

**109<sup>th</sup> INAUGURAL  
LECTURE**

**“CHRONIC KIDNEY  
DISEASES IN CHILDREN:  
THE MYTHS, THE  
POLITICS AND THE  
FACTS”**

**BY**

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**Thursday, 21<sup>st</sup> June, 2012**

The Vice Chancellor Sir,  
Deputy Vice Chancellors,  
Registrar and other principal officers of the University,  
Professor Emeritus Adeoye Adeniyi,  
Provost, Deans of Faculties, Postgraduate School and Student Affairs,  
Professors and other members of Senate,  
Chief Medical Director, University of Ilorin Teaching Hospital, Ilorin,  
Principal Officers (CMAC & DA) of the University of Ilorin Teaching Hospital, Ilorin,  
Head of Departments,  
Academic colleagues,  
Academic and non-academic staff of the University,  
My Lord Spiritual and Temporal,  
Members of my family: nuclear, extended and in-laws,  
Distinguished invited guests,  
Gentlemen of the press,  
Friends,  
Great students of the University of Ilorin,  
Distinguished Ladies and Gentlemen.

## **Introduction**

Inaugural lecture dates back to 1708, when Thwaites, an English Professor of Greek delivered the first inaugural lecture. It focuses on either the lecturer's area of research, specialization or some broad issues related to his discipline. In modern times, however, it has assumed different meanings. To some, it is an inaugural discourse within a very short period of assuming the position of Professor, to others, it is an academic ceremony, while to yet some others, it is a celebration of academic achievement and the goodness of God. However, Professor Emeritus O.O. Akinkugbe while delivering the 16<sup>th</sup> University of Ibadan Inaugural lecture defined it more aptly as **“a discourse in an area of specialty often ending with a flourish simulating an academic thanksgiving”**. Mr. Vice Chancellor Sir, I cannot but agree with the various definitions, the essence of which I will capture in the course of this lecture.

I am grateful to the almighty God for counting me worthy and privileged to stand before this distinguished audience to deliver the 109<sup>th</sup> inaugural lecture of this great university which also happens to be my alma mater.

At the departmental level, we have been privileged to deliver one of the earliest inaugural lectures in the history of this university on 29<sup>th</sup> May, 1980. It was delivered by the then Professor Adeoye Adeniyi (now Professor Emeritus) with the title, “**Child care in Nigeria: A critical appraisal of traditional and modern concept**”. This was followed on 28<sup>th</sup> July, 2011 (31 years later) by the 95<sup>th</sup> inaugural lecture titled “**The child’s gut and its gut**” by Professor Ayodele Ojuawo. About seven months later on 23<sup>rd</sup> February, 2012, another member of the department and Dean, Faculty of Clinical Sciences, Professor Abdulwahab Johnson delivered the 100<sup>th</sup> inaugural lecture titled “**Microbes and the bellows of young fellows; towards proscribing a pernicious parley**”. I feel highly humbled not only to be the fourth ‘inauguree’ in the department but one of the first two alumni of the College of Health Sciences, University of Ilorin to rise to the enviable position of a Professor in this university and subsequently deliver an inaugural lecture.

I chose medicine at the University Matriculation Examination (UME) due to peer group influence of two colleagues I admired for their brilliance while at Federal Government College Kaduna. I worked hard at it and it clicked at first attempt. That was how I found myself in University of Ilorin in the fifth set (1981-1987). I chose paediatrics for residency training due to lack of space in General Medical Practice (GMP) at that time and the encouragement of the then HOD of Paediatrics, Late Dr A.B.Bello at the interview. I started and completed the training after six years (1989-1995). After completing my residency training in 1995, I left to work briefly at the Federal Medical Centre, Abeokuta (1995-1996) even though I had an appointment as (Lecturer 1) in University of Ilorin. I returned after a year foray in Abeokuta chiefly because of a loving passing comment by my senior brother, Mr. Adeola Titus Adedoyin. He had told me when I left for Abeokuta that ‘**I thought you will become a Professor**’. That comment never left my mind, hence when I came back from Abeokuta, I worked hard at it and today by the grace of the almighty God, I have become one.

I was well trained in the sub-specialty of neonatology by Dr Oluade Ajayi but I veered into the vacant area of nephrology when I found that neonatal unit was already covered on my return from Abeokuta. That decision started my interest and love for the care of children with kidney diseases.

### **Definitions and local terminologies for the kidney**

A **child** is defined in Article 1 of the convention of the rights of the child as person aged 18 years and below, whilst the International Labour Organisation (ILO) defines a child as person below the age of 16 years. Politically, a child is anyone who cannot vote or be voted for in a general election of a country. This implies persons aged 18 years and below.

**Paediatrics**- is the study of diseases of children

**Child health** is the study of those things that facilitate the physical, social and mental well being of children

**Nephrology** is the study of kidney diseases

**Pediatric nephrology** is the study of kidney diseases in children

The local terminology for the kidney in Yoruba language is **Kidirin**.

We lack words to call the various common chronic kidney diseases (CKDs) such as Nephrotic syndrome (NS), Acute glomerulonephritis (AGN), Urinary tract infections (UTI), Acute renal Failure (ARF) now called Acute kidney injury (AKI), Chronic renal failure (CRF), End stage renal disease (ESRD). In interpreting it to parents in the local language of Yoruba, we use descriptive terms such as

NS, AGN- **Aisan kidirin**

UTI- **kokoro won nu ile ito**

ARF, CRF, ESRD- **kidirin o sise bo se ye ko sise mo**

ARF or AKI is sudden deterioration of kidney function which manifests with reduced urine output or no urine output

CRF is progressive and irreversible deterioration in kidney function

ESRD is the deterioration in renal function to the extent that medical management is no longer feasible and renal replacement therapy becomes absolutely necessary

### **A case report of Chronic Kidney Disease**

To enable us understand the plight of children with CKD, Mr. Vice chancellor Sir , permit to highlight the case of a 13 year old girl referred from General Hospital, Omu-aran, Kwara State, Nigeria with one week history of generalized body swelling, two day history of reduction in urine output and one day history of difficulty in breathing. The father was a Security Officer with a transport company and earned N20, 000 (US\$128.20) monthly.

On examination, the blood pressure was 170/130mmHg. Urinalysis revealed proteinuria of 3+, blood 3+, serum potassium was 7mmol/l, serum creatinine was 1138µmol/l. She was commenced on appropriate drug and planned for haemodialysis but convulsed while they were mobilizing fund. She had a total of 27 irregular sessions of haemodialysis in the over 4 months she was under our care before she died.

While with us, there were financial challenges which we tried to solve by outsourcing funds from doctors and nurses, management of University of Ilorin Teaching hospital (UIH), First Lady of Kwara state, pharmaceutical companies and philanthropic individuals such that at her death we had a balance of N85,000 (US \$544.87). Initially, the parent demonstrated some enthusiasm but as the duration of illness became endless, they became non-challant. This led to the eventual isolation and abandonment of the child. Food supply became

irregular with the child living on the benevolence of the managing team and patients' relation on the ward. We solved this challenge through regular counseling of the parents coupled with soliciting for support by the managing team. The counseling helped such that on a particular occasion when they had made up their minds to depart against medical advice (DAMA), our extensive counseling and reassurance dissuaded them.

This child had end stage renal disease (ESRD), a variant of CKD which is a money guzzler as the cost of adequate dialysis (thrice weekly for haemodialysis) is N51, 000(US\$326.9) in our center excluding N8000 (US\$51.28) per week for erythropoietin. This amounts to a total of N236, 000(US\$1512.82) per month to take care of the health of one child excluding the cost of subsistence. If renal transplantation is procured, the total cost will be in a conservative neighbourhood of N5 million (US\$32,051.28) excluding the cost of daily immunosuppressive therapy for life which should run to a conservative estimate of about N80, 000 (US\$512.82) monthly barring the occurrence of complications such as acute rejections which would gulp its own cost when it occurs. When the N236, 000(US\$1512.82) required for monthly haemodialysis is compared to the N20, 000 monthly salary of the father, the decision of the father would be along economic scale of preference. In that circumstance therefore, you will agree with me that they will use their little resources to provide sustenance for themselves and the other children and wait for her death

Sustaining this child with ESRD for over four months as you can see was an enormous challenge. Her case demonstrated the ordeal of children with ESRD in Nigeria with threats of DAMA when available funds get depleted. If they succeed with DAMA, the child ultimately dies at home undocumented making us believe that the prevalence was low. Our patient being alive for 4 months indicated clearly that she could have lived longer if the renal replacement therapy and other supportive therapies were regular including the offer of renal transplantation. Studies from Germany and Japan have indicated a 73-100% survival rates for dialyzed children with CKD. Our own survival rate is almost nil as dialysis is hardly sustained because the patient's parent pay out of pocket (Adedoyin et al, 2012).<sup>1</sup>



**Fig 1. Patient described above**



**Fig 2. Pedal oedema in the child described above**

### **Chronic kidney diseases**

The National Kidney Foundation (NKF)/ Kidney Disease Outcomes Quality Initiative (K/DOQI) in 2002 defined CKD as kidney damage manifested by structural or functional abnormalities lasting three or more months with or without decreased glomerular filtration rates (GFR ) or a  $GFR < 60\text{mls/min/ } 1.73 \text{ m}^2$ .<sup>2</sup>

Chronic kidney diseases (CKD) remain one of the most devastating childhood disorders. It robs them of school hours either due to frequent hospital admissions and follow-up attendance at clinic. It also robs parents of man-hour at work which affects the economy of the society and the nation at large.

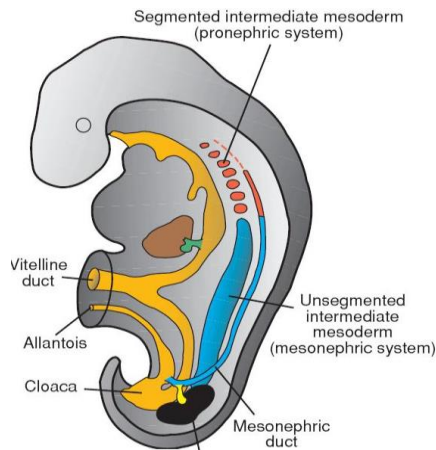
This is aside from the psychological trauma of how to get fund to take care of the child and anxiety about the outcome of the illness. There is also the aspect of diverting scarce resources that should have been used for food, shelter, education of the other children for the care of a single child. In the process, other children suffer or are deprived of care or the victim suffers and is abandoned to take care of the well children. Hence in the home of children with CKD, the illness of one child affects all.

CKD in children therefore throws up three major issues in an environment with strong culture and belief system and a lot of politics in the air. These three issues are;

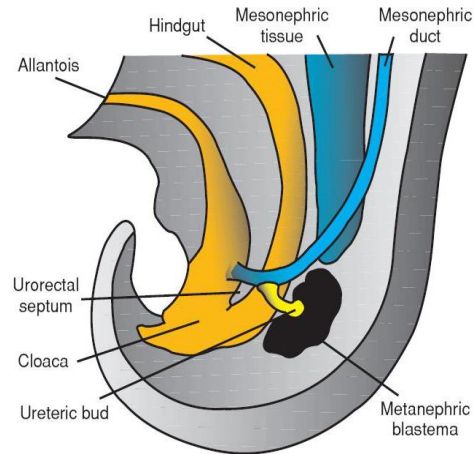
1. What are the belief systems about illnesses especially CKD since beliefs and cultural mindset affect health seeking behavior?
2. What politics influence or affect resource allocation to the care of illnesses including CKD?
3. What are the facts about the illness of CKD?

## Anatomy and physiology of the kidney

The kidneys and the urinary tract develop from primitive kidneys and collecting system. The primitive kidneys are represented by the pronephros, mesonephros and metanephros, while mesonephric duct and ureteric bud represent the urinary collecting system. The major part of the bladder is formed by the urogenital sinus.<sup>3</sup>

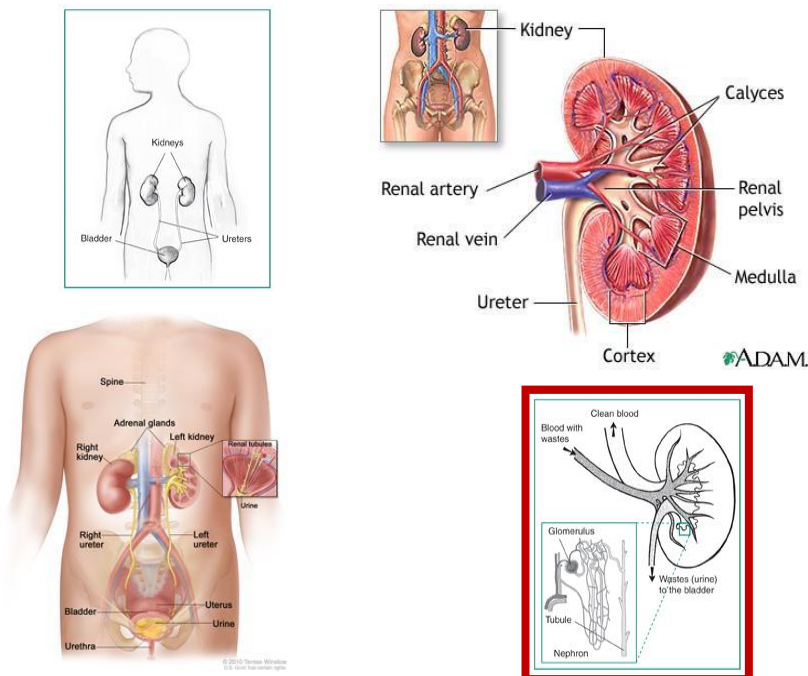


**Fig 3. Mesonephric system**



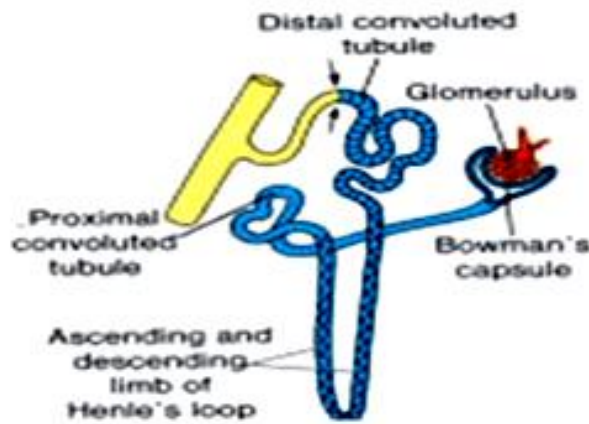
**Fig 4. Ureteric Bud**

The kidney is originally a pelvic (groin organ). It starts function from the first trimester during which it passes its excreted fluid to make up a bulk of the amniotic fluid. There are two kidneys which are bean shaped. It is made up of a million nephrons which is the basic unit of the kidney.



**Fig 5. Urogenital System**

The nephron serves as the filtering unit of the body with the glomerulus serving as the filter thus helping to excrete wastes (fluid and electrolyte) through urine. The tubules also reabsorb fluid and electrolytes.



**Fig 6. Nephron, the basic unit of the kidney (each kidney has between 300,000-1,000,000 nephrons)**

### Classification of CKD

**Table 1. K/DOQI Stages of Chronic kidney disease**

Stage	Description	GFR ml/min/1.73m <sup>2</sup>
1	Kidney damage with normal or increased GFR	>90
2	Kidney damage with mild decrease in GFR	60-89
3	Moderate decrease in GFR	30-59
4	Severe decrease in GFR	15-29
5	Kidney failure	<15 or dialysis

### Epidemiology

Information on the epidemiology of CKD in children is limited because less advanced stages of the disease are asymptomatic which leads to under-reporting. However the incidence and prevalence of CKD is 3.0 per million age related population (marp) and 15 per marp in Nigeria respectively, though many go undocumented.<sup>4</sup> A higher figure is expected in view of the heavy burden of infections, consanguinity and genetics in our environment. It is however no doubt, a small burden when compared to the burden of infectious diseases such as malaria, acute respiratory infections (ARI) and diarrhoeal diseases which remains the leading causes of childhood morbidity in Nigeria.<sup>5</sup>

In the developed world of Italy, there is incidence of 12.1 and a prevalence of 74.7 per marp in children younger than 20 years of age. In Sweden, the incidence is 7.7 and prevalence is 21



per marp respectively. In the USA, the incidence and prevalence was 15 per marp and 79 per marp.<sup>2</sup>

The higher incidence of CKD in children in the developed world stem from the clear transition they have achieved from communicable to non-communicable disease. This fact is aided by a better organized health system which enables them to capture every child with CKD successfully such that they can plan for them adequately. Theirs is also aided by a network of national data base driven by both government and the relevant professional societies through the documentation of every birth. A feat we have not been able to achieve, making some people to have two ages- official and real age.

The figures from Nigeria originate mainly as reports from major tertiary care referral centres which are just the tip of the iceberg as it does not represent the true burden of the disease. Such figure includes that from Port-Harcourt<sup>6</sup>, Enugu<sup>7</sup>, Zaria<sup>8</sup>, and Ibadan.<sup>9-10</sup> In Ilorin, CKD constitute 1.6% of all our annual hospital admissions (Adedoyin et al, 2012). This is in comparison to 25% for malaria, 16.7% for acute respiratory infections (ARI) and 7.8% for diarrhoeal disease.<sup>5, 11</sup>

On the surface therefore they look like a little morbidity burden. Deeply however, the extent of the morbidity is longer lasting and more devastating than infectious diseases such that the time, resources and energy it takes to manage one patient with CKD can be used to manage several patients with uncomplicated malaria.

Worldwide, the incidence of the most severe form of CKD, ESRD is increasing by 6-7%. The average incidence and prevalence is 100/million and 340/million respectively. Sixty-eight percent (68%) are on haemodialysis and 561,000 are living with kidney transplants.

### **Causes and predisposing factors to CKD in children**

Unlike adults in whom the primary aetiologies of CKD are diabetes and hypertension, the greatest percentage of paediatric CKD cases are congenital with variability among nations. In the North American Renal Transplant Cooperative Study (NAPRTCS) report, of the 6794 patients in the registry, 3655 are due to congenital anomaly of the kidney and the urinary tract (CAKUT).<sup>12</sup> Italian data showed 58% due to renal hypoplasia.<sup>13</sup> Japanese registry revealed that 34% are due to glomerulonephritis.<sup>14</sup> The Port-Harcourt data showed that of the 45 children, 28.9% were due to congenital disorders while 53.3% was due to Chronic glomerulonephritis (CGN).<sup>6</sup> The Ilorin report over a 12 year review period showed that 70.6% were due to the glomerulonephritides with 11.6% due to CAKUT (Adedoyin et al, 2012).<sup>11</sup>

### **Predisposing factors**

These include the

### Non-modifiable risk factors

1. Preterm: It has been proven that hypertension occurs more often in former preterm infants. Impaired renal development leading to reduction in number of nephrons in premature newborns has been proven to be related to hypertension later in life. <sup>15</sup>
2. Ethnicity-CKD is commoner in African-Americans in the USA when compared to Whites.
3. Age
4. Other genetic risk factors such as family history of kidney disease

### Modifiable risk factors

1. The use of soap containing mercury in children.
2. Bleaching cream has mercury which is injurious to the kidney. There is no uniform distribution of mercury and since it has poor lipid solubility, it accumulates mostly in the kidneys with insufficient renal excretion resulting in renal damage.



**Fig 7. Effects of mercury on the skin**

3. Cream containing steroid
4. Excessive use of analgesic and non-steroidal anti-inflammatory drugs (NSAIDs)
5. Constipation in children could press on the urinary tract and promote stasis and cause urinary tract infection(UTI)
6. Inappropriate treatment of sore-throat and skin infections could trigger immunological reaction
7. Inadequate management of diarrhoeal illness and malaria could result in complications in the kidney
8. Use of herbal remedies and foreign 'do-it all' products
9. Obesity- Prevalence of global obesity is fast exceeding that of protein energy malnutrition (PEM). While chronic hunger occurs in 824 million people worldwide, 1.6 billion people are overweight. There is also increasing prevalence of obesity in the younger age group. Twenty-two (22) million children worldwide are over-weight.

Indeed, the rate of obesity in younger children (6-11 yrs) is fast approaching the incidence in older subjects (12-19yrs). Rural-urban migration is associated with obesity in developing economy such as ours. Shift towards energy-dense foods, sedentary work and mechanized means of transportation are also contributory. Obesity causes renal hyperfiltration, hyperperfusion and microalbuminuria.

10. Poverty

11. Lawlessness and callousness which would make people not to follow standard in the manufacture of drug products- remember the ‘My pikin’ saga which damaged the kidney of about 119 children.

### Lawlessness and CKD



**Fig 8. Newspaper publication on ‘My Pikin’**

In November 2008, there were reports of sudden increase in young children seen with acute renal failure (ARF) (Fig. 8). Several children had ingested particular teething syrup, “My Pikin” contaminated with diethylene glycol (DEG). By February 2009, 84 children had been reported dead. They were mainly very young children 4 -24 months of age. This observation prompted a multicenter investigation of similar occurrences across the country at that time. It was found that out of 119 children that presented with sudden onset of ARF, sixty (50.4%) children ingested “My Pikin” teething syrup. When compared to children who had not ingested it, they were significantly ( $p<0.05$ ) younger (11.9 vs. 31months), more were anuric (98.3% vs. 74.6%), hypertensive (84% vs 52%), had severe metabolic acidosis (46.7% vs 20.5%) and died (96.6% vs71.2%).<sup>17</sup>

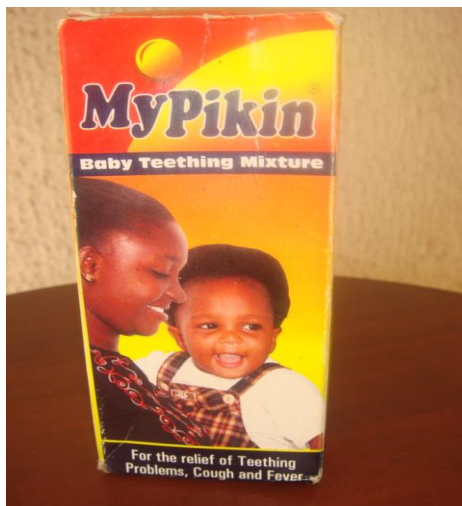
Di-ethylene Glycol was suspected to have contaminated paracetamol. It is an industrial solvent used in several products (brake fluid, antifreeze agent, textiles and plastics). It is cheaper than propylene glycol and it is sweet. The enzyme alcohol dehydrogenase

metabolizes ingested DEG, to toxic acids, glycolic and oxalic acids, which results in metabolic acidosis, acute renal failure, respiratory failure and brain damage.

A reason for taking “My Pikin Syrup” (Fig. 9) was because they thought Illness (Fever, Vomiting, Diarrhoea, and Cough) was due to teething. The drug was recommended to them by other mothers/neighbour and in no case was it recommended by a doctor.

During that period, we did not record any episode in Ilorin but other centres such as ABUTH, Zaria, National Hospital, Abuja, LUTH, Lagos, LASUTH, Lagos, UPTH, Port-Harcourt and UCH, Ibadan recorded cases.

Unfortunately, the finding threw up some legal fireworks which made prosecution of the manufacturing company unsuccessful. These include; was there any contract between the pharmaceutical company and the consumers? Has it been shown by post mortem that ‘My Pikin’ caused the renal failure? Has the provision of NAFDAC and NSO been breached by the company? Can Nigerian Government take action against the company to receive compensation for the death of those children?



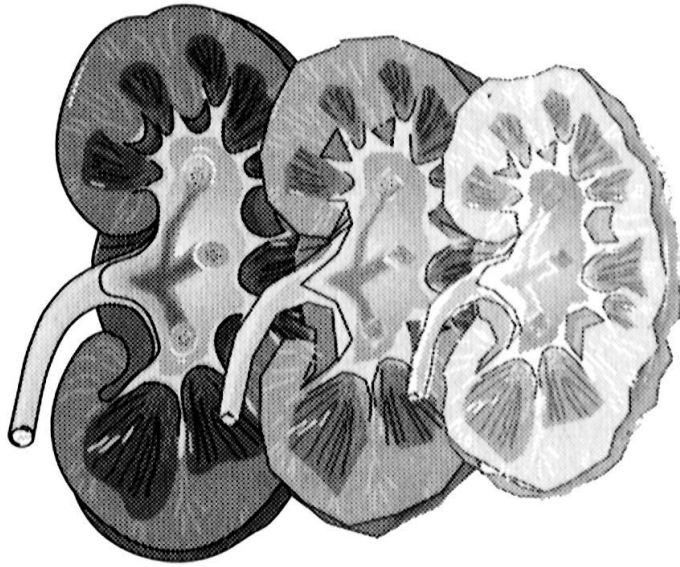
- Paracetamol -120mg/5mls
- Diphenhydramine HCL - 6.25mg/5 mls
- Marketed as a Baby Teething Mixture
- For relief of Teething problems, Cough and Catarrh
- NAFDAC REG No 04-8793
- Cost N280-350
- Manufactured in Lagos
- Sold mainly in Patent Medicine Stores

**Fig 9. ‘My Pikin Syrup’**

### **Pathophysiology**

The Underlying pathologic process common to all CKD is kidney scarring or fibrosis. This manifests as glomerular sclerosis and tubular atrophy which results in progressive reduction in kidney size as shown below (Fig. 20). Eighty-five percent (85%) of the kidney volume is made up of the tubule-Interstitial, thus progressive interstitial fibrosis is synonymous with disease progression.

Degenerating tubules secrete mediators that cause interstitial proliferation and matrix deposition. This process contributes to degeneration of affected nephrons and also initiates destructive process in healthy neighbouring nephrons. Nephron loss increases the workload of the remaining nephrons which hypertrophy, allowing higher filtration pressures. This results in increased vulnerability to further injury.



**Fig 10. Glomerular sclerosis and tubular atrophy lead to a progressive reduction in kidney size**

#### **Clinical features**

**“The first point I will insist upon is the frequency with which serious disease of the kidney fails in symptoms. It may be possible to overlook very chronic cases in children by reason of this very absence of symptoms”**

**..Dr James F Goodhart 1890**

Some children with CKD do not manifest clinically until their renal failure is advanced. However, acutely, it presents mainly with oedema. The mother may just notice that the child’s face is swollen when he or she wakes up and it may disappear during the day due to the effect of gravity (diurnal variation). Other clinical features include oliguria, anuria, and hypertension. If the disease is advanced, Patient could convulse and go into coma due to either uraemic or hypertensive encephalopathy. Polyuria may also occur in chronic renal failure.



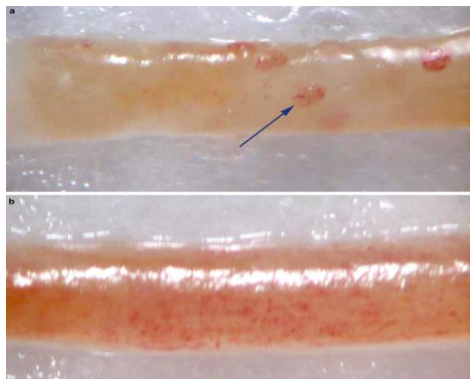
**Fig. 11 Severe facial puffiness in CKD**



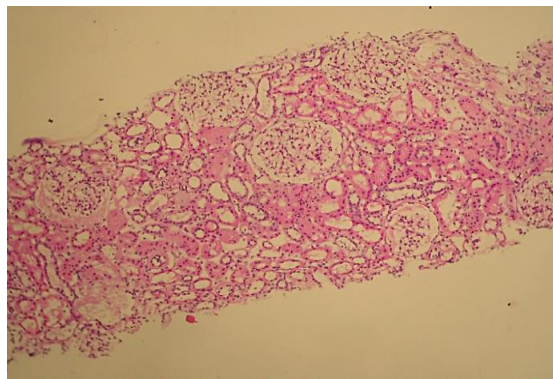
**Fig. 12 Anasarca in CKD**

## Investigations

One of the key investigations we carry out is renal biopsy. Through this procedure, we take a small kidney tissue (Fig.13) and examine it under the microscope (Fig.14). This helps us to assess the histopathological process and the extent of damage to the kidney.



**Fig. 13. Renal Tissue**



**Fig. 14. Glomeruli under light microscope**

## Treatment of CKD in children

The treatment can be divided into three

1. Non-pharmacological treatment such as reduction of salt intake, reduction of protein intake in those with severe CRF, reduced intake of potassium containing fluid, food or medication such as citrus fruits, reduction in fluid administration, correction of metabolic acidosis, anaemia and hypocalcemia
2. Pharmacological treatments include administration of diuretics (water pill), anti-hypertensives, calcium/phosphorus binders' e.t.c. To help practitioners have a full grasp of common pharmacological agents used in CKD, we published a paper titled common drugs used in kidney diseases (Adedoyin et al, 2002)<sup>18</sup>
3. Renal replacement therapies comprises of dialysis on one hand and renal transplantation on the other hand. All these treatment modalities are available in our hospital including renal transplantation that will take off soon. People have been trained and the management of UITH under the current Chief Medical Director, Prof A.W.O. Olatinwo has set up a committee to fast track that and make sure that patients with CKD do not have to go far to access renal transplantation. Furthermore, we have a good collaboration along this line with Sheffield Kidney Institute, Sheffield, United Kingdom (UK) which has graciously trained many of our staff. The effort of Sir (Dr.) Ademola Aderibigbe widely encouraged and supported by the immediate past CMD, now Prof. Sulyman Kuranga is worthy of commendation in making this a reality. I must also specially commend Sir (Dr.) Ademola Aderibigbe for his pioneering effort in dialysis in our centre. He did this through thick and thin but he finally succeeded.



**Fig. 15. Child with CKD whose oedema subsided with drugs**



**Fig. 16. Peritoneal Dialysis**



**Fig. 17. Haemodialysis**

### **More on Renal Transplantation**

**“We make a living by what we get, but we make a life by what we give”**

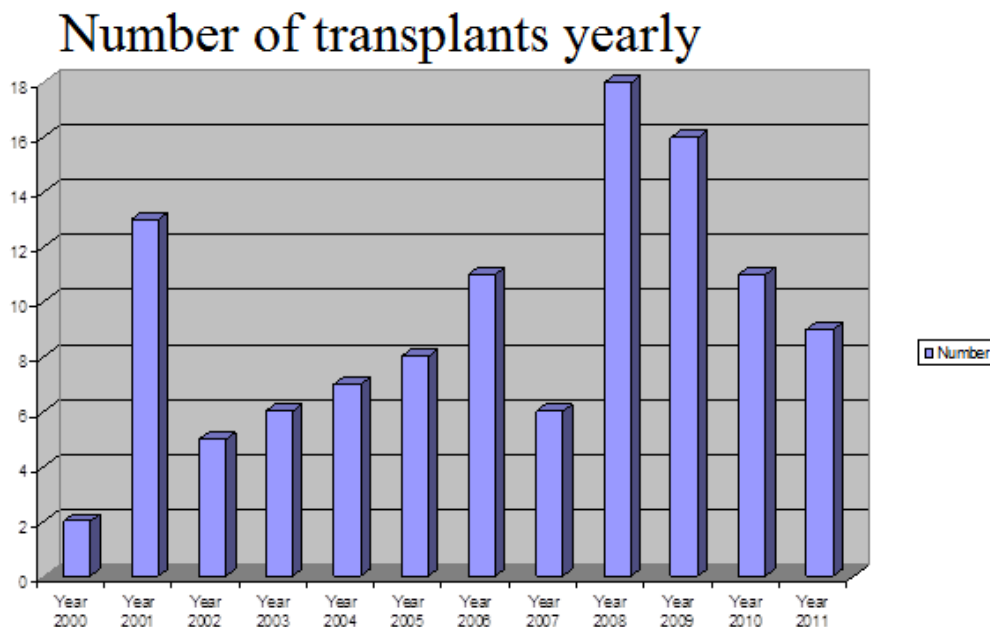
**-Sir Winston Churchill**

The first successful kidney transplant was between two twin brothers- Richard and Ronald. Ronald Lee Herrick (June 15, 1931-December 27, 2010) was the first successful donor to a twin brother-Richard, on 23 December 1954 at the age of 23 years. He lived for 56 years thereafter. He died of complications of heart surgery unrelated to kidney donation

Renal transplantation is the taking of kidney from one human to another human-renal allograft. If the kidney is obtained from another animal species and given to human, it is called xenograft. The pig kidney is been closely examined for that. If that succeeds, that would be a breakthrough. The living related donor is better than the deceased or cadaveric donors and among the living donors, sibling donors are preferable. The donors are usually screened alongside with the recipients to ensure that they are fit to donate. Anyone found unfit is rejected outright. Usually the kidney is transplanted immediately it is removed from the donor and 5year survival in living related donor is about 90%. The recipient is on immunosuppressive drugs for life after receiving renal allograft. The recipient also receives several other drugs when necessary. There is the possibility of rejection after transplantation and there are measures in place to combat it.

## Kidney Transplants in Nigeria.

The total number of kidney transplants done in Nigeria to date is 156 with a private hospital St Nicholas Hospital, Lagos doing most of it 115 (73.7%) followed by Aminu Kano Teaching Hospital, Kano 28(17.9%), Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife 8 (5.1%), UCH, Ibadan 2(1.3%), LUTH, Lagos 2(1.3%) and UMTH, Maiduguri ,1(0.7%). The first transplant at St Nicholas Hospital, Lagos was carried out on the 6<sup>th</sup> March, 2000 and since then, it has sustained it as shown in the bar chart below (Fig. 18). Out of the 115 transplants carried out to date in that hospital, 92 are genetically related ,while 23 were emotionally related and 4 re-transplantation have been carried out so far. The age range of recipients has been 13-67years with a mean age of 41.7 years and a male/female ratio of (90/25), 3.5:1. Seventy-seven (69%) of the 115 recipients are alive. One year graft survival is 84%. Of the 14 that have been transplanted for more than 10 years, only 7 are alive (50%) with 2 re-transplanted and one back on dialysis.<sup>19</sup>



**Fig. 18** Number of transplantations per year at St Nicholas Hospital, Lagos

## Millenium Development goals (MDGs) and CKD in children

MDGs are blended in a set of goals intended to transform the lives of inhabitants of the underdeveloped/developing countries from current position to better standard. In September 2000, 189 countries the world over concluded the decision to pursue these goals as a blueprint towards development . MDGs have eight goals broken into eighteen quantifiable targets measured by forty-eight indicators.<sup>20</sup>

- Goal 1- Eradicate extreme poverty and hunger



- Goal 2 -Achieve universal primary education
- Goal 3 -Promote gender equality and empower women
- **Goal 4 -Reduce child mortality**
- **Goal 5 -Improve maternal health**
- **Goal 6 -Combat HIV/AIDs, malaria and other diseases (including CKD)**
- Goal 7 -Ensure environmental sustainability
- Goal 8 -Develop a global partnership for development

Childhood deaths can be categorized into three groups according to the age at which the deaths occur. The number of children who die within the first 28 days of life per 1000 live births is referred to as neonatal mortality rate. The number who dies within the first year of life per 1000 live births is the infant mortality rate. While the number of children who die before the age of five years per 1000 live births is under five mortality rate.

These rates are sensitive indicators of country's development and evidence of its priorities and values. Unfortunately these rates are very high in Nigeria. When ranked in descending order, Nigeria has the 12<sup>th</sup> highest U5MR out of 191 countries of the world whose data were available for ranking. The countries that have child mortality rates similar to or higher than Nigeria are countries that had been at war, those currently having conflicts or those who have no natural resources.<sup>21</sup>

**Table 2 Comparative child mortality indicators (2006)**

Countries	Neonatal mortality rate	Infant mortality rate	Under-5 mortality rate
Sierra leone	56	159	270
Liberia	66	157	235
Nigeria	53	99	191
Rwanda	45	98	160
Benin	38	88	160
Uganda	32	78	134
Ghana	27	76	120
Phillipines	15	24	32
Jamaica	10	26	31
United kingdom	4	5	6
Sweden	2	3	3

Of the 191 countries for which adequate data were available, 129 are on track for achieving the MDG 4 having reduced the under-five mortality rate below 40 per 1000 live births or achieved an annual average reduction rate of 3.9% or more. Of the 46 countries in sub-Saharan Africa, only Cape Verde, Eritrea and Seychelles are on track to meet the MDG 4 and nearly half of the other countries in the region have registered either no change or only managed to reduce under five mortality by an average annual rate of one percent from 1990-2006. Nigeria belongs to this latter group making very little progress with an U5MR of 189

per 1000 live births in 2007 and a marginal improvement over the rate of 230 per 1000 live births in 1990.<sup>21</sup>

The foregoing has shown no remarkable improvement in our health indices in spite of all efforts to achieve the health related millennium development goals. This is due to among other reasons, over-selective attention to certain childhood illnesses especially the communicable ones to the detriment of the non-communicable ones like CKD. To achieve the MDG, every child must count and no illness must be left behind. There must also be a holistic approach to child health care. So far it has been 'as the spirit leads' or rather arbitrary. Recently, I heard on television, the Honourable Minister of Health canvassing for a bill to give special care to children suffering from sickle cell disease. Good as it sounded, it took the Senate President to point out to him that we would be heading for proliferation of bills for every illness if care was not taken. He advised him to come up with a total integrated package for health care for all citizens irrespective of age, gender or type of illness.

MDG goals particularly MDG 6 (combating HIV/AIDs, Malaria, TB, and other diseases including CKD) are far from being attained because a lot of our health care policies are international donor driven and not government driven. They put their money where they would benefit the most, hence programmes like BFHI, IMCI, ARI, RBM, and HIV go down as soon as the donor funds terminate. The government seems to have no contingency plan for sustainability or if there are, corruption eats up the fund such that in some programmes, personal emolument takes up to 80% leaving the rest 20% for the programme itself. All the programmes earlier enumerated are good to be sustained because their sustainability means that we would have fewer children with CKD. Malaria can lead to quartan malaria nephropathy and HIV can cause HIV nephropathy. Preterm delivery is a predisposing factor to CKD because of fewer nephrons.

Furthermore as evident around us, poverty is still prevalent, ignorance is still high with all its associated arrogance, health seeking behaviours are still low and displacement of people due to wars and disaster is rife among us. Sub-standard drugs still abound despite the effort of regulatory agencies. Water supply is nothing to write home about, sanitation is poor, there is overcrowding and environmental pollution is going on every day despite the efforts of government.

### **Challenges in the care of children with CKD**

There are numerous challenges in the care of children with CKD. These include;

**1. Delayed presentation;** A lot of our children with these illnesses present late in the hospital. This is because they would have tried alternative therapies ranging from the absurd to the unimaginable before coming to us. Such therapies include herbal remedies, religious water, 'foreign do- it-all products' and even urine itself. In the process, the disease process worsens and the damage to the kidney becomes irreversible. In a related study on health seeking behavior in Diarrhoeal illnesses, we found that many of them would have gone to chemist shop before ending up in the hospital (Ojuawo & Oyaniyi, 1993).<sup>22</sup>

**2. Confusion with other diseases by health workers:** Most children with CKD present with oedema (swelling of the body). These are usually confused with other causes of oedema such as malnutrition particularly kwashiorkor and marasmic kwashiorkor, heart diseases or liver diseases by health care providers. Some health workers particularly in the primary health facility think that every child with body swelling will benefit from water pills (lasix) forgetting that lasix if misused could damage the kidney. To resolve this confusion, we published a paper to help practitioners distinguish one form of oedema from another (Adedoyin, 2002).<sup>23</sup> We also went a step further by giving private practitioners simple clue to managing a common cause of oedema- post-streptococcal acute glomerulonephritis (Adedoyin, 2002)<sup>24</sup>

**3. Myths;** Our society is awash with belief system about illness and health seeking behaviour. They therefore react to those illnesses based on their perception-right or wrong. For in the book “Things fall apart” written by Chinua Achebe, a character, Unoka who had swelling of the stomach and limbs was sent to the evil forest to die because he was thought to have offended the gods.<sup>25</sup> Furthermore on the religious plane, a child with swelling of the body is quickly dismissed as a victim of witchcraft, sin, indirect attack to the parent, curse, e.t.c. This is because Africans look outward rather than inward to interpret unpalatable life events (including illnesses). Depending on the interpretation or perception by the parent, they seek the corresponding remedies which further delay appropriate treatment and worsen the disease process. My lecture is not out to prove or disprove the veracity of these claims as I know in part and lack the skill to do so. However, I have the skill to test the science of CKD and my findings have shown that that science of CKD runs parallel to varying and various myths. This lack of consensus on CKD between the practitioners and our local belief system has always delayed presentation and worsen illness resulting in dire consequences. To put these cultural mindsets in proper perspectives we have conducted Knowledge attitude and perception studies on three childhood disorders- enuresis (Adedoyin et al, 2002)<sup>26</sup>, passage of coke colored urine(Adedoyin et al,2005 )<sup>27</sup> and Hypertension (Adedoyin et al, 2006).<sup>28</sup>

**4. Funding:** The anxiety about how much it cost, lack of available funds and savings to take care of illness including CKD is always a discouraging factor to seeking medical care. This is worsened by the fact that in our system, there are no adequate social security arrangements to absorb the eventuality of illness, so you have to pay out-of- pocket before emergencies are attended to. This has made our health system to be lacking in human face. Yet a large percentage of our people are living below poverty line (where they spend over 40% of their income on food) leaving little for other needs. Therefore in the face of competing interest for the little fund, most parents opt for the line of least resistance which is to seek alternative therapies which are either cheap or free.

The recently published Nigerian poverty profile 2010 report by the Nigerian Bureau of Statistics (NBS) confirms that more Nigerians are becoming poorer. The report clearly indicated that the country’s relative poverty increased from 54.4% in 2004 to 69% in 2010 reflecting that 112,518,507 Nigerians live in relative poverty.<sup>29</sup> From the medical point of view, a practical definition of poverty is the state in which an individual or family spends more than 40% of income on food. The basic biologic needs are for food, clothing and

shelter. When more than 40% of the income are spent on food to satisfy hunger, then clearly very little is left for other needs which will remain largely unmet.<sup>30</sup>

**5. Dearth of paediatric nephrologists-** There are less than 20 paediatric nephrologists in the whole of Nigeria to take care of the numerous cases of CKDs in children. In the whole of North Central Nigeria, there are about six known to me, three of whom were trained by me. In all, I have successfully trained five resident doctors to the part II level and sister institutions still send residents to train under me. The number of paediatric renal nurses are also few and in some institutions, they are not even allowed to practise strictly paediatric renal nursing.

**6. Politics ;** Politics is an impediment to accessing health care for children with CKD because it is believed in government circle that funds committed to illnesses that affect few children do not receive as much applause and accolade as that committed to treating millions with malaria and diarrhoeal illness which are all occasioned by dirty environment. Clear the dirts , ensure a clean environment, promote clean and healthy habits, provide safe drinking water, enforce laws that bother on environmental contamination and the money spent on malaria and diarrhoea will reduce. In the immediate post-colonial era when we had little resources, the sanitation officials called ‘Wole-wole’ did it successfully.

**7. Lack of Health security;** Health security (to me) is the availability of world class optimal health care for any sickness at the shortest possible time at affordable and accessible cost. In other words, if a child needs haemodialysis, it can be offered within few hours of that decision being taken by the most qualified and competent personnel without any impediment.

**8. Medical tourism:** The sojourn to India to seek medical care has suddenly caught up with us. Government officials and private endowed people seek help and help others to do so. Children with CKD are not left out of this bug. One of our patients insisted on going there despite having received better and friendlier treatment from us for about 5months. The patient was taken there, but unfortunately she died. The parents regretted going and came back to commend our effort. I am also aware of another one who was correctly diagnosed and managed by our staff, only to opt to go to India where a another wrong diagnosis was slammed on the child. We have also had patients who request for letter from specialist to refer them to India for illness that can be handled here comfortably.

The India sojourn has become more of a status thing to show off wealth and affluence apart from the capital flight and the drain on our economy. But we can up the level of our health care to even exceed theirs. The private sector I am told drove their health sector to such an enviable level. Our private health sector can also seize the initiative by going into partnership to bring out the beauty of our expertise and competence. If we pool our resources together, we can provide the best for our people. A private set up in Nigeria, St Nicholas hospital has blazed the trail in renal transplantation. So far they have transplanted 115 patients in over 10years.<sup>19</sup> A feat that the public hospitals with all the human and capital expenditures are yet to achieve. Government is not the only machine that incites change in any country. It is the people and the Professional Associations. In the case of medical profession, the NMA should

continue to demand for good training, continuous professional education and set standards of service which we have to do and not the government.

However, I cannot blame the India health care seekers completely! What with delay in attending to patients, aggression, discourtesy and disrespect of some of our health staff to patients and fellow workers with unending contention for supremacy among health staff. Instead of earning respect, Health workers spend precious time demanding respect. There is no respect or recognition outside of service, sacrifice and skill. In my 25years of medical practice, I have come across doctors , pharmacists, nurses , laboratory scientists and attendants whose sense of duty and commitment has made indelible mark on me and as such they have my deep respect and regard. I must quickly mention and recognize Matrons Isaiah, Babamale, Owoeye, Bodunde, Mr. Chuks Nwofor , Mr Oyewale, e.t.c. They earned it!

There is also the need to pay serious attention to the marketing of our excellent human resources. Out there, they may not be as endowed as we are but they do good marketing. So we all need a behavioural and attitudinal change to believe in our nation and be committed to our father land. This also applies to our leaders. Let them trust and believe in what our physicians can offer and patronize them.

Furthermore , Mr Vice Chancellor Sir, I have discovered that what attracts our people abroad including India include some of the following which we are also capable of offering if we put our acts together; **Good human relation, Compassion and empathy, Comfort, Good work ethics** and **A working system**. People are rushing there because things are working and there are results. We have everything especially the human resources to make things work in our health system but we lack the right attitude to work. We lack the leadership to make us work in some places and appropriate sanctions are not applied to deviants. Instead, the deviants and mediocre may be the first to be rewarded probably because they work smart and have the right connections.

The missionary hospitals did it successfully for years and they are still doing it. In the 1960/70s we didn't have the number of experts we now have, but the care was good. We conquered our environment and everywhere was clean. The health workers were few, but they were dedicated. They didn't have a lot of hi-tech equipments that we now have (which is good) but they had commitment. There was good work ethics. Time was set for break and nobody leaves his duty post indiscriminately.

Mr. Vice Chancellor sir, Emergencies are attended to hours later not within seconds or minutes. There is no urgency in emergency, because he has to pay first before the services are rendered. I am told that it is only in Nigeria that people pay out-of-pocket for emergency.

### **Myths about CKD and my contribution to knowledge**

Myths are beliefs about issues which lack scientific basis. Our societies have health beliefs which are either beneficial or harmful. There are a few of such about CKD and they include the following:

1. That CKD in children is a death sentence because it is a terminal illness. It can only get worse and never better. That is not true! It depends on the stage of the disease. The early stages are mild and asymptomatic. There are slowing measures for the progression of the other stages of CKD to end stage renal disease. Angiotensin converting enzyme inhibitors (ACEI) have reduced the number of relapses in our patients with nephrotic syndrome (Adedoyin et al 2008)<sup>31</sup>
2. That CKD is idiopathic. It is not true in all cases as causes have been found for some CKDs. For instance, some CKDs are known to be caused by childhood illnesses such as systemic lupus erythematosus, sickle cell disease, Henoch-Schloen anaphylactoid purpura, e.t.c.
3. That CKD in children means they would remain on dialysis for life if there is no renal transplantation. Not all CKDs require dialysis continuously. Majority such as those with nephrotic syndrome (NS) may only need to be managed with steroids or cytotoxic drugs when there is steroid resistance. They only require dialysis when they progress to ESRD. In our experience published recently, only few has required dialysis (Adedoyin et al, 2012).<sup>11</sup> They do not really progress to end stage renal disease if they present early for management. In fact, in most children with NS, they may outgrow the disease and go on to live a normal life. One that readily comes to mind is this patient whom I have managed for over 15 years. She is now a Barrister at law and has remained under our care. We hope to stop seeing her when she marries.
4. That if you donate kidney to a child with CKD requiring it, you may also develop the disease. That is not true, because CKD is non-communicable.
5. That if you donate kidney to someone with CKD, you may not be normal with the remaining one. You are usually tested before kidney is removed from you and given to another person. Your consent is also obtained. You lead a normal life after donation as the remaining one kidney is able to carry on sufficiently.
6. That CKD is better handled by alternative therapies. The alternative therapies are classified into the harmful and harmless. The harmful could be some unknown, irrational harmful remedies, while the harmless may be prayers. The harmless alternative should however not be the only health seeking behaviour or approach but it can be complementary to the orthodox treatment. Studies have shown that belief system aids the acceptance of treatment and may even quicken healing process as the psychological component of man is assuaged.

***Alternative therapies should not however be completely dismissed due to the following posers; Some cancers that have been known to undergo spontaneous regression; some physical therapy such as acupuncture are becoming relevant and useful, there are individuals who are specially gifted with art of healing; we cannot deny the efficacy of***

*prayer; and herbal remedies and urine therapies have worked for some individuals in curing some illnesses.*

Furthermore, some people are beginning to question the effectiveness of orthodox medicine and are turning to alternative medicine. The current mood is best explained by this:

**2000BC- “I have a sore throat”**

**“Why don’t you eat this root?”**

**100AD- “That root is heathen, say this prayer”**

**1880AD- “That prayer is superstitious, you must drink this elixir”**

**1940AD- “That elixir is snake oil, swallow this pill”**

**2000AD- “That drug is artificial, why don’t eat this root”**

*“So knowledge keeps going in circle and nothing seems to be new under the heaven”*

7. That CKD has no cure. True, no cure has been found in the true sense of it for some CKDs. However, drugs to mitigate the effect of the disease abounds. But with many more researches going on we are closer than ever before to getting a cure.
8. That CKD is genetic and runs in families. It is not all of them but there are few that are autosomal recessive like polycystic kidney disease and Alporte syndrome .
9. That CKD could be caused by certain life styles and eating habits. None that I know except obesity which is associated with renal hyper-filtration, hyper-perfusion and microalbuminuria.
10. That intake of lots of water helps to prevent kidney diseases. Water by itself is good for healthy living but it is not like the magic wand for every illness as has been speculated in healthy living tips in newspapers. It helps to challenge the kidney ,aids quick excretion of waste and enhances perfusion of the kidney. It is however doubtful whether it can stop kidney diseases whose genetic template has been set or whose immunological process has been triggered. That notwithstanding, the intake of lots of water is one of those harmless myths that should not be discouraged.
11. That the intake of one’s urine could cure CKDs. Proponents of urine therapy supported their assertion with the fact that urine contains wide range of substances including hormone and antibodies that could be useful in some metabolic pathways. They have also asserted that individuals stranded in the desert survived on urine without untoward side effects and individuals living in communities known to have practised urine therapy have been found to outlive their counterparts in communities where urine therapy is not carried out. These observations have several shortcomings which make the efficacy of urine therapy doubtful. One of it is the fact that no controlled trials were carried out and the reports were mainly narrations of its efficacy for symptoms rather than diseases. Some traditions like among the Hindus believe that it has healing effect but that remains to be scientifically proven especially for CKD. On the other hand, certain religious beliefs and traditions forbid the intake of one’s urine.

## **The facts about CKD and our contribution to knowledge**

I have spent a good part of my life trying to unravel facts about CKD rather than depending on conjectures and feelings. Out of about 67 papers I have written in national and international peer reviewed journals, 44(66%) of them have dwelt on issues bothering on kidney diseases. I have studied from epidemiology, causes, pathology, treatment and prevention of kidney diseases. I have also studied related and unrelated issues to kidney diseases such as malaria, meningitis and malignant melanoma

### **Epidemiology of CKD**

1. We analyzed the various forms of CKD seen among our children in the hospital between 1995-2008, 164 children were seen in the hospital and found that nephrotic syndrome 69(42.1%) was most common, followed by Acute glomerulonephritis (AGN) 47 (28.7%) Three deaths occurred in each of them giving a case fatality of 4.3% and 6.4%. Nineteen children had ARF with 11 deaths giving a case fatality of 57.9% . Some of the children with ARF presented late while some died while trying to raise money for dialysis (Adedoyin et al, 2012).<sup>11</sup>
2. We analyzed the type of histology of nephrotic syndrome common among our children in Ilorin and focal mesangial proliferative was the commonest. This had an implication for therapy as they were mostly steroid resistant (Adedoyin et al, 2001).<sup>32</sup>
3. Are there cases of congenital CKD? Yes, we reported the case of a six week old baby with congenital nephrotic syndrome who finally died (Adedoyin et al, 2006).<sup>33</sup>
4. The actual prevalence and etiological factors of CKD within a community are difficult to evaluate as majority of individuals are asymptomatic in the early stages of the disease. Working under the aegis of the World Kidney Day through the Ilorin Renal Study Group, a total of 207 participants in a community in Kwara State were screened, 8 (4.6%) were hypertensive while 6 (3.6%) were found to be obese. A few of them were found to have urinary abnormality (Aderibigbe, Adedoyin, Chijioke et al,2008).<sup>34</sup>

### **Causes of CKD**

5. Urinary tract infection (UTI) is one of the most often missed diagnoses in children in the tropics. This is because most febrile illnesses in children are first suspected to be due to malaria. A total of 154 patients with various presumptive clinical diagnosis at admission were screened for the presence of UTI and we found that 33(21.4%) had proven UTI with *Escherichia coli* being the leading organism (Adedoyin et al,2003).<sup>35</sup>
6. Failure to thrive poses a diagnostic dilemma for paediatricians and renal tubular acidosis is hardly considered as a cause and hence investigations to diagnose it are often not carried out thus missing it. In a study we did outside the coast of Nigeria, in USA we found that few of the babies failing to thrive had renal tubular acidosis (Adedoyin & Trachtman et al, 2003).<sup>36</sup>
7. Is the effect of CKD just limited to the kidney? No! we reported the occurrence of cardiac disease in children with FSGS compared with other glomerular causes of



primary nephrotic syndrome. We therefore speculated that the immune mechanism responsible for the development of FSGS may also affect the heart (Adedoyin & Trachtman et al, 2004).<sup>37</sup>

8. Anaemia has been known to occur in both AGN and NS due to haemodilution but the effect of these two kidney disorders on other haematological profiles were not known which we studied but found none as there were just sporadic lymphocytosis, lymphopenia and neutrophilia which had no statistical significance (Adedoyin & Olawumi et al, 2006).<sup>38</sup>
9. The occurrence of UTI in NS has been widely reported. It has been implicated as a precipitating factor for relapse in NS. However not much has been documented about the occurrence of UTI in patients with AGN, hence the levels of susceptibility to UTI by both diseases was compared and we found that the occurrence was low and insignificant (Adedoyin et al, 2010).<sup>39</sup>
10. It is commonly assumed that bladder stone was uncommon in Nigerian children despite the scorching heat that could facilitate it. We found and reported a case of bladder stone in a 3year old boy. The case was suspected to be due to posterior urethral valve which caused obstruction and stasis (Adedoyin et al, 2011).<sup>40</sup>
11. Sick cell disease, a common haematological disorder we found out could also be a cause of CKD and we documented it among some of our patients (Adedoyin et al, 2012).<sup>41</sup>

### **Pathophysiology**

12. Published data on the evaluation of renal function in Nigerian newborn are very few. Hence we carried out a study to establish baseline values of glomerular filtration rate (GFR) in Nigerian preterm and term newborn of different sexes and found a positive correlation between the GFR and the gestational ages (Adedoyin et al, 2000).<sup>42</sup>
13. Similarly, we carried out a study to establish baseline values for serum electrolytes urea and creatinine in the newborn. We found a negative correlation between the serum sodium, potassium, urea, creatinine and the gestational age (Adedoyin et al, 2001).<sup>43</sup>
14. We found that there was no study known to us on fractional excretion and reabsorption of sodium in newborns in the tropics in spite of the fact that sodium containing fluids are commonly administered to them when they require parenteral fluid. Therefore to prevent sodium deficits or overload in these babies, we thought we needed a local knowledge of the capacity of the neonatal kidney to reabsorb and excrete sodium. We therefore determined fractional reabsorption and excretion of sodium in 80 clinically stable babies comprising 60 preterms and 20 term babies and found that the fractional reabsorption of sodium increases as the gestational age increase resulting in the reduction of the fractional excretion of sodium which may lead to hyponatraemia (Adedoyin et al, 2003).<sup>44</sup>
15. Little is known about the relationship between nephrotic syndrome and bronchial asthma. We reported the association in two patients which we postulated may be due

to similarity in their hyper-responsiveness to foreign antigens through immune mediated mechanism which result in complex glomerular injury in nephrotic syndrome and airway constriction in the case of bronchial asthma (Adedoyin & Johnson et al, 2003).<sup>45</sup>

16. Nephrotic syndrome and AGN are two leading childhood disorders in the tropics that present commonly with oedema and therefore increased weight. Knowledge of the dry weight of oedematous patients will provide objective assessment of the degree of fluid retention and would also guide fluid and electrolyte management. We therefore derived a formula to determine the dry weight of patients with nephrotic syndrome and AGN using their oedematous weight and the weight when oedema was no longer clinically detectable (Adedoyin et al, 2009).<sup>46</sup>

### **Complications**

17. We found that certain neonatal problem such as sub-galeal hemorrhage could set a template for CKD through complication of ARF if it is not properly managed (Adedoyin et al, 2003).<sup>47</sup>
18. We found that renal deterioration could occur in a child with cyanotic congenital heart disease if not properly managed. This may be as a result of decrease in cardiac output in the late stages of cyanotic congenital heart disease (CCHD) (Adedoyin et al, 2006).<sup>48</sup>
19. We found that psychiatric manifestation could complicate certain children with CKD. The aetiology has been linked to the reduced clearance of neurotoxins such as ammonia, middle molecular weight toxins which are not effectively removed by haemodialysis but better removed by peritoneal dialysis (Adedoyin & Ajiboye et al, 2010).<sup>49</sup>
20. We found that the exuberant immunological response that follows sore throat and skin infection can actually affect both the heart and kidney at the same time in the same patient resulting in AGN and RHD (Adedoyin& Afolabi et al, 2010).<sup>50</sup>

### **Transplantation**

21. Paediatric patients who receive a kidney transplant require extended follow up to monitor graft function and for management of complications. Because of convenience, most patients are sent back to the nephrologist who referred them for transplantation (primary nephrologist) for long term care. As a consequence, in the USA, many paediatric nephrologists who provide this extended care are not associated with a transplant center. In our study, in which both approaches to care were compared, we found that the clinical outcomes were acceptable and compared favourably with the results described in the literature that have been achieved in patients followed up at transplant centers. This approach to care is recommended because it is more likely to foster compliance by both patients and parents (Adedoyin& Trachtman et al, 2003).<sup>51</sup>

### **Treatment**

22. We found lisinopril to be useful in the delayed progression of CKD in our children but it has to be used for at least 3 months. In another study we found that the longer it was

used over period of years, the lesser the frequency of relapse (Adedoyin et al, 2008).<sup>31,52</sup>

23. We found that some of the drugs we used in the treatment of CKD could have some asymptomatic biochemical effects such as hypokalemia and hyponatremia, however there was generally a low prevalence (Adedoyin et al, 2006).<sup>53</sup>

### **Outcome**

24. We recorded a bad outcome in a child confirmed to have minimal change nephrotic syndrome which was considered unusual. We suspected a conversion from minimal change disease to another very unusual variant (Adedoyin & Adeniji, 2007).<sup>54</sup>

### **Prevention**

25. A preventive approach remains the key to curbing the menace of CKD and along that line we proposed a pro-active approach to the management at primary, secondary and tertiary levels of preventions with clinical scenarios as examples (Adedoyin & Adeniyi, 2001).<sup>55</sup>
26. We spelt out measures including regular routine measurement of blood pressure, routine urinalysis, monitoring for hypertension in children on steroid drugs and cautious use of nephrotoxic drugs to prevent hypertension(Adedoyin & Adeniyi, 2001).<sup>56</sup>
27. We also enumerated measures to prevent acute renal failure which include accurate management of diarrhoeal illness, identification and proper management of severe malaria, prompt management of septicaemia, rational use of nephrotoxic drugs, early detection and management of any form of nephropathy and the keeping of strict input and output charts in older children or monitoring of urine passage in children by mothers (Adedoyin, 2000).<sup>57</sup>
28. Since the complication of poorly managed UTI such as hypertension, chronic pyelonephritis and ESRD are quite severe and the costs involved in the management are enormous and clearly beyond the income level of the average parent in the tropics we proposed practical method to prevent UTI such as screening of all febrile children for UTI, avoidance of urethral catheterization if it is possible, frequent and prompt change of baby diapers, discouragement of female circumcision, children wearing pants while playing and the practice of exclusive breast feeding. (Adedoyin, 2002).<sup>58</sup>
29. We spelt out simple ways to identify haemolytic uraemic syndrome (Adedoyin, 2001).<sup>59</sup>
30. We did a review to strengthen easy ways of deriving GFR instead of collecting urine (Adedoyin& Mark, 2007).<sup>60</sup>
31. We advocated vigilance on kidney function in the management of neonatal illnesses such as sepsis, perinatal asphyxia and neonatal jaundice (Adedoyin & Mokuolu, 2005).<sup>61</sup>

### **Others**

32. We looked at the extent of success in the introduction of oral rehydration salt (ORS) in the management of diarrhea and found that the application of ORS resulted in the

reduction of severe dehydration seen in children with diarrhea in Ilorin( Ojuawo, Njoku & Adedoyin, 2003).<sup>62</sup>

33. Malaria affects the kidney and we therefore looked at the burden of congenital malaria in newborns in Nigeria through a multi-center study. It was found to be low occurring 95/1875 (5.1%). It was also found to be asymptomatic, clears spontaneously and may not warrant treatment ( Mokuolu & Adedoyin et al, 2009).<sup>63</sup>
34. We found that severe malaria which could lead to CKD is better managed with Artesunate rather than artemether. This was landmark finding that has changed the face of management of severe malaria globally since November 2010 (Dondorp, Mokuolu & Adedoyin et al, 2010).<sup>64</sup>
35. Using the data above which was carried out in 11 countries and about 5000 children with severe malaria recruited, we found that the presence of metabolic acidosis, cerebral involvement, renal impairment and chronic illnesses are key independent predictors of a bad outcome in African children with severe malaria (Siedlen, Adedoyin & Mokuolu et al, 2012).<sup>65</sup>
36. Due to the fact that anecdotal experience showed that there was increasing over-diagnosis of malaria, we compared the outcome of laboratory and clinical diagnosis and found that out of 419 patients treated for malaria , only 25% were malaria parasite smear positive. The over-diagnosis was more among children who had a smear positive rate of 10.3% compared to 36.9% in adult (Adedoyin, Sanya & Ernest et al, 2010).<sup>66</sup>
37. Food poisoning due to yam flour (amala) consumption which occurred almost in quick succession between February and July 2005 among five family clusters in Ilorin was reported. They presented variedly with diarrhoea, abdominal pain, convulsion and loss of consciousness. They all recovered within 48 hours of admission. Even though we could not carry out toxicological tests, yam flour consumption was highly implicated as the cause. Investigations indicated that the use of certain lethal preservatives for the processing of the yam flour might be responsible. We recommended education on proper processing of all food products in view of the public health implication of doing otherwise (Adedoyin et al, 2007).<sup>67</sup>
38. We have done several other works on anaemia in children<sup>68</sup>, meningitis<sup>69-70</sup>, sickle cell disease<sup>71</sup>, pneumonitis<sup>72</sup>, malignant melanoma<sup>73</sup>, Burkitt's lymphoma<sup>74</sup>, Hodgkins lymphoma<sup>75</sup>, Tuberculosis<sup>76</sup>, Perinatal asphyxia<sup>77</sup>, morbidity and mortality pattern in children<sup>78</sup> and malaria.<sup>79</sup>

### **The politics of CKD in children**

Politics is about having advantage, relevance and voice. Unfortunately, children generally and indeed children with CKD have no voice, no vote and no fund. Hence, it is the adults who are either the health workers, their parents or guardian that must put forward their position to the authorities.

Politics is also about number. Politicians pay more attention to issues that affect the majority than the minority. They forget that while politics may be the tyranny of the majority, the minority can become sufficiently irritating. Yes, CKD may affect 2% of children compared to 30% or so with malaria but that is just statistics drawn from the larger population. In the family of the child with CKD, the morbidity and mortality is 100% as it takes all their time, emotion, concern and love. The society should help to mitigate this pain.

Politics is also about resource distribution on an equitable if not equal basis to competing interests. Here the children with CKD have had a bad and rough deal. They cannot vote because they are under-aged. They cannot be heard because they have no brown envelope to give. They don't have fund for their care because they depend on impoverished parents who are struggling to eke out a living.

If a CKD child requires dialysis, the cost is enormous as earlier underscored.<sup>1</sup> If renal transplantation is required, it cost about N4million at St Nicholas Hospital, Lagos. This is a far cry from the monthly earning of even the highest paid civil servant. So clearly help must come from abroad. The abroad here refers to well meaning individuals or government.

Charity is still largely rudimentary here, because the economy has not produced many wealthy individuals who can have something to spare for others. Philanthropy on the other hand which is service to humanity through giving is practised by a few on an epileptic basis. The best option therefore is a government policy that provides for free or subsidized care if they need dialysis or renal transplantation.

Politics is also about planning ahead. We should begin to plan ahead for the looming transition from communicable disease to non-communicable disease. Already that has happened in adult medicine. The bulk of their patients are either hypertension or diabetes or CKD. With the intense concentration by partners in controlling malaria, ARI, Diarrhoea illnesses a 'reverse morbidity transition' may soon occur.

Unfortunately, despite the fact that World Health Organization stipulates that 15% of a country's national budget should be for health, The Nigerian budget for health has remained less than 10% with little or nothing allocated to the care of children with CKD. This is in contradiction to what obtains in the USA where an individual who is diagnosed with CRF or ESRD is guaranteed dialysis and other treatment which improve their care as long as he has paid into the social security system and he remains a USA citizen. For those that receive kidney transplant, Medicare covers drugs only for a period of three years. Thereafter the individual is responsible for the cost.<sup>80</sup>

In England and Wales, the National Health system (NHS) provides dialysis and transplantation for all citizens. In the Kingdom of Saudi Arabia, a developing country with an oil economy like Nigeria, renal replacement therapy is free for all citizens. In South Africa, a fellow African country, people earning below a particular income receive all treatments practically free. In Nigeria, The National Health Insurance Scheme (NHIS) does not cover chronic illnesses like CKD and other capital intensive illnesses. Foreign aids to Nigeria are directed mainly to communicable diseases. Possible extension to renal care is doubtful or at

best likely to be minimal because industrialized countries are now contending with increased prevalence of CKD and rising costs of treatment. Hence the only feasible funding option in Nigeria is either government funding or through health insurance programme.<sup>80</sup>

In a democracy, there are four things that aid health care; constitutionalism, legislation, appropriation and budget implementation by the executive. Unfortunately again there is no mention of health in our constitution. The closest strong document on Health so far is the yet to be signed National health bill which if signed into law would take health care to the next level in Nigeria. Though the bill does not have any welfare provision for children with CKD, it has provision for those things that will facilitate the treatment such as law on tissue donation. There are annual appropriations for health care in Nigeria but most of it is for recurrent expenditures with little left for capital development in the health sector. Sometimes the appropriations in the budget are also not fully implemented which is wrong and illegal.

On the international plane, there was the Istanbul declaration<sup>81</sup> on organ trafficking and transplant tourism by WHO in 2004 which took measures to protect the poorest and vulnerable groups from transplant tourism and the sale of tissues and organ.

The International Society of Nephrology (ISN) through its Renal Sister Center programme encourages nephrology centers in the developed world to aid centers in emerging countries by exchanging and sharing faculties, fellows, students and equipments as well as by cooperating in clinical research projects and educational courses. The UITH, Ilorin as earlier mentioned has benefitted from the renal sister programme through collaboration with Sheffield Kidney Institute, United Kingdom (UK) which has trained some of our professionals. There is also the ISN fellowship programme which offer training opportunities to young nephrologists in emerging countries with the ultimate goal of improving the home institutions' standard upon the Fellow's return. To date I have endorsed at least six resident doctors (including three from UITH) for this opportunity.

The WHO recently also declared CKD in children and adult an emerging epidemic and have therefore in cooperation with the ISN declared the 8<sup>th</sup> of March every year World kidney day during which awareness about kidney diseases are created and screening for CKD are carried out. The Ilorin renal study group of which I am a member and an official has regularly marked this day by creating awareness and going to the rural areas to screen people for kidney disease. The outcome in one of the communities we screened has been published.<sup>34</sup>

### **My refrain**

In my 25 years of medical practice, I have often repeated certain philosophies passionately. They include:

**Preventive nephrology:** In view of the fact that a lot of our people lack the resources to handle CKD in children when they occur, we had long proposed the concept of preventive nephrology, before it became popular at conferences in Nigeria (Adedoyin & Adeniyi, 2001).<sup>55</sup>

**Single-digit mortality:** As my little contribution to meeting the health related MDGs, during my tenure as HOD, I brought up the concept of aiming to achieve single digit mortality (<10% mortality) in all our units in the department. It is my opinion that a tertiary facility such as ours with all the available abundant human resources in the form of highly skilled experts should use single digit mortality as a measure of performance.

**Double jeopardy:** In the course of my practice, I noted that certain combination of diseases rarely occurs. I therefore came up with the concept of abhorrence of double jeopardy in disease combination in children. This concept holds true in sickle cell disease (SCD) where certain illness such as febrile convulsion, cerebral malaria, malnutrition, malignancies and tuberculosis have been found to be rare in children with SCD (Adedoyin, Adesiyun, Adeboye & Mark 2010).<sup>71</sup> It is possible that there are certain factors in the sickle cell gene that protect them against these diseases.

**No child left behind in health care:** I believe strongly that no child should be left behind in obtaining certain social benefits such as education and health care. I have therefore been an advocate of not prescribing apparently expensive drugs if it is possible, for children of very poor parents. Alternative equally efficacious and cheap brands of drugs should be offered to them. This is because very often, the illnesses of the child meet the poor parent unaware and when as usual they have little fund. Since they have to pay out-of-pocket, while they are trying to mobilize funds for expensive drugs, no treatment is administered to the child and the disease worsens.

**Efficiency in the system:** I am passionate about an efficient health system. Many of us have been privileged to enjoy or benefit from an efficient system outside our country, but hardly replicate the same system when we return, in our little corner. Hence, I make it a point of duty to organize any system I preside over.

**Modified industrial dispute resolution in the health sector:** There is no denying the fact that much of the gains in the welfare of health workers have come after strike actions. I am therefore unable and incompetent to proffer better and alternative dispute resolution mechanisms. However, strike interrupts services and further worsens child health indices. I therefore passionately suggest a modified industrial dispute resolution mechanism that permits health workers in the children emergencies and intensive care unit to offer some services during strike. This is because of all the victims of strike action by health workers, children are the only group unable to take decisions for themselves and therefore suffer the most.

### **Contribution to Medical education**

I have been lecturing since 1989, two years after I finished medical school first as associate lecturer in Physiology (1989-1991), then associate lecturer in Paediatrics (1991-1996) then lecturer 1 in Paediatrics in 1997. For a large part of my service as associate lecturer, I offered them gratis.

Furthermore, in pursuit of excellent medical education, I have been involved in curriculum development in the then Faculty and now College of Health Sciences. I am currently the chairman of College retreat committee that would review the college curriculum. I was for a long time on the professional induction committee and rose to be the chairman.

Mr. Vice-chancellor Sir, let me use this opportunity to make a special plea (with due respect) to my Dean and Provost, that the good old tradition of releasing professional examination results within 24-48 hours after completion of the exam be sustained. I recall with nostalgia that during my days in the medical school, our results were placed within 24-48 hours after completing the final professional examination. As an alumnus of this great University, during my days, we also looked forward with excitement to the initiation ceremony being graced by the aura and dignity of the Vice-Chancellor and other principal officers with the accompanying memorable handshake. We all worked hard to make that day popularly called 'Geneva' . I gathered that other professionals now carry out similar induction ceremonies. That notwithstanding , the medical graduation induction ceremony has been on for ages and remains a trailblazer that still deserves a pride of place and special recognition.

As Head of Department, I established the Ilorin Annual Paediatric Digest which is a compendium of all our grand round presentations. The content of the digest is so much of high quality that Nigerian Journal of Paediatrics (NJP) has for the second year running been publishing some of the write-ups in its journal. To date, we have produced six editions.

At the UIITH level, which is the laboratory of most of my researches, I have supervised 17 fellowship dissertations successfully, served and still serving on various committees actively. I am the residency coordinator in my department.

## **Recommendations**

### **Individual level**

1. Avoid the use of soap and cream containing mercury. Do not misuse and abuse analgesics and non steroidal anti-inflammatory drugs (NSAID) through chronic and unwarranted use. Take herbal remedies and other unregulated "do-it-all" remedies with caution. Adopt weight reducing life styles such as regular physical exercise and intake of low calorie food like fruits.
2. Pre-school medical screening including renal ultrasonography and urinalysis should be taken serious for our children. It should not be corrupted.

### **Institutional/Governmental level**

3. Childhood period is the beginning and foundation of a meaningful later life. If the kidney of the child is well protected, then the adult kidney is safeguarded and by extension the heart is also protected. Therefore any investment in child health is the right investment and the best investment because the society will be the best for it.
4. Renal replacement therapy for children with CKD should be free or heavily subsidized as most of them from our experience cannot afford it. A major overhaul of our health system



should be undertaken to reflect a shared burden of CKD between the sufferer and the government. Alternatively, NHIS should include chronic illnesses like CKD in its care plan rather than concentrating on only infectious diseases. The removed petroleum subsidy should be re-invested in to the NHIS fund to enable it capture children with chronic illnesses. The nation is suppose to provide for the good health of every child according to the the Child's right act<sup>82</sup> in Part 1, section 13.

5. A shift in emphasis from equipment/facilities for just malaria, ARI and diarrhoea. We have consolidated on that over the years and we should continue to. Let our tertiary institutions now begin to take on sub-specialty care like renal transplantation, fertility care, and cardiac surgery e.t.c to enhance their relevance. These are some of the reasons our people go to India for care. In this line, I must commend the UITH under the Professor A.W.O. Olatinwo for working so hard to see that renal transplantation takes off in Ilorin and for also establishing cardiac and fertility centres.
6. National health bill should be signed into law to guarantee a robust and organized health system. To date, that document remains the only legal document on health since the constitution did not mention anything regarding health. Child's Right Act should be adopted by States that are yet to do so. In this line , I must commend the Kwara State Government for being one of the few States in the Federation that have adopted the Child Right Act.

### **Thanksgiving**

I want to thank the almighty God for sparing my life to see this day. I wish to appreciate his unseen hand which has lifted me from grass to grace. I am grateful to the Vice-Chancellor, Professor Is-haq Olanrewaju Oloyede for counting me worthy of appointment as Professor.

I am also grateful to the Chief Medical Director, Prof A.W.O Olatinwo and other past Chief Medical Directors (Professors Daramola, Fakeye and Kuranga) for providing the conducive atmosphere to carry out my researches. I wish to acknowledge with gratitude the esteemed presence of Kabiyesi, Eleju of Igbonla, HRH, Oba Abdulrahman Akande Oyediran. Let me also recognize with gratitude the presence of Chief Joseph Otunola, the Odofin of Ile Odofin in Igbonla.

I also wish to specially thank my teachers from primary school to the University for being used by God to gradually change me from the “**little Kaduna boy**” who could neither read nor write to a Professor of Paediatrics. I remember with nostalgia and gratitude one of my primary school teachers, Mr. Joseph whose interest in me propelled me to improve tremendously such that I remained top in my class from primary three onward. Let me remember with gratitude, the role of the Fellowship of Christian Students (FCS) at Federal Government College Kaduna in laying the foundation of a sound character and God fearing life in me. In this light, I want to recognize one Mrs. Babalola and several others who helped to mould our character while in FCS. I also want to thank all my teachers while an

undergraduate, some of who may be here today like Prof (Mrs.) Balogun, Prof Edungbola, Dr Agbede, Dr Abdulrahman, Dr AL Babata and Prof BJ Bojuwoye.

I am most grateful to My Lord, Archbishop of Kwara Anglican Province/Bishop of Igbomina Diocese, Most Rev. M.O. Akinyemi, Bishop of Igbomina West Diocese, Rt. Rev J.O. Akinola, and the Vicar -in-Charge of St John's Anglican Church, Igbonla/ Coordinator of Igbonla Deanery, Rev. Canon M.O. Oladipo for their esteemed presence. Let me also thank very specially all the Pastors and Elders in the Redeemed Christian Church of God in the Kwara Provinces and Region 4 ably led by Pastors SE Akande (Regional Pastor), Pastor MA Majekobaje (Provincial Pastor, Kwara Province 3) and Pastor Bankole (Provincial Pastor, Kwara Province 2) for their esteemed presence.

I must also express profound and immense gratitude to my dear wife, Mrs. Folashade Adedoyin, my only jewel of inestimable value and my children-Joshua Oluwapelumi Adedoyin, John Ibukun-Oluwa Adedoyin, Joseph Oluwatomi Adedoyin, and Esther Ore-ofe-Oluwa Adedoyin for their unquantifiable support, love and understanding with a husband and father with multiple commitments.

Let me pay special tribute to my late Father, Mr. Job Adedoyin Oyaniyi who passed on when I was just six years of age. I must not forget to thank my mother, Mrs. Rachel Ayoku Adedoyin for her exceptional and outstanding motherly love and sacrifice to see me to this great height. I shall never forget your resilience and fighting spirit! Many thanks also to her sister Mrs. Kehinde Adekeye who stood by our mum and us right from when we lost our father till now. Let me also thank in a very special way all my siblings Mr. Omoniye Adedoyin, Mr. Adeola Adedoyin, Mrs. Dupe Aroke and Engr Adetunji Adedoyin for their immense sacrifices, love and contributions in seeing me to this glorious level. I must specially thank Mr. Titus Adeola Adedoyin who sacrificed a greater part of his income to see me through my undergraduate training. I am most grateful to Mr. and Mrs. Samuel Oluwaniyi, Mr and Mrs Olubiyi, Pastor and Mrs Afolayan for their love and support. I must also appreciate Mr and Mrs Odetundun who played host to me during my undergraduate training at the University of Ilorin and for his role in making this occasion a success. I appreciate the presence of all my in-laws ably led by Mr&Mrs Adenekan. I wish to specially appreciate Mr. &Mrs. Joseph for their continual interest and prayer for me. Special thanks also go to Mr&Mrs Oladele, Mr&Mrs Aiyegbusi and Mr&Mrs Kareem.

I am grateful to all members and matrons/patrons of Egbe Omoluabi of Igbonla led by our President, Dr Abdul Fatah Olabode Jimoh for finding time to grace this occasion. I really appreciate the honour done to me by all of you. Ire akari! I also thank all indigenes of my native community of Igbonla in Irepodun LGA of Kwara State which has produced several intellectuals who are raising their head in various places. I feel proud to be associated with you all and feel highly humbled to be the first professor to be produced by the community. It is my prayer that very soon Igbonla indigenes will rule the world!

My gratitude also goes to the Emeritus Professor Adeoye Adeniyi, Professor A.B.O.Omotoso, Professor W.B.R. Johnson, Professor Ayo Ojuawo and Sir (Dr) Ademola

Aderibigbe for their mentorship and tutelage. I am grateful to Professor Olugbenga Mokuolu with whom I went through my residency training in those days when there was dearth of trainers. We went through it all successfully as brothers, friends and colleagues and we have remained so till today. I am also grateful to my numerous collaborators in my various research works for their cooperation and team spirit. I acknowledge with thanks the special role played by my HOD, Professor A Ojuawo, Major (Dr) SA Ayeni and Dr BA Issa in the preparation of this lecture.

I must not forget to thank numerous colleagues including Drs. Ernest, Gobir, Adesiyun, Adegbeye, Adeboye, Afolabi, Olaosebikan, Saka, Katibi, Abdulkadir, Obasa, Odeigah, Popoolas, Olanrewaju, Ajiboye, Professors, Aboyeji, Katibi, Salami, Chijioke e.t.c for their love and goodwill. Thanks also go to all my resident doctors and departmental staff both in the UITH and Unilorin for their support and goodwill. I am also grateful to all the nurses with whom I have worked during my career. They are too numerous to mention but I must quickly recognize Mrs Ajala, David, Maiyaki, Ajiboye, Adeniran, Balogun, Babamale, Adeyemo, Isaiah, Kolawole, Bodunde e.t.c who were epitomes of the ideals of nursing. I am also grateful to all the Staff of the Renal Care Center and colleagues in the Paediatric Surgery unit for their tremendous support. Thanks also go specially to Mallam Shehu Afunsho who notionally is an office Assistant but to us in the department is a (“Director of Administration”). His commitment to duty is legendary and outstanding.

I am specially grateful to the Principal, staff and students of United Secondary School where my wife teaches as Chief Education Officer for finding time to grace this occasion.

I also remember with nostalgia the class of 1987 in the then Faculty of Health Sciences some of whom are also lecturers in the College. I feel proud to be associated with you all. Let me also recognize two alumni, Professors I Adigun-Lawal and MO Buhari who were also recently appointed Professors.

I am also grateful to my neighbours- Justice S.O.Mohammed , Engr & Mrs Fashanu, Surv. & Mrs. Salawu, Pharm. & Mrs Katibi, Prof. & Mrs Olorunmaiye and others for finding time to grace this auspicious occasion. I must not forget to appreciate family friends- Dr & Mrs Ogbonmide, Prof & Mrs Ologe, Mr and Mrs Jooji, Mr and Mrs Adebisi, Engr and Mrs Alaba, Pastor and Mrs. Gideon Majekodunmi for their esteemed presence and honour.

I am also grateful to all members of the Redeemed Christian Church of God from various parishes here present. Thanks also go to members of Women and Child Watch Initiative (WOCWI) ably led by Barrister Abiola Adimula.

I want to thank all the staff of the various departments in the Faculties and College ably led by the College Secretary, Dr BS Adisa and indeed the entire University community for their esteemed presence.

I also say thank you to all to the renal nursing and medical students, Ilorin University Medical Students Association (ILUMSA), Basic Medical Sciences Student Association (BAMSSA) members and officials, Unilorin Christian Union (UCU) members and officials,

Nigerian conference of Christian Medical and Dental Students (NCCMDS) members and officials for their esteemed presence and honour.

## **Conclusion**

Finally let me recall with nostalgia a popular and favourite hymn that reverberates in my mind often. It was written by Fanny J. Crosby (1820-1915) and the first stanza says

**“Blessed Assurance, Jesus is mine  
Oh what a foretaste of glory divine  
Heir of salvation, purchase of God  
Born of his spirit, washed in his blood”**

I would like to end this lecture, Mr Vice Chancellor, Sir with the chorus of that hymn which says **“This is my story! This is my song!”**

Thank you for listening.

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