good health at work.

Kidney transplantation provides a near normal life for the patient and the patient can carry out other activities like any other person within a certain leverage. The first kidney transplantation ever was performed by Joseph Murray in Herrick identical twins on the 23rd December, 1954 (fig. 11).

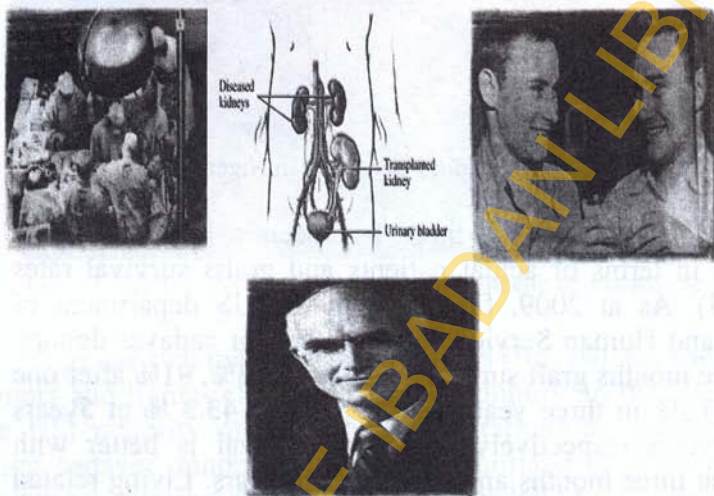


Fig. 11. Herrick twins and Joseph Murray, December 23 1954.

In Nigeria today, kidney transplantation has been successfully performed at the Saint Nicholas Hospital, Lagos, the hospital that started the programme in Nigeria—Obafemi Awolowo University Teaching Hospital Complex Ile-Ife, Aminu Kano Teaching Hospital, Kano, and recently the University of Maiduguri Teaching Hospital. I must say however that the first four centers have been in the forefront before our own service and they all have contributed in a way to our little story (see fig. 12).

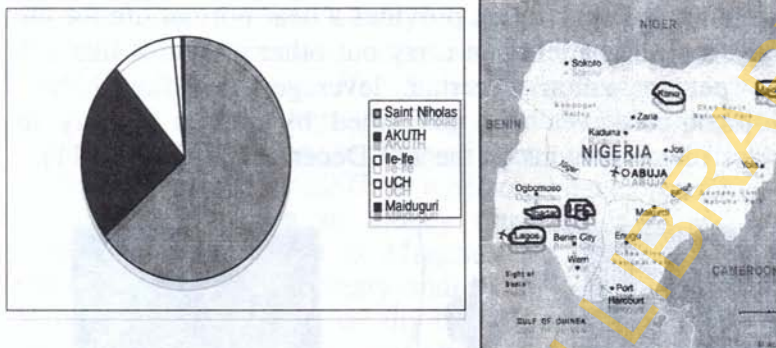


Fig. 12. Kidney transplant in Nigeria

Over the past years, there has been a high degree of success in terms of actual patients and grafts survival rates (fig. 13). As at 2009, figures from the US department of Health and Human Services showed that for cadaver donors, the three months graft survival rate was 95.3%, 91% after one year, 80.1% in three years and 69.3% and 43.3 % at 5years and 10years respectively. Patients' survival is better with 98.1% at three months and 61.2% at ten years. Living related donor outcomes are better with graft survival rate of 98.1% at three months and 59.3% at ten years. Patients' survival rate for this category is better than that of cadaver transplant after ten years of surgery. However, donor sourcing is a big challenge even in advanced countries. In Ife,^{38,39} between 47.3% and 63% of hospital workers were willing to donate a kidney while it was 52% of patient's relations who were willing to do same. 4% of them wanted some financial reward for this (Unpublished data).

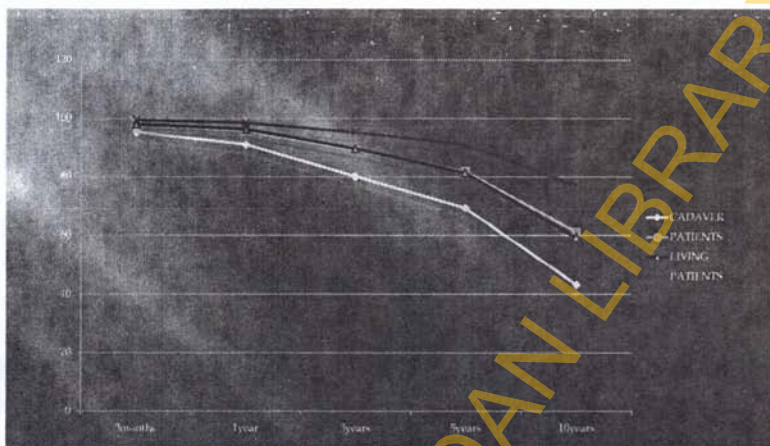


Fig. 13. Grafts survival (US department of health and human services)

There are two major forms of donors (fig. 14), the cadaver donors and living-related or unrelated donors. In the UK and the US, majority of kidney transplantations are performed using cadaver donors, however, the shortage of organs and the ever increasing demand for them has led to an increase in living donor transplantation. It is well known that organs from living donors are superior to cadaver donors. In Nigeria, only living-related kidney transplantation is commonly performed for now. We need government legislation on the practice of cadaveric transplantation. Cadaver donors often come from patients who are certified brain dead, who may have suffered cardiac arrest while in the hospital. In this case, the donor would have expressed the desire to donate his/her kidney while living and the patient's family must also consent before the kidney can be harvested.

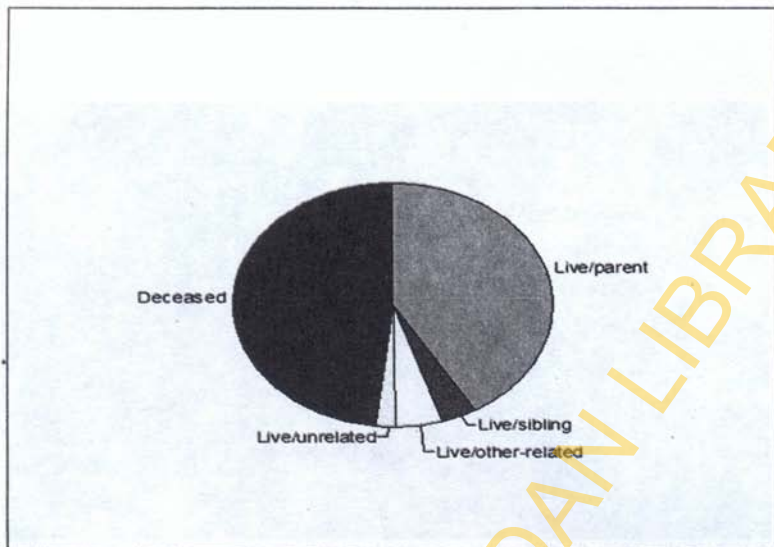


Fig. 14. Donor sources

The knotty issue of paid donors which means direct payment of money in exchange for organ donation is discouraged in the transplant world but may be increasing the number of organs available for transplant as it goes on underground. Although officially condemned, this practice is booming in different parts of the world. Paid donors are usually poor people and under very great financial distress while the recipients are often very rich and want to get well; to make matters worse, middlemen are often involved. An argument against paid donors therefore expresses concern for the exploitation of the poor donor who may not get a fair deal. On the other hand, allowing paid donors is seen in some quarters as an opportunity to improve the quality of life of a paid donor was living; supporters of the paid donor process argue that he or she owns his/her body and should be allowed to use it the way he or she feels. Data have however shown that in countries where this has been, paid donors end up back in debt and abject poverty with lower family income than before they sold their kidneys, in fact, some of them were

willing to sell the second kidney and then go on free dialysis provided by their countries.

Mr. Vice-Chancellor, maintaining the donor kidney is not an easy task in a poor resource country like ours; kidney transplant surgery cost about N3.5million in Nigeria and the patient should be able to procure regular immunosuppressants without which the donor kidney will be rejected. This has contributed to the high cost of post transplant maintenance of the patients, which may cost as much as N120,000-150,000 per month. Ladies and gentlemen, the consequence of the hatred hypertension has for the kidney, the patient and his family, the national economy and the society at large is therefore considerable. For nephrologists in Nigeria however, we have been able to put smiles on some faces that were able to afford dialysis and transplantation and this has been our little joy.

Mr. Vice-Chancellor Sir, having found out that even kidney transplantation is froth with its own problems like issues of rejection, development of new cancers and opportunistic infections, and furthermore, it is very costly either to perform or to maintain, it dawned on me that nephrologists need to engage in activities and advocacy in preventive nephrology. This has prompted me to write *The Handbook of Kidney and Kidney Related Diseases for Laypersons*, a one hundred and nine-page book written in simple language for all persons who are not medically qualified (fig. 15). It is my hope that this will add to my modest contribution in the field of nephrology by serving the purpose for which it is meant.

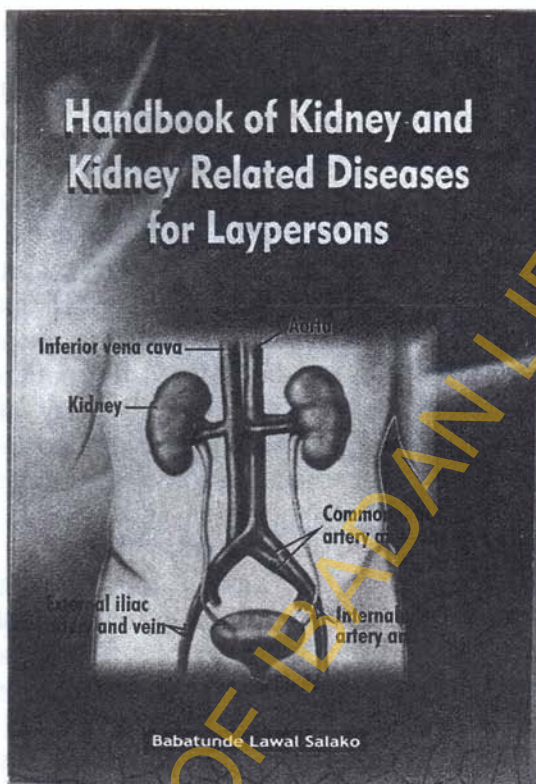


Fig. 15. Handbook of kidney and kidney-related diseases.

While prevention is being encouraged, the world has moved a step further to the genetic study of patients with end stage kidney disease and hypertension. Perhaps, the discovery of a candidate gene will enhance our strategy at primordial prevention and cure. In the past, a follow-up family-based association analysis of regions on chromosomes 6 and 7 was linked to blood pressure (BP) among Nigerians by the Loyola group⁴⁰; strong preliminary evidence that the regions may also influence susceptibility to elevations in BP was also observed. To narrow down the association regions, we conducted fine mapping analysis of the regions in 1614 unrelated adult Nigerians genotyped. After correction for multiple comparison through permutations, 8 intergenic SNPs clustered over a 70 kb region in chromosome 6 retained

statistical significance ($P < 0.05$) for association with hypertension. These data reinforce previous findings that loci in chromosome 6 may influence susceptibility to hypertension (fig. 16). We are also currently carrying out a pilot project on the MYH9 gene and chronic kidney disease which has recently been linked to end stage kidney disease in patients of African descent in the United States. This is the source of the current grant that Prof. Sola Ogunniyi and I are now working on in collaboration with the Department of Epidemiology and Preventive Medicine at the Loyola University, Chicago, United States. I visited the United States as a visiting professor to that University last year where I had the opportunity of giving a lecture to my colleagues at the Division of Nephrology and Hypertension. The title of my lecture was "Nephrology Practice in Nigeria". My audience was taken aback by the poor state of health of our patients, mortality results and the lack of adequate facility for dialysis and transplantation, all of which they have always taken for granted in their country. I thank Professor Richard Cooper, Dr. Tayo Bamidele, Dr Holly Kramar and the entire staff of the Department of Epidemiology and Preventive Medicine, Loyola University, for making my stay worth the while.

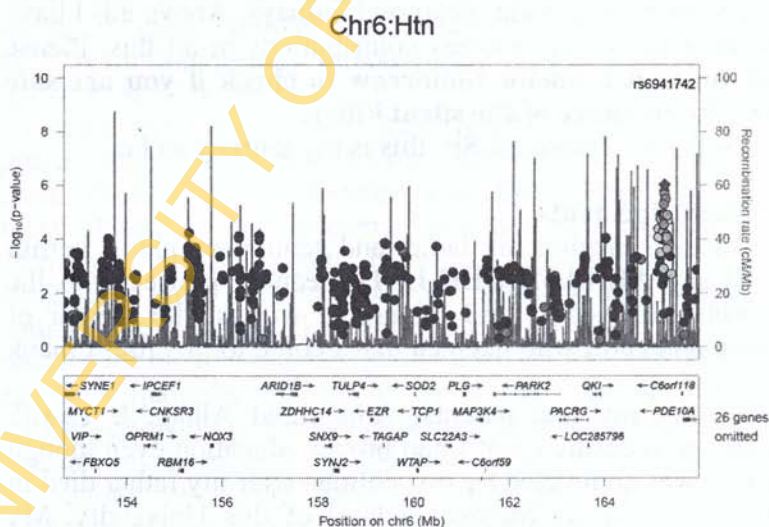


Fig. 16. Hypertension results for chromosome 6

In conclusion, ladies and gentlemen, I have attempted to explain to you in the last one hour or so, the love and hatred that hypertension has for the heart, brain, eyes and more importantly the kidneys. I have shown that the prevalence of hypertension is high and that blood pressure control is generally poor especially in our environment. I have described to you the role hypertension plays in causing morbidity and mortality in our environment and the challenges that Nigerian and African Nephrologists face in the management of hypertension and chronic kidney disease, I have shown you the problems associated with the existing modalities of therapy, dialysis and transplantation, and the efforts that the scientific world is making to unravel the mystery behind hypertension and chronic kidney disease. I have suggested that advocacy groups are required to disseminate information on prevention of hypertension and kidney disease and Government should ensure that cheap drugs, dialysis spare parts and softwares are made available in the market. The National Health Insurance Scheme should incorporate the treatment of kidney disease in its plans. I sincerely believe that you can now understand and appreciate the unhealthy romance, love and hatred that this silent killer has for your eyes, brain, heart and kidneys. Above all, I have informed you of my modest contributions in all this. **Please find yourself a doctor tomorrow to check if you are safe from the romance of the silent killer.**

Mr. Vice-Chancellor Sir, this is my journey so far.

Acknowledgements

Mr. Vice-Chancellor Sir, ladies and gentlemen, please permit me to say **ALHAMDULILLAH** meaning praise be to the almighty **GOD**, the Lord of all the worlds, the creator of heaven and earth who decreed that I come to this life, I thank you.

I thank my late parents, Alhaji and Alhaja I. Lawal. Salako, who ensured that I had proper education even though the task was completed by my siblings after my father died in my 4th year in the Medical School of this University. My father took me to Hajj at the tender age of 13 years where I

had the opportunity of reshaping my destiny early in life. As a very playful young boy, my father in his spiritual belief and wisdom thought it wise that the best place to take me was Hajj in 1972, where I fervently prayed and asked God the Almighty to make me someone that will be useful to others in life, little did I know it will be through Medical Profession and Teaching. His vision for me eventually came to pass and I strongly believe that I have been fulfilling that purpose. May their gentle souls continue to rest in perfect peace. *Amin.*

As the last-born son of 18 children, I had no problem collecting tolls from all my siblings after the death of my father. My brothers and sisters, I appreciate you all and I use this opportunity to put on record all your kind gestures towards me, even till today. I must thank my big uncle and his wife, Emeritus Prof. Lateef Akinola Salako who laid an excellent and firm foundation for a good name in the academic arena in the University of Ibadan and beyond; people like me have benefited from this since I started my career. I thank Uncle Ore Salako and other members of Salako descendant union for their support at all times.

I like to pay tribute to Emeritus Prof. O.O. Akinkugbe who introduced me into the field of medical research soon after I came back for residency training at the University College Hospital, Ibadan; he influenced my decision to specialize in Nephrology unknowingly. The experience has been very useful to me, Sir.

I thank my teachers who have taught me medicine; to represent them I will mention Prof. Jide Ajayi, Prof. Ayodele Falase, Prof. Oluwole Akande and Prof. Kike Osinusi. Special thanks to my teachers from whom I have learnt nephrology, although you have since made me your colleague, I still respect you all. Prof. Wale Akinsola examined me as a Part II candidate, Prof. S. Kadiri wrote a reference for me to come into residency training in UCH after Prof. GTA Ijaduola, a friend of my brother had scolded me for looking for job as a medical officer instead of going back for residency training in 1989. Both Prof. Kadiri and Dr. Arije taught me nephrology and provided me with the enabling academic milieu in the Renal Unit to work for them

and later work with them. I also like to thank Prof. Adesola Ogunniyi, who has always taken time to look at my works when requested to do so; he also took time to go through this lecture. Professor Ogunniyi is often jokingly referred to as my academic brother by some of my friends, he is also a mentor, and he was the link to Chicago.

I also have a number of family friends who have remained loyal since we met, the story of my life will not be complete without a chapter for them all. I therefore like to thank some of them—Otunba Kunle Kalejaye SAN and Mrs. Funmi Kalejaye and family, Mr. and Mrs. Adegoke and family, Dr. and Dr. (Mrs.) Abdus-Salam and family, Omowunmi Opatunji and Family, Mr. and Mrs. Bakare and family, Dr. and Dr. (Mrs.) Lasisi and family, Dr. and Mrs. Fehintola and family, Mr. and Mrs. Amin, Mr. and Mrs. Edison, Dr. and Mrs. Musa, Commodore and Mrs. Salau and Professor Akibu Sholagberu and family. I thank my older friends who have become my adopted uncles and fathers, they are many but I shall mention some including the *Are Musulumi* of Yoruba Land, Alhaji Abdul Azeez Arisekola Alao, Omo-Oba Rasheed Adesokan, Chief Lateef Oyelade, Alhaji Lateef Olasimbo Champion, Alhaji Gbolahan Aroyeun, and Prof. Dupe Olatunbosun. I thank my numerous patients for being the source of many of my research data and I thank Drs. Fatiu Arogundade, Ebun Bamgboye, Gbenga Ayodele, Ifeoma Ulasi who provided me with data from their various centers..

I must not forget my colleagues, who worked with me and have contributed in one way or the other to my path to success. I thank all my colleagues in the Department of Medicine, Senior Registrars in Renal Unit – Drs. Onaga, Asemoh and Konigbagbe, the Nurses at Owena Dialysis Center, UCH; I thank Dr. Dapo Olayemi, Dr. Akin-Tunde Odukogbe, Prof. Tayo Alebiosu, Dr. F.A Fehintola, Dr. Olugbenga Ayodele, Dr. Kayode Adedapo, Dr. Akeem Lasisi, Dr. Okechukwu Ogah, Dr. Chris Aimakhu, Dr. T.S. Oluleye, Dr. Charles Bekibele, Dr. Ibrahim Imam and Dr. Kingsley Urakpo who was the link to Manchester Royal Infirmary.

Lastly, I like to acknowledge the support of my dear wife Mrs. Saidat Abiola Abiodun Salako, and my three children,

Ibraheem Abiodun and Hikmat Yetunde; both have started taking their own giant strides as undergraduates of the University of Ibadan, and Idris Akinola who is coming confidently behind them. Without a peaceful home and an understanding family, the road to success may have been rather bumpy. During the past years, I tried as much as possible to be a responsible husband and a good father. I hope you will all sincerely give me a pass mark on this occasion and overlook my shortcomings.

Mr. Vice-Chancellor, ladies and gentlemen, I thank you all for listening. God bless you.

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BIODATA OF PROFESSOR BABATUNDE LAWAL SALAKO

Professor Babatunde Lawal Salako was born on 23rd July 1959 to Alhaji and Alhaja Ibatlahi Lawal Salako of Oke Oyinbo Quarters, Ota, Ogun State. After his secondary education at the Ansar-ud-deen College, Offa, between 1975 and 1979, he enrolled at the Kwara State College of Technology Ilorin, for his basic studies from 1979 to 1981. After this he was admitted to study medicine at the University of Ibadan and obtained MBBS degree in 1986. His post-university work experience include the period of housemanship at the Lagos Island General Hospital, and Island Maternity Hospital, Lagos Island, from 1986 to 1987; and later, the mandatory one-year NYSC service at the Isiala-ngwa Local Government Area of Imo State.

After the NYSC, Professor Salako commenced his residency training at the University College Hospital, Ibadan in April 1990 and obtained the Fellowship of the West African College of Physicians in October 1994. He commenced his academic career with his appointment in the Department of Medicine of this university as Lecturer I in March 1996 with joint appointment as honourary Consultant Physician and Nephrologist to the University College Hospital, Ibadan. He rose through the ranks to become Senior Lecturer in 1999, Reader in 2003, and Professor effective October 1, 2006.

A recipient of several local and international awards, fellowships and grants, Professor Salako has to his name the World Heart Federation Fellowship in 2000, the University of Ibadan Senate research grants and Macarthur research grant, and National Institute of Health grant in collaboration with the department of Preventive Medicine and Epidemiology, Loyola University, Chicago, USA. He is also a Fellow of the World Heart Federation, Global Forum for Health Research, Geneva, International Society of Nephrology, International Society of Hypertension, and International Society of Hypertension in Blacks, among others. Tour of duty took him to the

Manchester Royal Infirmary, Manchester University Hospital, UK, in 2007 as a visiting Nephrologist, and the Department of Preventive Medicine and Epidemiology, Loyola University, Chicago, USA in 2010 as a visiting professor. His contributions to improving health of mankind include membership of the international expert panel set up by the Centre for Disease Control in Atlanta, USA, to design a ten-day seminar on control of chronic disease, and cardiovascular disease epidemiology for sub-Saharan Africa in 2003; membership of the Scientific planning Committee for the 2003 international conference of the International Society of Hypertension in Blacks in Ghana; opinion leader in an international consortium to discuss kidney transplantation in sub-Saharan Africa, organized by Novartis International in Dakar, Senegal.

A team player and member of several professional bodies, Prof. B.L. Salako served as the Chairman of the Nigerian Medical Association, Oyo State, between 2002 and 2004; member of the National Executive Council of the Nigerian Medical Association between 2002 and 2006. He has also served on several committees at the Faculty College and University levels, including Chairman, Faculty of Clinical Science sub-committee on UI 60th anniversary celebration, and Hall Master, Alexander Brown Hall, recently. In recognition of his capabilities and dedication, the erudite scholar received the distinguished Brownite of Honors Award from the prestigious Alexander Brown Hall in 2004. Professor Salako is a member of the Governing Council of the Muslim Hospital, Ibadan and the Chairman, Governing Council of Kings Gate International College, Bashorun Ibadan.

His honours, distinctions and memberships of learned professional bodies include the Nigerian Medical Association, Nigerian Association of Nephrology, and Nigerian Society of Hypertension. He was appointed the editor of the Tropical Journal of Nephrology, the official journal of the Nigerian Association of Nephrology in 2005. An experienced examiner, he has been examining at the West African College

of Physicians from 2006 to date, and has also served as an external examiner to a number of Nigerian University medical schools.

Professor B.L. Salako, Fellow of the West African College of Physicians, is a clinician of high repute and has made significant contributions to the field of hypertension and kidney disease. He is in the forefront of kidney transplantation at the University College Hospital, Ibadan, Nigeria. A widely travelled man, attending both local and international conferences and workshops, he has published more than 70 journal articles in both local and international journals and is the author of a book on kidney disorders. He is married to Mrs. Saidat Abiola Abiodun-Salako; and they are blessed with 3 children.