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Childhood Acute Glomerulonephritis in Benin City

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Summary

Ibadin OM, Abiodun PO. Childhood Acute Glomerulonephritis in Benin City. *Nigerian Journal of Paediatrics* **2003; 30:45.** A prospective study of consecutive cases of acute glomerulonephritis (AGN) in 63 children was conducted at the University of Benin Teaching Hospital (UBTH), between January 1996 and December 2000. There were 28 (44.4 percent) males and 35 (56.6 percent) females whose ages ranged from 0.2-15.0 years. The mean age of the males (6.6 $\pm$ 4.3 years) did not vary significantly from that of the females (7.6 $\pm$ 3.6 years) ($t = 0.30$; $p > 0.50$). The peak age incidence for both genders was three years. The lowest annual incidence of nine was seen in 1997 while the highest of 17 occurred in 2000. About 90 percent of the patients came from low socio-economic class families. Presenting features included oedema (93.7 percent), hypertension (82.5 percent), oliguria (47.6 percent) and pulmonary oedema (39.7 percent). Others were headache (11.1 percent) and convulsion (4.8 percent). Haematuria and proteinuria of varying degrees occurred in all the patients, while antecedent infections were noted in 49.2 percent. Complications included congestive cardiac failure (39.7 percent), urinary tract infection (20.6 percent), acute renal failure (12.7 percent), and hypertensive encephalopathy (4.8 percent), while mortality was 3.2 percent. Two cases each, developed nephrotic syndrome and chronic renal failure after about two years of follow up. Despite geographical variations, the pattern of the disease was similar to what obtains in other centres in the country.

Introduction

ACUTE glomerulonephritis (AGN) remains a leading renal cause of childhood morbidity[1,2] in developing countries, in contrast to the observed marked decline in its incidence in the rest of the world.[3] It is the most common non-suppurative renal disease in childhood.[4] Information on its epidemiology in different parts of Africa is scanty and varied.[1,5,6] Unlike earlier reports from Ibadan,[5] recent studies in Port-Harcourt,[2] Enugu[7] and Zaria[8] indicate increasing yearly incidence of AGN. In developing countries including Nigeria, substantial cases of AGN are attributed to post-streptococcal infection, a situation fostered by low socio-economic conditions and poor environmental hygiene.[2] Seasonal variations in its incidence have also been reported from some centres.[2,7,8] While extensive, detailed and repeated studies on AGN have emanated from other centres in the country,[2,7,8] none is available for Benin City. In this communication, we present consecutive cases of AGN seen at the University of Benin Teaching Hospital (UBTH), Benin City, over a five-year period, with the aim of establishing the features and pattern of the disease and comparing them with what obtains in similar centres in Nigeria and elsewhere.

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Subjects and Methods

All cases of AGN admitted to the paediatric wards of UBTH, Benin City, between January 1, 1996 and December 31, 2000 were prospectively enrolled in the study. Criteria for diagnosis were acute onset haematuria and proteinuria found often in association with oedema, hypertension and azotaemia. The presence of granular and red cell casts were highly suggestive of AGN but were not mandatory for diagnosis. A proforma was eventually used in extracting from the case records, the following information: name, sex, age, presenting complaints and their duration(s), date of presentation, antecedent history of recent sore throat and skin infections, duration of hospitalisation, as well as family socio-economic status and size as determined by the method of Olusanya *et al.*[9] Also documented were blood pressure readings and results of comprehensive investigations including urine microscopy for granular

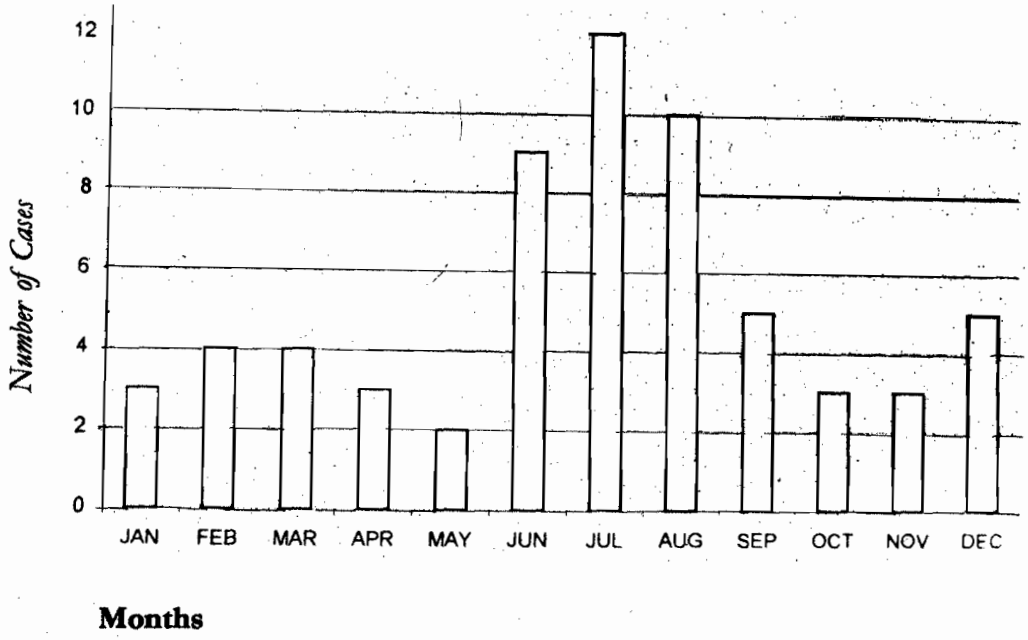

Fig. 1 Bar graph showing monthly incidence of acute glomerulonephritis in 63 patients

Table I

Features of Acute Glomerulonephritis in 63 Cases

Feature	*No. of Cases*	*Percentage of Total*
Proteinuria	63	100.0
Haematuria	63	100.0
Oedema	59	93.7
Hypertension	52	82.5
Oliguria	30	47.6
Orthopnoea	25	39.7
Pyoderma	21	33.3
Fever	17	28.0
Granular cast	16	25.4
Antecedent history of sore throat	10	15.9
Dark brown urine	10	15.9
Headache	7	11.1
Blurred vision	4	6.3
Convulsion	3	4.8

and red cell casts, urinalysis for the presence and semi-quantification of proteinuria and haematuria, 24-hour urinary protein determination and paired anti-streptolysin O titres (ASOT). Total and differential serum proteins, serum urea, electrolyte and creatinine, urine culture and treatment outcome were also documented. Cases presenting with a nephrotic range proteinuria were included in the study only when their symptoms resolved spontaneously within four weeks and did not recur during the period of follow up. Serum C_3 levels and hepatitis B surface antigen were not determined for lack of appropriate facilities. Cultures of throat or wound swabs were also not carried out. Hypertension was defined by the use of sex-specific blood pressure normograms.[10] Values in excess of 6.6 mmol/1 and 176 umol/1 were considered high for blood urea and creatinine respectively, while figures lower than 300g/l and 600g/l of serum albumin and total protein respectively, were considered indicative of hypoalbuminaemia and hypoproteinaemia.[7]

Clinical Management

All patients were managed as in-patients. Management entailed the use of antibiotics (ampicillin, 100mg/kg/day or erythromycin, 30mg/kg/day in divided doses) for eradication of possible precipitating/residual infections. Anticipatory observation for, and prompt treatment of potentially serious complications including hypertension, hypertensive encephalopathy, circulatory overload, pulmonary oedema and electrolyte derangement were also undertaken. Following discharge, patients were seen monthly on outpatient basis, for the first six months and less frequently thereafter; urinalysis was carried out at each visit.

Statistical analysis

Student t-test (unpaired) was used in assessing the strength of relationship between parametric variables. P values less than 0.05 were considered significant.

Results

Sixty-three cases of diagnosed AGN were enrolled over the five-year period; this represented 0.8 percent of the total paediatric admissions during the period. Twenty-eight (44.4 percent) of these were males and 35 (55.6 percent) females; a male to female ratio of 1:1.3. The mean age for male patients of 6.6 $\pm$ 4.3 years (range 0.75 to 15.0 years) did not vary significantly from the 7.6 $\pm$ 3.6 years (range 0.2 to 15.0 years) of the female patients ($t = 0.30$; $p > 0.05$). For both genders, the modal age was three years. The monthly peak prevalence occurred during the wet humid periods of June – August each year (Fig.1). Fifty-seven (90.5 percent) of the patients belonged to families of low socio-economic classes (IV and V) while the remaining (9.5 percent) were from the middle or high socio-economic classes of I to III. The mean family size was 5 $\pm$ 3.9 (range 1–13).

Oedema of varying degrees was a presenting complaint in 59 (93.7 percent) of the patients while oliguria was volunteered in 30 (47.6 percent) patients. None of the patients with oliguria was less than four years of age. Passage of dark coloured urine, suggesting macroscopic haematuria was elicited in only 10 (15.9 percent) patients. Other symptoms included orthopnoea in 23 (36.5 percent), fever in 17 (28.0 percent), headache in seven (11.1 percent), blurred vision in four (6.3 percent), convulsion in three (4.8 percent) and paroxysmal nocturnal dyspnoea in three (4.8 percent) patients (Table I). Antecedent infection was noted in 31 (49.2 percent) patients; 10 (32.0 percent) with sore throat while 21 (67.7 percent) others had varying forms of rashes and pyoderma including seven and five cases of infected scabies and impetigo, respectively. Two (6.5 percent) of these 31 patients had both antecedent sore throat and pyoderma while 42 cases (66.79 percent) had neither rash nor pyoderma. Hypertension was the commonest clinical finding, occurring in 52 (82.5 percent) children. Features compatible with congestive heart failure including pulmonary oedema were found in 25 (39.7 percent) while eight (12.7 percent) patients had acute renal failure during the course of their illness.

All 63 (100.0 percent) patients had haematuria (macroscopic or microscopic) and proteinuria, with eight (12.7 percent) having nephrotic range values. Granular casts were found in 16 (25.4 percent) cases. Hypo-albuminaemia occurred in 15 (23.8 percent), while low total serum protein was seen in nine (14.3 percent) children. Elevated ASO titres (greater than 200 Todds units) were seen in 11 (39.3 percent) out of the 28 in whom they were determined. Transiently elevated serum creatinine and urea levels were seen in eight (12.7 percent) and 20 (31.7 percent) cases, respectively.

Clinical Course

The mean duration of hospital stay was 14.4$\pm$7.6 days (range 2-28 days). Complications or associated morbidities encountered were congestive cardiac failure in 25 (39.7 percent), urinary tract infection (UTI) in 13 (20.6 percent), acute renal failure (ARF) in eight (12.7 percent), and hypertensive encephalopathy in three (4.8 percent) cases. Death, which occurred in two (3.2 percent) cases, was principally from ARF. Four (6.3 percent) of the patients were discharged against medical advice. Two (25.0 percent) of the eight patients who had ARF were referred to other tertiary centres for peritoneal dialysis. Follow-up periods ranged between two weeks and two years. Twenty-one (38.2 percent) of the remaining 55 had dropped out of follow-up by six-months. Two (5.9 percent) each, of the 34 cases seen beyond six months period of follow-up, developed nephrotic syndrome (NS) and chronic renal failure.

Discussion

Over the five-year period, the yearly prevalence of AGN ranged between nine and 17. This might perhaps, have implied that AGN was not a common childhood illness in Benin City and its environs. However, the figures are close to the mean annual values noted in Kampala, Uganda[6] but lower than the annual prevalence figures of 31-50[1,7,8] reported from similar centres in Nigeria. It is not clear why there is such a low prevalence in the study location. Although the yearly prevalence fluctuated greatly, the highest figure of 17 cases seen in 2000 may be a pointer to the fact that the figures could rise in future as more parents seek specialized care for their children with renal problems. Industrial crises in the health sector involving resident doctors in the late 1990s may, perhaps, also explain the low prevalence noticed in some years.

Unlike what is observed in most Nigerian series, sex predilection was in favour of males although the reason (s) for this is not clear. Similarly, only one monthly peak prevalence occurring in July was noticed in this series as against the double peaks reported in Zaria,[8] Enugu[7] and Port-Harcourt.[2] Although Benin City has periods that can be designated wet and dry, it is humid and experiences rainfall virtually all the year round with July marking the peak of rainfalls. These weather

characteristics may perhaps explain the differences observed in the studies. Antecedent streptococcal infections have been implicated as a causal factor in AGN.[2-4,8] However, varying proportions of throat infection and pyoderma have also been reported in several African studies.[2,7,8] Pyoderma was the commonest antecedent infection in the present series where the prevalence figure of 67.7 percent is comparable to the 63.5 percent and 79.0 percent reported from Enugu[7] and Zaria[8] respectively, but higher than 45.6 percent reported from Port-Harcourt.[2]

Oedema is a common presenting feature in the African child with AGN.[8] As reported from other centres in Nigeria and other African countries,[2,6,8] it was the commonest presenting feature in our series. Variability in the degree of oedema has also been noted by other workers.[7,8] Hypo-albuminaemia and massive proteinuria were found in 23.8 percent and 12.7 percent of our cases respectively; workers in Zaria[8] and Enugu[7] in Nigeria, have reported that 44.0 percent and 38.0 percent respectively, of their cases had serum albumin lower than 300g/l. Hypertension occurred in 82.5 percent of cases seen in this series. In comparison with the range of 45.0-68.0 percent reported from centres across Africa,[6-8] our figure is high. This could be due to the use of varying blood pressure criteria for the diagnosis of hypertension. While we applied the blood pressure normogram,[9] absolute diastolic and systolic blood pressure beyond which hypertension could be defined, were employed by some authors.[8] Acute pulmonary oedema was found in 39.7 percent of cases, an observation markedly at variance with the incidences of 7.0 percent and 20.4 percent recorded in Enugu[7] and Port-Harcourt,[2] respectively. The increased incidence may be a reflection of a higher prevalence of hypertension in our patients. This may be further buttressed by the increased incidence of orthopnoea as a clinical feature noted in this study. Fever, which was a presenting feature in 28.0 percent of our cases, had not been mentioned in previous studies[1,2,7,8] carried out on AGN in this environment. Nonetheless, it may represent a feature of the preceding infection or an evidence of a concomitant infection. In 20.6 percent of our cases, diagnosis of concomitant UTI was made from the initial urine evaluated at presentation. There is paucity of information on possible interaction between AGN and UTI. Nephrotic syndrome predisposes to UTI through excessive urinary loss of protein and immunoglobulins.[11] The fact that some of these patients with AGN presented with features similar to those of nephrotic syndrome may account for the findings. Hypertensive encephalopathy was recorded in only 4.8 percent of cases, a figure that is comparable to the two percent reported from Zaria,[8] but lower than the 11.6 percent noted in Enugu.[7] Although a higher incidence of hypertension was seen in this study, hypertensive encephalopathy was relatively uncommon.

In this study, 96.5 percent of the patients were from families of low socio-economic background, which is in consonance with the reports from Port-Harcourt.[2] The association between low socio-economic status and increased incidences of AGN, mainly from streptococcal infection, has been documented.[2,12] Only 5.9 percent of those followed up for sufficiently long periods, developed nephrotic syndrome. This is markedly low compared to the 29.2 percent reported from Port-Harcourt.[2] The high default rate noted during follow-up may explain the possible under-reporting seen in this series. The mortality rate of 3.2 percent in this study is comparable to the 2.3 percent noted in Ilorin,[1] but much higher than 1.4 percent and 1.5 percent reported from Enugu[7] and Port-Harcourt,[2] respectively. Mortality could have been lower if appropriate facilities for dialysis had been readily available.

The findings in this study indicate that some subtle geographic variations exist in the prevalence and epidemiology of AGN in Nigeria. This may be explained by differences in weather, economy and health seeking attitudes in the various communities. Nonetheless, most centres in Nigeria share good immediate outcome, low mortality rate and similar spectrum of complications.

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