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# Home-Based Management of Fever In The Context of Lassa Fever Disease Control In Children

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# ABSTRACT

Fever is a major symptom of infectious illnesses. In areas where malaria and Lassa fever are co-endemic, prolonged home treatment for febrile illness may compromise the outcome of Lassa fever management. Objective: The study was aimed at determining the home-based practices for fever among caregivers in the context of Lassa fever control. Methods: It was a hospital-based cross-sectional study. An interviewer-administered questionnaire was used to obtain information from respondents. A Chi-square test was adopted for categorical variables. Results: A total of 384 respondents were recruited, 269 (70.1%) used anti-malarial for home treatment of fever with 221 (82.2%) having positive malaria rapid diagnostic tests. More caregivers of the lower socio-economic class used antibiotics (63.8%) and herbal mixture (94.4%) for the treatment of fever compared to 36.2% and 5.6% respectively noted among participants of the upper socio-economic class. Thirty-five (9.1%) caregivers reported the death of their children from febrile illnesses, 71.4% of them were of lower socio-economic class, 88.6% practiced home treatment for their children for more than 3 days, and only 22.9% had positive malaria rapid diagnostic test. There were significant relationships between home management practices for fever and socio-economic class (P=0.000), and rapid test for malaria parasite and death from febrile illness (P=0.000). Home treatment for fever was common in this study. The socio-economic class of participants influenced their home management for fever. Economic empowerment and health education on the benefits of seeking care early in health facilities is advocated.

Keywords: Fever, Home-based, Lassa fever, Management

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#### INTRODUCTION

The complaint of fever is the commonest presentation of childhood diseases. <sup>1</sup> Caregivers first notice fever in their children when touched, either accidentally or deliberately at the suspicion of ill-health. <sup>2</sup> Palpation method although useful in determining fever in children less than 5 years of age, especially in deciding a child that may need further evaluation, it is not completely reliable. <sup>3, 4</sup> In sub-Saharan Africa where malaria is endemic, fever perception either by palpation or with the use of thermometer, is met with antimalarial use without laboratory evidence of the disease either by microscopy for malaria parasite or malaria rapid diagnostic test, due to the traditional believe that the presence of fever in children less than 5 years was considered to be malaria. <sup>5</sup> However, World Health Organization (WHO) in 2010 recommended that parasitological confirmation of malaria should be determined before instituting antimalarial treatment. <sup>6</sup>

Besides malaria, there are other febrile illnesses that may mimic malaria and are also endemic in the region. Lassa fever disease is endemic in countries of West Africa, Central Africa and Central Africa. <sup>7</sup> In Nigeria, 17 states are said to be endemic for Lassa fever with Edo, Ondo and Ebonyi states having more than 75% of the cases reported with case fatality rates of 14.6%, 24.2% and 23.4% respectively. <sup>8</sup> Fever is the major presenting symptom of Lassa fever disease; other symptoms include sore throat, headache, body pains, convulsions and even loss of consciousness. Hence Lassa fever disease can masquerade as malaria, typhoid, meningitis and pharyngotonsillitis.

Several epidemiological studies showed that 60-90% of children received home treatments for febrile illnesses before presenting to hospitals.<sup>9, 10, 11</sup> Treatments received ranged from use of anti-malarial, antibiotics, antipyretic to herbal mixture. <sup>9</sup> Potential risk of home treatment of fever in communities where both Lassa fever disease and malaria are endemic is prolonged home treatment without diagnosis of illness and consequent late presentation to the hospital.<sup>12</sup> The case definition of Lassa fever disease according to the Nigerian Center for Disease Control (NCDC) is persistent fever for >2 days despite anti-malarial and/or anti-biotic use. <sup>13</sup> This is to enable early diagnosis for Lassa fever disease and prompt institution of management as case fatality is worse with delayed presentation to health facility of care.

This study is therefore aimed at determining the home based management of fever in the context of Lassa fever control in Abakaliki, Ebonyi State. It is hoped that findings from study will be useful in health education on proper home treatment for fever.

#### MATERIALS AND METHOD

Ebonyi State has 13 Local Government Area. Abakaliki is the capital of Ebonyi State, it comprises of two LGAs namely Abakaliki and Ebonyi with a land mass of 452sq

Kilometers.<sup>14</sup> Ebonyi State has a population of 2,176,947, majority of which are Igbos.<sup>14</sup> The study was carried out a tertiary hospital that is domiciled in the state capital. Study period was from April 2019 to March 2020.

It was a hospital-based cross-sectional study. Sample size was calculated using prevalence rate of 50.0% where prevalence rate is unknown. The sample size was determined by the formula for sample size appropriate for an infinite population (i.e. greater than 10,000). <sup>15</sup>

 $n=z^2pq/d^2$ 

Where,

n=sample size when the population is greater than 10,000

z=the standard normal deviate, usually set at 1.96 (which corresponds to 95% confidence interval)

p=the proportion in the target population estimated to have a particular characteristic.

q=1-p

=1-0.5=0.5

d= degree of accuracy desired, which for the purpose of this study is set at 0.05 (proportion of the sampling error tolerated)

#### Thus

 $n = (1.96)^2 (0.50) (0.5) / (0.05)^2 = 384$ 

#### **Inclusion Criteria**

- 1. All caregivers of children whose ages were below 5 years old
- 2. All caregivers with history of febrile illness in their under 5 children/wards
- 3. All caregivers who gave informed written consent

#### **Exclusion criteria**

- 1. All caregivers whose children had a history of fever but are 5 years old and above
- 2. Caregivers of children below 5 years of age that presented at the children outpatient clinic within the study period and met the inclusion criteria were recruited consecutively until sample size was reached; a structured questionnaire was used to obtain information.

#### **Ethical Considerations**

Study commenced after ethical approval had been sought, obtained and details of study explained to mothers/caregivers. (REC APPROVAL NUMBER 24/02/2019-28/04/2019)

#### Data analysis

Data obtained was analyzed using the Statistical Package for social science (IBM SPSS, version 22, Chicago USA). Descriptive statistics (mean and standard deviation) was calculated for continuous variables while frequency and percentage was calculated for categorical variables. The significance of associations between categorical variables was

tested using Pearson's Chi-square test for comparison of proportions. The level of statistical significance was achieved if P < 0.05.

## **RESULTS AND DISCUSSION**

Of the 384 caregivers that participated in study, mean age was  $33.37 \pm 7.61$ ; with a male to female ratio of 1:2.4. Participants from lower socio-economic class were 223 (58.1%) versus 161 (41.9%) from the upper socio-economic class, residence in urban area was 301 (78.4%) versus 83 (21.6%) residing in rural area. [Table 1]

Socio-demographics	Frequency n=384	Percentage (%)
Age (in years)		
≤35	261	68.0
36-45	100	26.0
>45	23	6.0
Gender		
Male	113	29.4
Female	271	70.6
Place of residence		
Urban	301	78.4
Rural	83	21.6
Socio-economic class		
Upper	161	41.9
Lower	223	58.1

 Table 1: Socio-demographics of study participants

Of the 269 (70.1%) respondents who used anti-malarial for febrile illnesses of their under-5s, 221 (82.2%) had a positive rapid test for malaria parasite. Thirty-seven (63.8%) and 34 (94.4%) of caregivers in lower socio-economic class used antibiotics and herbs for the treatment of fever compared to 21 (36.2%) and 2 (5.6%) respectively from the upper socio-economic class. A total of 128 (61.0%) and 110 (57.3%) of caregivers in upper social class visited the health facility for complains of respectively sore throat and convulsion accompanying fever in their children unlike 133 (80.1%) and 78 (72.9%) of caregivers from lower social class that resorted to use of antibiotics from patent medicine dealers for sore throat and palm kernel intake and application on body for convulsion respectively. There were significant relationships between home management practices of febrile illnesses and socio-economic class (P= 0.000, 0.000 and 0.000) [Table 2].

Chi-square test has the symbol denoted as  $\Box^2$ . It is a statistical test used to determine whether there is a statistically significant difference between the expected frequencies and the observed frequencies in one or more categories of a contingency table. That was the statistical test used for Table 2 and 3

53.6 0.000

Rush to a hospital

Give palm kernel oil

Give herbal mixture

Go to church

Put spoon into the mouth

and socioeconomic class							
Home-management practices	for	or Social class of the caregiver					
illnesses		Upper 1	n=161	Lower	n=223	$\chi^2$	Р
		(%)		(%)			value
Fever							
Antimalarial		128 (47.6)		141 (52.4	.)		
Antibiotics		21 (36.2)		37 (63.8)		24.2	0.000
Herbal mixture		2 (5.6)		34 (94.4)			
Others		10 (47.6)		11 (52.4)	1 (52.4)		
Fever with Sore throat							
Administer antibiotics		33 (19.9)		133 (80.1	)	70.5	0.000
Go to a health facility		128(61.0)		82 (39.0)			
Do native uvulectomy		0 (0.0)		8 (100.0)			
Fever and Convulsion							

110 (57.3)

29 (27.1)

22(44.0)

0(0.0)

0(0.0)

82 (42.7)

78 (72.9)

28 (56.0)

1 (100.0)

34 (100.0)

 Table 2: Relationship between home-based management of fever, some febrile illnesses

 and socioeconomic class

Thirty-five (9.1%) of the 384 respondents reported deaths of their under 5 children from febrile illnesses and 25 (71.4%) of them were from lower socioeconomic class. A hundred and seventy-three (45.1%) of respondents believed that persistence of fever for more than 3 days after anti-malarial and antibiotic intake was due to fake drugs and this group of respondents had 13 (37.1%) of deaths from febrile illness. A total of 211 (54.9%) of respondents were aware that Lassa fever can present as malaria or typhoid. Majority of the deaths reported were from caregivers that made diagnosis of fever by palpation of body surface (29/35, 82.9%) and managed fever for more than 3 days (18/35, 51.4%). There were more death in children that tested negative (77.1%) to rapid diagnostic test for malaria compared to children that had a positive test results (22.9%). There were significant relationships between knowledge of possible cause of fever after 3days on drugs, knowledge of Lassa fever presenting as malaria and typhoid, rapid test for malaria parasite and death from febrile illness (P= 0.010, 0.000 and 0.000 respectively) as shown in Table 3

Table 3: Relationship	between p	erception/j	practices	related to	) febrile i	illness an	d history

Perception and practices in febrile illness	Death from f	$\chi^2$	P value					
Knowledge of possible cause of fever for >3	Yes	No						
days despite anti-malarial/antibiotics use	n=35 (%)	n=349 (%)						
Poisoning	9 (25.7)	32 (9.2)						
Fake drugs	13 (37.1)	160 (45.8)	20.04	0.010				
Lassa fever	7 (20.0)	53 (15.2)						
Don't know	5 (14.3)	70 (20.0)						
Typhoid	1 (2.9)	34 (9.7)						
Knowledge that Lassa fever can present as malaria/typhoid								
True	17 (48.6)	194(55.6)						
False	1 (2.8)	16 (4.6)	22.68	0.000				
Don't know	17 (48.6)	139 (39.8)						
Detection of fever made by								
Palpation	29 (82.9)	233 (66.8)	4.31	0.116				
Thermometer	6 (17.1)	116 (33.2)						
Rapid test for malaria parasite								
Positive	8 (22.9)	213 (61.0)	17.44	0.000				
Negative	27 (77.1)	136 (39.0)						
Duration of home care (in days)								
<3	4 (11.4)	57 (16.3)						
≥3	31 (88.6)	292 (83.7)	5.09	0.278				

#### of death from febrile illness

# DISCUSSION

The findings from this study show that irrespective of the social class all the caregivers gave medications at home for the treatment of fever before presentation at the hospital. This finding is similar to that reported by Al-Nouri *et al* <sup>16</sup> where majority of the study population had used medications at home for treatment of fever in their children. Some of these medications especially if not given in the right dosage may result into harmful side effects to the child. There is therefore need to educate caregivers to avoid indiscriminate use of drugs at home in the management of fever.

Antimalarial was the commonest of the medications used at home even though only 82.2% of the caregivers that used antimalarial had a positive rapid diagnostic test for malaria parasite. The reason for this is that most parents will likely attribute fever to malaria infection since the later is endemic in Nigeria and the drugs are easily accessible over the counter. The Nigerian Centre for Disease Control (NCDC) and WHO recommend home treatment of fever with anti-malarial after a laboratory diagnosis using malaria rapid diagnostic test or microscopy and its use should be terminated if fever persisted for more than 2 days.<sup>17, 18</sup> Anti-malarial was also the commonest drug used at home in a study by Salako *et al.*<sup>19</sup> In an environment where Lassa fever disease is also endemic, prolonged use of anti-malarial may lead to late presentation to the hospital and poor prognosis with risk of community transmission in a situation where the cause of fever is due to infection by Lassa fever.

The use of herbal mixture was commoner among lower social class. Social class is a reflection of both income and educational status of the individual. Therefore caregivers who are of the lower social class are more likely to use herbal mixtures because it is assumed to be cheaper compared to orthodox medications. The use of herbal mixture for fever caused by malaria and possibly Lassa fever disease may result in more severe symptoms like renal failure. Anokye *et al* <sup>20</sup> also attributed the use of herbal mixture among respondents as a result of poverty and low educational status. Therefore, empowering caregivers by government providing jobs and encouraging formal education will enlighten the populace on the evils that bedevil the use of herbal concoction in the treatment of diseases.

A significant number of caregivers in this study still engaged in harmful practices like instilling palm kernel oil into the mouth of a convulsing child with febrile illness. This finding brings to lime light the local beliefs and practices of the people. This practice should be discouraged because it further endangers the life of the child and may lead to death. The presence of convulsion in a febrile child that probably has Lassa fever disease is an ominous sign. As such the child needs immediate management in the hospital facility. Resorting to home management of convulsion such as was observed in this study may increase morbidity and case fatality of severe malaria and possible Lassa fever cases.

Majority of the caregivers detected fever in their children using the palpation method which was similarly reported by other authors. <sup>16, 20, 21</sup> However in a study by Thota *et al* <sup>22</sup> more than two-third of the caregiver use thermometer to measure temperature. Majority (82.9%) of death occurred among children whose care givers used palpation method compared with those whose caregivers used thermometer. The reason for this finding may be because those who used thermometer were able to appreciate the degree of the fever and the need to present to the hospital early for treatment when body temperature was persistently very high. Unlike in the palpation method which may be subjective and caregiver may not be able to detect if there was rising body temperature. Several studies that compared the use of palpation method to thermometer in detecting fever observed that palpation method had higher sensitivity and lower specificity compared to measurement by thermometer.<sup>23, 24</sup> Li et al <sup>25</sup> in a systematic review reported that assessment of fever by palpation method has moderate diagnostic value. Chaturvedi et al <sup>26</sup> also reported high sensitivity of palpation method and the likelihood of the caregiver over reporting fever due to parental anxiety. In order to reduce the rate of mortality in children with fever caregivers should be encouraged to use both palpation method and thermometer in detection of fever in children. This will aid early detection, determination of the degree of fever and the need to present early to the hospital for prompt diagnosis and treatment.

Despite the recommendation by WHO and NCDC on the administration of antimalarial only after a parasitological diagnosis of malaria, 17.8% of caregivers still administered antimalarial to their under-5s who had negative result. It was also observed that a higher proportion (88.6%) of death occurred among children who have received home care for more than 3 days. This finding shows the importance of caregivers bringing their children to the hospital not later than 2 days of initiating home treatment if fever is still present, for early diagnosis and treatment of cause of the fever. Despite having received anti-malarial, many of the children still had fever lasting >3 days, meaning that malaria was the unlikely cause thus indicating other possible causes of febrile illness which include Lassa fever disease. Financial constraints may have contributed towards their delay in seeking hospital care since more than half of the caregivers were of the lower socio-economic class. This was corroborated by the study by Abdulkadir *et al*<sup>27</sup> who observed that secondary school education and low socioeconomic class were significant predictors of late presentation of febrile children to the hospital.

### CONCLUSION

Administration of anti-malarial for febrile illness was highest in this study. A significant number of respondents believed that persistent fever despite antimalarial/antibiotic drug use was either due to fake drugs or poisoning and high mortality following febrile illness was associated with prolonged home management for fever persisting for more than 3 days. Public enlightenment on the need for early presentation to health facility for medical care after at least 2 days of home treatment should be encouraged.

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