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Full Length Research paper

Causes and renal morphological changes in chronic renal failure: A retrospective study of 50 autopsy cases

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The paper aims to determine the age and sex distribution of patients with end stage renal disease in Benin City, Nigeria, to study renal changes in chronic renal failure and determine where possible the causal/associated aetiopathologic agents in relation to chronic renal failure, and to compare results with those of similar studies done in other parts of the country. Complete autopsy was carried out on bodies of 50 patients who died of chronic renal failure at the University of Benin Teaching Hospital Benin City, after securing informed consent from the relatives. The kidneys were measured, weighed and described. In addition tissue samples were taken for histology using haematoxylin and eosin stain and the slides were subsequently read. Periodic acid Schiff and Masson's Trichrome stains were applied to kidneys to address unresolved cases. All cases of acute renal failure due to shock were excluded from the study. As an inclusive criterion all cases used for the study were confirmed chronic renal failure patients who had been on dialysis for at least a period of 6 months and they all had a renal biopsy with histological confirmation of the type of renal lesions involved. Ethical approval was sought and granted by relevant authorities in UBTH before the study commenced in 2004. Twenty nine of the patients (58%) are males, 21 (42%) are females, with a male to female ratio of 1.38:1. The largest concentration of chronic renal failure (CRF) related deaths occurred in the 30-39 years 18 (36%), with the age range varying from 8 years in a male child who died of Good Pastures syndrome, to a 65 year old woman dying of chronic hypertensive renal disease. The average age of patients dying CRF is 43.9 years SD 6.6. Adult polycystic kidney disease is responsible for 2 deaths (4%), Systemic lupus erythematosus one death (2%). Chronic glomerulonephritis is responsible for 21 deaths (42%), the most significant cause of both end stage kidney disease and CRF. Diabetic nephropathy is responsible for 7 deaths (14%); hypertension is responsible for 15 cases (30%). Chronic renal failure related deaths in Benin City have a slight male preponderance of 1.38:1, and occurred in the average age group of 43.9 years SD 6.6. The commonest causes here include chronic glomerulonephritis accounting for 42%; hypertension, 30% and Diabetic Mellitus, 14% of cases.

Key words: Chronic renal failure, changes, autopsy, retrospective study.

INTRODUCTION

According to the Kidney Disease Outcomes Quality Initiatives (K/DOQI) guidelines, chronic kidney disease is defined as either kidney damage or GFR less than 60 mls/min/1.72 m^2 for a period equal to or less than 3 months. Kidney damage itself refers to pathological abnormalities or markers of damage including abnormalities in urine or blood tests or imaging studies (http://www. Kdo-qi.org, 2009). Kidney failure is defined as either (1) a level of GFR to <15 mL/min/1.73 m^2, which is accompanied in most cases by signs and symptoms of uremia, or (2) a need for initiation of kidney replacement therapy (dialysis or transplantation) for treatment for complications of decreased GFR, which would otherwise increase the risk of mortality and morbidity. Some patients may need dialysis or transplantation at GFR ≥15 mL/min/1.73 m^2 because of symptoms of uremia (http://www. Kdoqi.org, 2009).

The prevalence of primary renal disease resulting in

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Table 1. Showing percentage distribution of causes of chronic renal failure with respect to age and sex

Causes of chronic renal failure	Frequency	Sex		Average age	%	Weight.
		M	F			
Adult Polycystic Kidney Disease	2	2	0	48	4%	4Kg
Chronic glomerulonephritis	21	13	8	35	42%	60.5g
Diabetic nephropathy	7	5	2	51	14%	105g
Hypertension	15	5	10	56	30%	92.5g
Systemic Lupus Erythematosus	1	0	1	19	2%	80g
Obstructive Uropathy	1	1	0	46	2%	65g
good pastures syndrome	1	1	0	8	2%	75g
Unclassifiable	2	2	0	48	4%	55g
Total	50	29	21	43.94	100%	

SD 6.63.

end stage renal failure in Blacks has been documented in very few reports from different parts of Africa (Hutt and Coles, 1969; Hutts and Wing, 1971; Edington and Mainwaring, 1966). Most of these reports were based on retrospective of patients with chronic renal failure. Oyediran and Akinkugbe (1970) drew attention to the highly disturbing high percentage of cases of chronic renal failure occurring in people under 40 years of age (Oyediran and Akinkugbe, 1970). This study attempts to define the most common causes of chronic renal failure in patients who died of chronic renal disease in Benin City, so as to determine their significance in causing renal diseases in otherwise young Nigerians and therefore possibly suggest ways of prevention of chronic renal failure which is an incurable but expensive disease, sometimes needing renal transplant which most of these suffers cannot afford. Although end stage renal disease (ESRD) patients represent a small group of the total European countries population, (0.02% in UK and 0.06% in Italy), dialysis costs absorb 0.7–1.8% of the health-service budget (Oyediran and Akinkugbe, 1970). In the United States, the expenditure on ESRD is estimated to double in the next year to more than US$28 billion by 2010 (Isah et al., 2002). Similar figures are lacking in Africa and indeed, Nigeria. The exact prevalence rate of Chronic Renal Disease (CRD) in Nigeria is not known. Hospital based data in Nigeria have reported prevalence rates expressed as ratios of hospital admissions of between 1.6 and 8% (Eke and Eke, 1994; Okoro and Okafor, 1995). This study attempts to draw attention to the causes and therefore possible ways of prevention of ERSD while outlining the predominant morphological changes in renal size and morphology.

MATERIALS AND METHODS

This is report of a one year study done from September 2003 to August 2004. Institutional approval was first sought and received before the study was carried out. Complete autopsy was carried out on bodies of 50 patients who died of chronic renal failure at the University of Benin Teaching Hospital Benin City, after securing an informed consent from the relatives. The kidneys were measured, weighed and described. Tissue samples were in addition taken from the kidneys for histology using haematoxylin and eosin stain and the slides were subsequently read. Periodic acid Schiff and Masson's Trichrome stains were applied to kidneys to address unresolved cases. All cases of acute renal failure due to shock were excluded from the study. As an inclusive criterion all cases used for the study were confirmed chronic renal failure patients who had been on dialysis for at least a period of 6 months and they all had a renal biopsy with histological confirmation of the type of renal lesions involved. Ethical approval was sought and granted by relevant authorities in UBTH before the study commenced in 2004.

RESULT

Table 1 shows the percentage distribution of chronic renal failure in all cases seen. Twenty nine patients (58%) were males, while 21 (42%) were females, with a male to female ratio of 1.38:1. The highest prevalence of chronic renal failure is in the 30-39 age range, with a frequency of 18 (36%). The youngest patient seen is an 8 year old male who had Good Pastures syndrome. The oldest patient seen is a 65 year old female with a chronic hypertensive renal disease. The average age of patients who died of chronic renal failure is 43.94 years with a standard deviation of 6.63.

Adult polycystic renal is responsible for 2 cases (4%); obstructive uropathy with severe pyelonephritis is responsible for 2 cases (4%); two cases (4%) were unclassifiable with regards to the cause; chronic glomerulonephritis is the cause of 21 cases (42%); the highest singular causative agent seen in the study. Diabetic nephropathy is responsible for 7 cases (14%), while hypertension is the cause of chronic renal failure in 15 cases (30%). Systemic lupus erythematosus related kidney disease is responsible for one death from chronic renal failure. In two cases the cause was inconclusive.

Severe atrophy or contraction is seen in both kidneys of chronic glomerulonephritis, while secondary causes of chronic glomerulonephrirtis like Systemic lupus erythe-

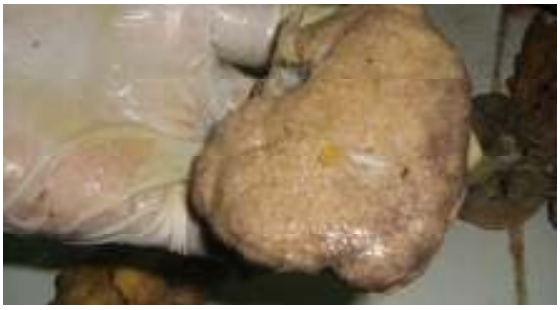
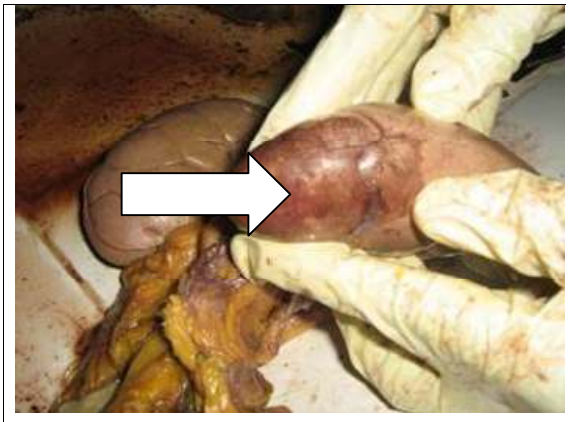


Figure 1. Showing the kidneys of SLE. See one of two kidneys of SLE patient whose breath compares favorably with the hands breath of the author ie 8 cm in its longest diameter, with diffuse coarse granularity. Weight about 80 g.

A



B

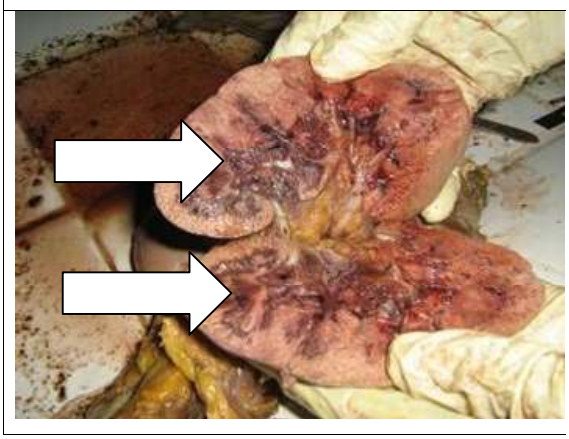


Figure 2(a, b). Showing the wedge shaped area of inflammation surrounding the papillary in fact in the cut surface in 2(b). See arrows.

matosus also recorded shrunken kidneys which were not as severe as those of the primary aetiology (Figure 1). In both cases above the kidneys are coarsely granular and bilaterally symmetrical. Hypertension also produced kidneys of variously decreased sizes with fine granularity averaging 92.5 g but much more severe contraction in the malignant hypertensives. Adult polycystic kidneys have kidneys of average weight of 4 kg. Figure 2 showed a diabetic kidney with lower pole papillary necrosis and a reactive pericortical inflammation in a 51 year old male with poorly controlled diabetes.

The microscopic changes in the kidneys of patients with chronic renal failure also varied with the cause of the chronic renal failure. Pyelonephritis and papillary necrosis is seen in long standing diabetic nephropathy. Thyroidization of the glomerulus is prominent in the kidney of chronic glomerulonephritis, with loss of viable glomeruli per high power field. Numerous nephrons are seen dispersed in between cysts and lined by variable epithelium in adult polycyctic renal disease. Few cresents are seen in the case of Good Pastures syndrome, while focal glomerulosclerosis was noted in most cases of diabetic kidneys.

DISCUSSION

The most common causes of chronic renal failure among Nigerians have been stated to include glomerulonephritis, hypertension, diabetes mellitus and obstructive uropathy (Akinsola et al., 1989). In this study our findings are that chronic glomerulonephritis is the most common cause of end stage renal disease, and is responsible for 21 cases (42%). Hypertension is the cause of chronic renal failure in 15 cases (30%). Diabetic nephropathy is responsible for 7 cases (14%).

Glomerular diseases especially chronic glomerulonephritis have been documented to constitute one of the most common causes of chronic renal failure in humans (Ojo et al., 1992). Although we know little of the etiologic agents and triggering events, it is clear that immune mechanisms underlie most forms of primary glomerulonephritis and many of the secondary glomerular disorders (Wilson, 1996; Nielsen et al., 2001). In Nigeria a tropical country with poor socioeconomic indices and a weak health care delivery, glomerulonephritis is certainly taking a major toll as the most common cause of end stage kidneys especially in the relative younger productive sector with a mean age of end stage kidney reported here as 43.94 especially so in the 30-39 age range. Ojo et al. (2005) in a similar study at Ile-Ife Nigeria reported chronic glomerulonephritis to be the most common cause of chronic renal disease accounting for 40.9% of all causes (Alpers, 2005).

Hypertension as a cause of end stage kidney disease manifested much later in individuals at a mean age of 56 years. Majority had been diagnosed with benign hypertension but a few subsequently developed a superimposed malignant hypertension with diastolic blood pres-

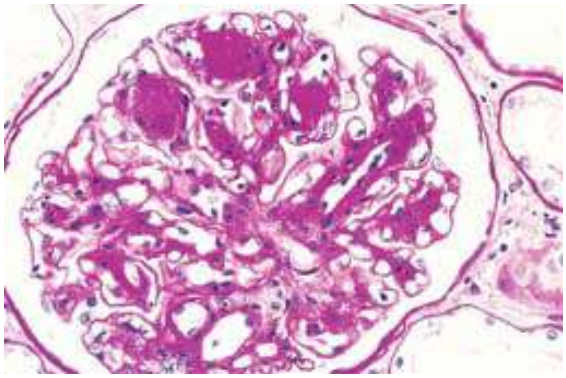


Figure 3. Below shows a PAS stain of the kidneys showing a nodular multiple eosinophilic mostly anucleate material surrounded by dilated capillaries in nthe periphery. There is also an increase in the mesangial matrix (Kimmelstiel Wilsons glomerulopathy).

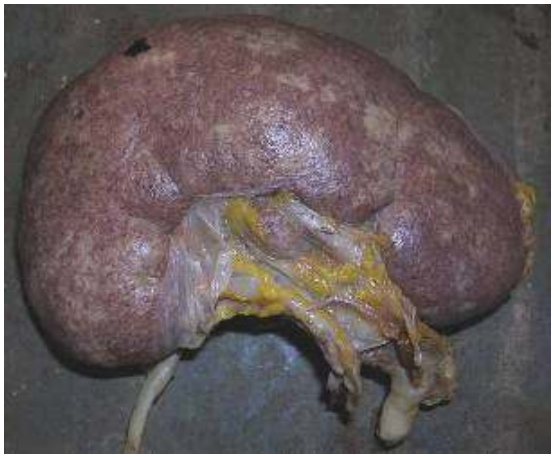


Figure 4. Flea bitten finely granular kidneys of malignant hypertension.

sures in excess of 120 mmHg. The basis for this turn of events for the worse is not known, but may be related to some form of vascular damage. Some others also had essential hypertension with incidental findings including pyelonephritis. Diabetes mellitus is the next major cause of end stage kidney disease representing 7 cases or 14. Diabetes related end stage disease presented at a mean age of 51 years. Almost all patients are type 2 and obese. Their kidneys had typical papillary necrosis with multiple scarifications. Typical Kimmestiel Wilsons glomerulopathy was seen in histology (Figure 3). Their kidneys were marginally shrunken weighing 105 g.

The preponderance of male patients numbering 29 (58%) in this study agrees with previous reports by Ojo et al. (1992) at Ile-Ife, Western Nigeria, in which he had a similar male to female ratio of 1.28:1 (Ojo et al., 1992). Abdurrahman et al. in Northern Nigeria also found a male preponderance amongst children suffering from renal failure 2.1:1 (Abdurrhman et al., 1983)

The implication is that these patients are dialysis dependent needing dialysis in their steady state twice every week for life with each session costing over a $100. Most of these patients are indigent and cannot afford it. The only chance of a cure being a renal transplant costing over $25,000:00 for the procedure without the immunosuppressive follow up. The emphasis here must therefore be preventive with continued health education to avoid certain practices including the use of mercury laden bleaching creams, good personal hygiene to reduce the chances of streptococcal infections with subsequent glomerulonephritis, good governance and the equitable distribution of resources, transparency and eradication of corruption in government, with entrenchment of democratic values, better education and health care facilities, with a functional health care policy. The net effect is a well educated and healthy more productive population.

The gross and microscopic changes mirror those of earlier reports. Severe atrophy or contraction is seen in both kidneys of chronic glomerulonephritis, while secondary causes of chronic glomerulonephrirtis like Systemic lupus erythematosus also recorded shrunken kidneys which were not as severe as those of the primary aetiology (Figure 1). The diagnosis of Systemic lupus erythematosus was made by fulfillment of five of the criterion set by the American college of Rheumatology, including the presence of malar rash, photosensitivity, oral ulcers, severe renal disorder with GFR less than 10%, arthritis, haemolytic anemia, and immunological disorder with positive lupus cell demonstrated in the haematology lab (www.aafp.org/afp/2003). In both cases above the kidneys are coarsely granular and bilaterally symetrical. The microscopic changes were those of end stage kidneys.

Hypertension also produced kidneys of variously decreased sizes with fine granularity averaging 92.5 g but much more severe contraction in the malignant hypertensives. Adult polycystic kidneys have kidneys of average weight 4 kg. Figure 2 showed a diabetic kidney with lower pole papillary necrosis and a reactive pericortical inflammation in a 51 year old male with poorly controlled diabetes.

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sis was noted in most cases of Diabetic kidneys.

Early diagnosis of these lesions with proper follow up may be the key therefore in the management of patients who already have these lesions to slow the steady nephron loss associated with them, thereby slowing the disease progression considerably.

Finally since most end stage kidney disease is caused by chronic glomerulonephritis, good personal hygiene, better housing education may play a role in decreasing the frequency of the infections hence in controlling them, while regular check up and treatment will slow the disease progression delaying sufficiently the time required for the development of end stage kidneys.

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