

Evaluation Of Some Predisposing Factors To Malaria Related Anaemia Among Children In Benin City, Nigeria.

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Abstract

Predisposing factors to severe anaemia in children must be determined and controlled before blood transfusion rate can be reduced among them. Malaria related anaemia remains common indication for blood transfusion in endemic areas and this study was carried out in order to evaluate some of these predisposing factors. It was carried out at the University of Benin Teaching Hospital, Benin City between June and December 2003. Children with malaria related moderate-severe anaemia were recruited for the study while children with uncomplicated malaria were used as controls.

Only 6.4% of the 357 cases received treatment in orthodox health facilities within 48 hours of onset of illness. Reasons adduced for delay, included confidence in other facilities (38.0%), financial constraints, 8.5% and parental ill health (1.5%). In 32.3% of cases, children were considered not ill enough. First aid treatment offered by caregivers included, paracetamol only, paracetamol and chloroquine at sub-optimal doses in 39.2% of cases. Moderate-severe anaemia was significantly associated with time of presentation in hospital ($\chi^2 = 4.97$, $p < 0.05$). The need for transfusion was also significantly more in those presented late to hospital ($\chi^2 = 5.50$, $p < 0.05$). Delay in presentation was however independent of care givers' educational status, tribe and religion. Eventual cost of hospitalization ($\chi^2 = 18.95$, $p < 0.05$) and subsequent stay ($\chi^2 = 19.43$, $p < 0.05$) were significantly more in children brought late to hospital. Moderate-severe anaemia complicating malaria was common when the child presents after 48 hours of onset of symptoms. The implications of these on children living in malaria endemic communities are discussed.

Keywords: Moderate-Severe Anaemia, Malaria, Late Presentation, Hospital, Children.

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Introduction

Malaria is the leading cause of morbidity and mortality in under-fives in Sub-Saharan Africa.¹⁻³ The morbidity and mortality remain common among children with severe malaria.⁴⁻⁶ Though cerebral malaria is associated with more fatal outcome, moderate to severe anaemia also contributes significantly to the morbidity burden.^{7,8} It also has potentials of further increasing this burden by predisposing young children to blood transfusion with the attendant risks of infection with HIV/AIDS among others. These risks are profound in areas lacking the required expertise and facilities for safe blood transfusion.

Therefore predisposing factors to malaria related moderate/severe anaemia must be determined and evaluated in order to control it. Workers have identified delayed presentation of the sick child in a competent health facility as an important contributory factor to the development of anaemia in malaria.² This may be due to the fact that some children in sub-Saharan Africa are first taken to facilities other than orthodox healthcare ones when symptoms develop.^{9,10} This practice negates the objectives of the Roll Back Malaria programme.

This study therefore aims to evaluate some important predisposing factors to malaria related moderate/severe anaemia in Benin City located in the South-South region of Nigeria.

Materials and Methods

The descriptive, cross-sectional study was carried out at the Children's Emergency Room (CHER) of the University of Benin Teaching Hospital (UBTH) Benin City between June and December 2003. The hospital, which is a tertiary healthcare facility, provides referral services to the numerous primary and secondary health facilities in Edo and neighbouring states of Ondo, Kogi and Delta.

Only patients managed exclusively for malaria (compatible clinical features co-existing with positive malaria parasitaemia) were enlisted in the study. Patients with haemoglobin genotype SS were excluded from the study even if they were managed solely for malaria. Also excluded were those whose anaemia or degree of anaemia

could not be explained by only malarial episode. The children aged 5 years and below were consecutively recruited from among those attending CHER either as in-patients or outpatients.

Information/data required for the study was collected by use of researcher- administered questionnaire (O.O and O.A). The questionnaires, which were pre-tested in another tertiary health facility in Benin City, comprised a mixture of both open-ended and closed-ended questions aimed specifically at addressing the aims and objectives of the study. They included sections on biodata, laboratory results, treatment offered, transfusion and social factors of education, economic class, occupation, tribe and religion.

From each case and control 5millilitre of venous blood was obtained after due skin preparation and kept in a sequestrene bottle. Packed Cell Volume (PCV), malaria parasite smear (thin and thick films) and haemoglobin electrophoresis were determined in each sample using standard laboratory procedures at the medical laboratories of UBTH by trained scientists. Family socio-economic status was assessed using the methods of Olusanya et al.¹¹ The following were taken into consideration in assessing the cost of care: drug treatment, cost of investigations/screening, transfusion (where applicable) and feeding. Ward and service charges were not routinely computed in UBTH for children during the study.

Analysis and Statistics

For the purpose of the study presentation was considered late when it was made in excess of 48 hours from point of initial complaint or observation of symptoms by the caregiver.² A patient was considered to have severe anaemia if he had a PCV of less than 15%.¹² Higher haematocrit values up to 20% were regarded as moderate anaemia. Study subjects were stratified into two – those who presented late and others who did not. Variables of severe anaemia, need for blood transfusion, family socio-economic status, were assessed between the two groups. Responses were expressed in percentages or proportions and associations between variables were assessed by the Chi square test (with Yates correction for continuity, where applicable). P was considered significant if < 0.05. SPSS version 10 was utilized for the analysis.

Results

The study population consisted of 357 caregivers who were predominantly (86.6%) mothers. Age range of respondents was 18-50 years and the modal age bracket was 21-30 years. Majority (43.7%) of the respondents

Table 1: Occupational distribution of respondents

Occupation	Frequency	Percentage
Trading	147	41.2
Housewife	61	17.1
Teaching	38	10.6
Business person	23	6.4
Hairdressing	17	4.8
Seasmstress	6	1.7
Civil servant	6	1.7
Miscellaneous	59	16.5
Total	357	100

Table 2: Reasons warranting referral of the child with malaria

Occupation	Frequency	Percentage
Lack of improvement	129	36.1
Deterioration	90	25.2
Seeking improved care	82	23.0
Needing blood transfusion	34	9.5
Inability to pay fees	7	2.0
Miscellaneous	13	4.3
Total	357	100

Table 3: Interval between onset of symptoms and eventual presentation in an orthodox health facility.

Occupation	Frequency	Percentage
≤ 48	23	6.4
49-72	52	14.6
73-96	34	9.5
97-120	107	30.0
> 120	141	39.5
Total	357	100

were Binis. Others were Ibos (16.8%); Ishan (9.2%), Urhobos (6.4%), Yorubas (2.2%) and Hausas (0.8%). Miscellaneous ethnic groups accounted for the remainder. Christians accounted for 96.4% of the respondents while only 7 (2%) were Moslems. Others practiced varied forms of religion. Majority or 177 (49.6%) of the respon-

Table 4: Reasons adduced by 334 respondents for delay in presenting the sick child in orthodox health facility

Reasons	Frequency	Percentage
Financial constraints	28	8.4
Confidence in other facilities	127	38.0
Child was not considered ill enough	108	32.3
Parents engrossed in other duties	50	15.0
Parental ill health	5	1.5
Miscellaneous	16	4.8
Total	357	100

Table 5: Effect of delay on eventual cost of hospitalization.

Cost in Naira(interval)	Interval between onset of illness and eventual presentation		
	Within 48 hours	> 48 hours	Total
1000-2500	13	62	75
2501-4000	6	132	138
4001-5500	2	61	63
≥5501	2	74	76
Total	23	334	357
$\chi^2 = 18.95; p < 0.05$			

dents had secondary education, 94 (26.3%)) tertiary education while 81 (22.7%) had only primary education. The commonest occupation among the respondents was trading. Others are as depicted in table 1. Socio-economic stratification of the families revealed that 38.7% were of the lower class (class III), 35.8% middle (class II), while 25.5% were of the upper class (class I).

Initial treatment point

Majority or 279 (78.2%) of the children received initial treatment outside orthodox healthcare facilities. One hundred and ninety two (53.8%) were initially managed at home. Fifty-two (14.6%) were taken to patent medicine stores and 35 (29.7%) were taken to nurses and private homes. One hundred and six (29.7%) were subsequently seen at either privately owned clinics or UBTH after 48 hours from onset of illness. Most respondents could not recall drugs used in pre-hospital treatment. However, 94

(26.3%) of the respondents gave solely paracetamol, which they considered adequate for the treatment of fever while another 46 (12.9 %) gave chloroquine in largely sub optimal doses. Modes of referral to the hospital were self in 207 (58.0%); by doctors, 86 (24.1%); nursing personnel, 35 (9.8%) and others 29 (8.2%). Reasons warranting referral are as listed in table 2.

Delay in Presentation

Table 3 shows the interval between onset of symptoms and eventual presentation in clinics/hospitals in 357 cases. Only 23(6.4%) presented within 48 hours of onset of symptoms. Thus the prevalence of late presentation in hospital was 93.6%. Reasons for the delay included confidence in other facilities, 127 (38.0%). Others were financial constraints 28(8.5%) and parental ill health, 5(1.5%). In 108(32.3%) and 50(14.9%) cases respectively, the child was considered not ill enough and mother too busy to take child to hospital. Other varied reasons were volunteered by 16 (5.0%) respondents (Table 4).

Two hundred and seventy six (77.3%) respondents had haematocrit of less than 30%, 153 had a packed cell volume (PCV) of less than 20% while 67 had PCV of <15%. The prevalence rate for severe anaemia was 18.8% while that of moderate-severe anaemia was 42.9%. Though not significant, more children presenting late to hospital had severe anaemia in comparison to those presenting early (67/334 or 20.0% vs 2/23 or 8.7%; $\chi^2_y = 1.09; p > 0.05$). However, the prevalence of moderate-severe anaemia was significantly ($\chi^2 = 4.97, p < 0.05$) associated with time of presentation in hospital. Far more patients (145 or 40.62%) were transfused with blood in comparison with the proportion that had severe anaemia. However the proportion transfused with blood (145 or 40.6%) approximated the number with moderate/severe anaemia. The need for blood transfusion was significantly more in those coming late to hospital (4/23 or 17.4% vs 141/334 or 42.2%; $\chi^2 = 5.50; p < 0.05$).

The cost of hospitalization was significantly higher in those presenting late in hospital ($\chi^2 = 18.95; p < 0.05$) (Table 5). Delayed presentation cut across the various social classes with more families in social class II involved (124/128 or 96.9% as against 83/91 or (91.2%) in social class I and 127/138 or 92.0% in social class III. The relationship between social class and act of late presentation in hospital was however not statistically significant. Delay in presenting the sick child in hospital was independent of caregiver's educational status, tribe and religion. There was a significant association between duration of subsequent stay in hospital and time of presentation ($\chi^2 = 19.43; p < 0.05$).

Discussion

The study reveals that as many as 93.6% of children with malaria are presented late to orthodox health facilities – a trend that confirms the findings of Kaewsanthi¹³ in Thailand and Deming¹⁴ in Togo that both noted the widespread practice amongst patients with malaria to first patronize sources other than orthodox healthcare facilities. The common trend in these settings may be explained on the bases of the facts that they are all developing economies with comparable levels of development including disposition to healthcare facility utilization and economic endowment.

The delay was independent of such factors as educational status; religion and tribe suggesting that other factors may be at play in dictating the trend. Culture and tradition may have played some roles since they are acknowledged factors with inexplicable influences on peoples' disposition to challenges and issues notwithstanding education attainment. Though the trend was prominent with families drawn from social class II it is difficult to explain why that should be so as socio-economic status is intricately linked with education and occupation, in which case one would have expected the phenomenon to be commoner with social class III. Financial constraints as reason for the delay as volunteered by respondents appears untenable as the ultimate average cost of hospitalisation was far in excess of what it would ordinarily cost to treat non-severe malaria. Confidence in other health care facilities as advanced by respondents would appear more tenable as it is inexplicably hinged on deep-seated traditions and cultures that defy rational reasoning.

Prevalence of moderate-severe anaemia was significantly more in patients who had delay in hospital presentation. We are unaware of previous studies that specifically evaluated the relationship between delay in presentation in hospital and degree of anaemia in children. Nonetheless the relationship would not be unconnected with the fact that delay provides ample opportunities for the disease to exert its toll either through combined effects of haemolysis and marrow suppression⁸ or from negative effects of interventions that are commonly inappropriate, ineffective and diversionary. Similar factors could explain why far more patients who presented late to hospital were offered blood transfusion. The transfusion rate was unacceptably 40.1%. Though no mortality was recorded in either group of patients the burden of malaria and attendant blood transfusion pose sufficient threat to any healthcare system. Far more patients than those with severe anaemia were transfused with blood implying that some children with higher haematocrit were transfused. Cost of blood transfusion sometimes exceeds that required to treat primary morbidity. It therefore

becomes financially exerting on the family and economy to have children receive warranted and unwarranted blood transfusion.

In consonance with low mortality observed in this study is the report by Alen¹⁵ in Papua New Guinea who noted the minimal contribution of anaemia to mortality in malaria. He nonetheless acknowledged the pronounced morbidity in malaria contributed by anaemia. This is however in contrast to the findings in the works of Ofovwe and Eregie⁴ and that of Hedberg et al¹⁶ where anaemia accounted for substantial number of deaths in malaria. Shear implication of these findings is that malarial anaemia is real and in areas where effective and safe blood banking practices are scarce or unavailable, compromised transfusions could thrive, thus providing veritable avenues for spread of HIV/AIDS and other infections.

Mean duration of eventual treatment was significantly higher in patients who presented late to hospital and this may have impacted negatively on the ultimate cost of treatment, which was also significantly higher in the same group. Inability to afford cost of initial hospital charges is commonly viewed as reasons for the perpetuation of delayed presentation.^{2,17} It is however, noteworthy that ultimate cost of management following prolonged stay is no less expensive. The earlier prospective caregivers appreciate this the better.

In conclusion, the problem of moderate-severe anaemia complicating malaria and the attendant blood transfusion in malaria-endemic areas are formidable and delay in accessing competent healthcare intervention is a major predisposition. As a social factor, delay in presenting in health care facility following onset of symptoms in a young child can be minimized through goal-oriented multi- sectoral collaboration or approach.

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