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Haemolytic Uraemic Syndrome in children admitted to a rural District Hospital in Kenya

A. Olotu¹, S. Mithwani¹, and CRJC Newton¹

¹Centre for Geographic Medicine Research, Coast KEMRI-Wellcome trust Research Programme

Abstract

Objective—To review children admitted with Haemolytic Uraemic Syndrome (HUS) to a rural District Hospital in Africa.

Method—Records of children admitted with HUS to Kilifi District Hospital, Kenya between 1997 and 2005 were reviewed to determine clinical features and outcome.

Results—Thirty-one patients fulfilled the criteria for HUS. Twenty-one (68%) children had diarrhoea-associated-HUS (D+HUS), whilst the remainder had no diarrhoea (D-HUS). Five children had involvement of the central nervous system. Children with D-HUS had lower haemoglobin and platelet counts compared to those with D+HUS. Overall mortality rate was 55% (17/31) with no significant difference between the two groups. Severe hyponatremia ($[Na^+] < 120\text{mmol/l}$) predicted poor outcome. *S. dysenteriae* was the most common isolated organism in the stool. *E. coli* and *S. dysenteriae* were the commonest blood isolates respectively.

Conclusion—HUS carries a high mortality rate in our children and D-HUS is as common as D+HUS.

INTRODUCTION

Haemolytic Uraemic Syndrome (HUS) is one of the commonest causes of acute renal failure in children worldwide ¹, but there is little data on this condition in tropical countries, despite the fact that bacterial causes may be more common.

There are no case series studies, which have reviewed the HUS in a non-epidemic setting, though few studies in Africa have described HUS as a cause of renal failure ^{2, 3}. However secondary aetiologies still remain the major contributor of acute renal failure in Africa ⁴.

We reviewed the rates and the clinical characteristics of HUS among children admitted to Kilifi District Hospital in non-epidemic setting over a period of eight years.

METHODOLOGY

We reviewed the notes and laboratory details of children admitted to Kilifi District Hospital (KDH), Kilifi, Kenya from January 1997-April 2005 to identify features of HUS. HUS case was defined using CDC criteria.

All data was entered and analysed using the CDC software Epi Info version 3.3.2. Significance between groups was tested using the Fisher's exact test and the non-parametric Kruskal-Wallis test. Multivariate analysis was performed by logistic regression to ascertain the prognostic value of variables, which showed association at P value of 0.05. The adjustment was done for age, sex and presence or absence of diarrhoea.

Results

Clinical data

There were a total of 31 patients with HUS in over 8 years of whom 19 (61%) were males (Table 1). Eight (38%) patients with D+HUS had a history of bloody diarrhoea. The onset coincided with long rainy season (March-May).

Laboratory findings

Mean haemoglobin at admission, lowest mean haemoglobin during hospitalisation and mean platelets levels at admission and were significantly lower in D-HUS compared to D+HUS group (Table 1). *S. dysenteriae*, and *E.coli* were the most common isolates from stool and blood (Table 3).

Clinical outcome and prognosis

Blood transfusion was prescribed in 22 (71%) patients. All patients received antibiotics during their hospitalisation. Only two patients had peritoneal dialysis of which one died. Hypertension was recorded in the two patients who had undergone peritoneal dialysis.

Severe hyponatremia (Sodium concentration < 120mmol/l) independently predicted poor outcome (OR=21.68 [CI 1.2-394.67] P-value=0.04) on multivariate analysis.

Discussion

In the review of 8 years admissions, 31 patients were identified to have HUS most of whom had D-HUS. D-HUS patients presented with more severe disease. Severe hyponatremia was predictive of the poor outcome in our children. The commonest stool isolate was *Shigella dysenteriae*. *Escherichia coli* was the commonest blood isolate.

The HUS was uncommon compared to reported incidence in United States⁵. This may reflect under-diagnosis, given the difficulty of differentiating HUS from Disseminated Intravascular Coagulopathy (DIC) complicating septic conditions common in our children. However clotting mechanisms are less often investigated.

S. dysenteriae was the most common stool isolate in children with D+HUS. No *E. coli* was documented in patients with D+HUS. This has implication in the management. The most widely accepted recommendation in children with bloody diarrhoea is to obtain stool culture and initiate empirical antibiotic treatment for *Shigella*. In contrast antibiotic treatment is not recommended in diarrhoea induced by *E. coli* 0157H: 7⁶.

Central nervous system (CNS) involvement in our children was lower than in United Kingdom⁷. We identified five (16.1%) patients who had CNS involvement (generalised convulsions or coma). Three (60%) of patients who had CNS involvement died.

Mortality in our patients with both D-HUS and D+HUS were far higher than reported in developed⁸ countries and Africa⁹ with severe hyponatremia being predictive of poor outcome.

In conclusion, HUS is uncommon but carries a high mortality and D-HUS is as common as D+HUS. Prompt diagnosis, appropriate management and referral to the tertiary facility with a renal unit where possible is crucial for survival.

References

1. Siegler R, Oakes R. Hemolytic uremic syndrome; pathogenesis, treatment, and outcome. *Curr. Opin. Pediatr.* 2005; 17:200–4. [PubMed: 15800412]
2. Shimelis D, Tadesse Y. Clinical profile of acute renal failure in children admitted to the department of pediatrics, Tikur Anbessa Hospital. *Ethiop. Med. J.* 2004; 42:17–22. [PubMed: 15884273]
3. Olowu WA, Adelusola KA. Pediatric acute renal failure in southwestern Nigeria. *Kidney Int.* 2004; 66:1541–8. [PubMed: 15458449]
4. Anochie IC, Eke FU. Acute renal failure in Nigerian children: Port Harcourt experience. *Pediatr. Nephrol.* 2005; 20:1610–4. [PubMed: 15947980]
5. Kinney JS, Gross TP, Porter CC, Rogers MF, Schonberger LB, Hurwitz ES. Hemolytic-uremic syndrome: a population-based study in Washington, DC and Baltimore, Maryland. *Am. J. Public Health.* 1988; 78:64–5. [PubMed: 3276232]
6. O’Ryan M, Prado V. Risk of the hemolytic-uremic syndrome after antibiotic treatment of *Escherichia coli* O157:H7 infections. *N. Engl. J. Med.* 2000; 343:1271–3. [PubMed: 11183358]
7. Sheth KJ, Swick HM, Haworth N. Neurological involvement in hemolytic-uremic syndrome. *Ann. Neurol.* 1986; 19:90–3. [PubMed: 3947042]
8. Lynn RM, O’Brien SJ, Taylor CM, et al. Childhood hemolytic uremic syndrome, United Kingdom and Ireland. *Emerg. Infect. Dis.* 2005; 11:590–6. [PubMed: 15829199]
9. Bhimma R, Rollins NC, Coovadia HM, Adhikari M. Post-dysenteric hemolytic uremic syndrome in children during an epidemic of *Shigella* dysentery in Kwazulu/Natal. *Pediatr. Nephrol.* 1997; 11:560–4. [PubMed: 9323280]

Table 1
Summary of results in D+HUS and D-HUS patients in Kilifi district hospital (January 1997-April 2005)

Characteristics	D+HUS (n=21)	D-HUS (n=10)	P value
Demographic characteristics			
Median Age (months)	19(3-179)	26.5(3-80)	0.4
<i>Sex</i>			
Male	13(61.9%)	6(60%)	0.61
Clinical findings			
Median duration of diarrhoea (days)	4(0-21)		
History of fever on admission	18/21(85.7%)	9/10(90%)	0.6
CNS involvement (convulsion and/or coma)	3/31(14.3 %)	2/10(20%)	0.5
Laboratory values on admission			
Mean haemoglobin (g/dL)	8.7(3.4)	4.4(1.8)	0.0006
Mean platelets level ($10^9/l$)	215.1(150.8)	151.1(249.1)	0.0310
Leukocytosis ($WBC > 10 \times 10^9$)	14/20(66.7%)	6/10(60%)	0.7
Mean serum creatinine (mmol/l)	106.9(99.6)	86(63.6)	0.4828
Laboratory values during admission			
Mean lowest haemoglobin (g/dL)	6.2(2.7)	4.1(1.0)	0.02
Mean lowest platelet level ($10^9/l$)	91.8(85.2)	47.5(52.0)	0.2
Mean highest serum creatinine (mmol/l)	239(177)	150(109.5)	0.2
Mean urine output (ml/kg/hr)	1.3(1.5)	3.2(3.6)	0.2
Hyponatremia ($[Na^+] > 120 \text{ mmol/l}$)	6/20(30%)	2/10(20%)	0.45
Outcome			
Median duration of hospitalization	10(6-38)	4(2-4)	0.014
Mortality	11/21(52.4%)	6/10(60%)	0.4

Numbers in bracket are Standard deviations unless otherwise described.

Table 2
Relative univariate risk on selected characteristics on outcome in children with HUS in Kilifi district hospital (January 1997-April 2005)

Characteristics	Alive (n=14)	Death (n=17)	Odds Ratio (95%CI)	P value
Demographic characteristics				
<i>Sex</i>				
Male	11(57.9%)	8(42.1%)	3.9(0.68-30.08)	0.08
<i>Age (Years)</i>				
>3 years	4(50%)	4(50%)	1.3(0.19-8.87)	0.5
Clinical features				
CNS involvement	2(40%)	3(60%)	0.8(0.06-8.09)	0.6
No history of diarrhoea (D-HUS)	4 (40%)	6 (60%)	1.35(0.23-8.58)	0.5
Laboratory features				
Haemoglobin 5g/dL	6(54.5%)	5(45.5%)	0.63(0.11-3.43)	0.4
Hyponatremia ([Na ⁺]<120mmol/l)	1(12.5 %)	7(87.5 %)	9.3 (1.2-245.5)	0.03
Positive blood culture	10(50%)	10(50%)	0.72 (0.13-3.75)	0.5
WBC > 20×10 ⁹ /l	6(50%)	6(50%)	0.82(0.16-4.33)	0.5
Platelets <50× 10 ⁹ /l	5(29.4%)	12(70.6%)	1.4(0.13-19)	0.56
Serum creatinine > 100μmol/l	6(30%)	14(70%)	6.1(1.14-33.07)	0.02

Table 3
Isolates from stool, urine and blood of children with HUS in Kilifi District hospital
(January 1997-April 2005)

Type of culture	Negative	S. dysenteriae	E. coli	S. pneumoniae	GNR	Coliforms	A. hydrophilla
Stool	10	3	0	0	0	0	1
Blood	12	3	4	1	2	0	0
Urine	13	0	1	0	0	3	0