



Prevalence, Aetiology and Outcome of Febrile Convulsions at the Wesley Guild Hospital, Ilesa, South-West Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author OAO designed the study, provided clinical care for the patients, collected and analysed the data and wrote the first draft. Authors SAA, BPK and EOO collected the data, provided clinical care for the patients and participated in the writing of the manuscript, authors SBAO, TAA and SAA participated in the design of the study, in statistical analysis and data interpretation. All authors critically reviewed the manuscript and approved the final version of the report.

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ABSTRACT

Background: Febrile convulsions continue to be a common occurrence in paediatric practice in Nigeria and Africa. Constant review of the subject from time to time is therefore desirable.

Methods: We prospectively studied over a seven month period the prevalence, aetiology and outcome of febrile convulsions among children admitted into the children emergency room (CHER) of the Wesley Guild Hospital (WGH), Ilesa, South West Nigeria.

Results: Over the study period, febrile convulsions accounted for 18.0% of all the 880 admissions into the CHER. The children were aged 3 months to 6years with male: Female ratio of 1.1:1. Malaria was the commonest identified aetiology associated with febrile convulsions in this study. It occurred in 80.4% of the 158 children with febrile convulsions, followed by respiratory tract

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infections. Outcome was good as none of the patients developed neurologic deficit or died.
Conclusion: Febrile convulsions are common among children admitted at the CHER of the WGH, Ilesa with malaria being the major aetiology. Adequate malaria control may reduce the burden associated with febrile convulsions in this environment.

Keywords: Febrile convulsions; prevalence; aetiology.

1. INTRODUCTION

Febrile convulsion is defined as convulsions in infancy or childhood associated with fever but without evidence of intracranial infection or a defined cause, a definition that includes all post neonatal children [1]. The National Institute of Health Consensus Statement [2] modified this by fixing the age limit as 3 months to 5 years; whereas 6 months was fixed as the lower age limit by the Joint Working Group of the Research Unit of the Royal College of Physicians and the British Paediatrics Association [3]. The latter group also recommends that the child 'is otherwise normal'.

Febrile convulsion is a very common cause of convulsions in the children's emergency room. Various studies [4-9] have been done in several parts of Nigeria with incidence ranging between 8.05 percent in Jos [6] and 21.5 percent in Enugu [7]. These studies in Nigeria have shown malaria to be the commonest aetiology of fever leading to convulsions accounting for up to 60.0-74.8 percent in some studies [5,6,9-11]. This high incidence of malaria as a cause of fever is understandable, considering the fact that Nigeria is holoendemic for malaria infection. Other identified causes include bronchopneumonia, measles, otitis media, pharyngitis, tonsillitis, gastroenteritis, impetigo, pyoderma, cellulitis, arthritis, septicaemia and urinary tract infection (UTI). In fact, any extracranial infection that can cause fever is a potential cause of febrile convulsions.

Genetic susceptibility to febrile convulsions has also been suggested, although no clear-cut pattern has emerged [8,12-14]. However, on the basis of available data, an autosomal dominant mode of inheritance with variable penetrance is the most plausible, though autosomal recessive and extrachromosomal modes cannot be completely ruled out. This implies that the inheritance of febrile convulsion is multifactorial.

Simple febrile convulsions last for less than 15 minutes, are generalized (without a focal component), and occur once in a 24-hour period, whereas complex febrile convulsions are

prolonged (>15 minutes), are focal, or occur more than once in 24 hours [15]. The distinction between simple and complex febrile convulsions is important with regards to the overall outcome because the latter has a higher risk of association with epilepsy than in the general population [16]. Recurrence of febrile convulsions may occur in about 33 percent [16,17] and about 17 percent of these may have more than one recurrence [17]. The identified predictive risk factors for recurrence are onset before 1 year of age, complex febrile convulsions, family history of non-febrile seizures, pre-existing neurological or developmental disorder and persistent post-ictal neurological disorder [12,17].

Local Nigerian studies on long-term intellectual and behavioural outcomes of children with febrile convulsions seem sparse. It was found in a study done in Tainan city, Taiwan, [18] that those children who had febrile convulsions performed as well as other children in terms of academic progress, intellect and behaviour at 10 years. They were not significantly different from their peers with respect to inattentiveness, hyperactivity, clumsiness or antisocial behavior [18]. The incidence of epilepsy is approximately 9 percent when several risk factors are present compared with an incidence of 1 percent in children who have had febrile convulsions and no associated risk factors [16,17]. Febrile convulsions can be quite distressing to the parents and caregivers though mortality associated with it is often low [19]. This study is therefore set up to review the current characteristics, determine the aetiology and outcome of children with febrile convulsions at the WGH, Ilesa, Nigeria.

2. METHODOLOGY

This prospective, cross-sectional study was conducted at the Children Emergency Room of the Wesley Guild Hospital (WGH) Ilesa, of Obafemi Awolowo Teaching Hospitals Complex (OAUTHC), Ile-Ife.

Permission for the study was granted by the Ethics and Research Committee of the hospital.

For each child, verbal and written informed consent was also obtained from the parent(s) or the accompanying relative(s). A study proforma designed to document pertinent historical information and findings on physical examination was completed for each patient. All the children with convulsions were reviewed and those who fulfilled the criteria for febrile convulsions were recruited [3].

Febrile convulsions were categorized into simple or complex. Other relevant data including age, sex, date of admission, and history of previous convulsion were obtained. The socioeconomic status was determined using the Oyedeji classification [20]. Investigations carried out on the children with convulsions included blood film for malaria parasite, blood chemistry, blood glucose, lumbar tap for cerebrospinal fluid analysis and others like chest radiographs as indicated. Lumbar tap was done in all the children according to the departmental protocol. Chest radiograph was done in children who were dyspnoeic, tachypnoeic or suspected to have pneumonia. Management was achieved through controlling fever by tepid sponging, treatment of the underlying cause of fever and or associated problems. Convulsions were treated acutely with deep intramuscular paraldehyde or intravascular diazepam. Anticonvulsants were not used prophylactically. For the purpose of this study, malaria was diagnosed in children with febrile convulsion when there is demonstration of *Plasmodium falciparum* on peripheral blood film. Children with prolonged coma >30 minutes, abnormal findings on cerebrospinal fluid analysis and afebrile seizures were excluded.

Data were analyzed using the SPSS for Windows software version 16 package. Means and standard deviations (SD) were computed and where necessary, comparison of means were done using the Student's "t" test, while proportions were compared using the Chi square (χ^2) test with Fishers exact probability test used as appropriate. Values of $p < 0.05$ were accepted as statistically significant.

3. RESULTS

During the seven month study period, 880 patients were admitted into the children emergency room (CHER) of the Hospital, consisting of 463 males and 417 females, with a male: Female ratio of 1.1: 1. Of these 880

children, 158 (18.0%) had febrile convulsions. They consisted of 95 males and 63 females giving a male: female ratio of 1.5: 1 indicating preponderance of febrile convulsion in male children.

3.1 Detailed Information on the Children with Febrile Convulsions

One hundred and fifty eight (18.0%) of the 880 children admitted during the period of this study were for febrile convulsions. Eighty-nine (56.3%) of these had complex febrile convulsions, while 69 (43.7%) had simple febrile convulsions. Thus, the ratio of simple to complex febrile convulsion is 1:1.3.

3.2 Sex and Febrile Convulsions

Ninety five (60.1%) of 158 children with febrile convulsions were males while 63 (39.9%) were females. Out of the 95 males with febrile convulsions, 53 (55.8%) had complex febrile convulsions while 42 (44.2%) had simple febrile convulsions. Similarly, 36 (57.0%) of the 63 females had complex febrile convulsions and 27 (43.0%) had simple febrile convulsions. Comparing sex with the type of febrile convulsion; a higher proportion of females had complex febrile convulsions while a higher proportion of males had simple febrile convulsions, however, the difference was not statistically significant. ($P = 0.87$).

3.3 Age Distribution of the Children with Febrile Convulsion

The mean (SD) age of the children with febrile convulsions was 26.2 (14.5) months with a range of 3 months to 6 years. The 13-24 month age-group had the largest representation (Table 1).

3.4 History of Previous Convulsions

Thirty-four (21.5%) of the 158 children with febrile convulsions had past history of convulsion, comprising 12 (17.4%) of the 69 children with simple febrile convulsions and 22 (24.7%) of 89 with complex febrile convulsions. Although, a higher proportion of children with complex compared to the children with simple febrile convulsions had convulsed previously, the difference was not statistically significant ($P=0.27$).

Table 1. Age and sex distribution of children with febrile convulsions

Age (months)	Male n(%)	Female n(%)	Total (%)
≤ 12	14	12	26 (16.5)
13-24	39	31	70 (44.3)
25-36	25	12	37 (23.4)
37-48	8	5	13 (8.2)
49-60	6	2	8 (5.1)
>60	3	1	4 (2.5)
Total	95(60.1)	63 (39.9)	158 (100.0)

3.5 Family History of Convulsion

Thirty-two (20.3%) of the 158 children with febrile convulsions had positive family history of convulsions, while in 124 (78.5%) children with febrile convulsions, family history of convulsions was denied. Family history of convulsions could not be ascertained in two children. The 32 children with family history of convulsions comprised eight (11.6%) of those with simple febrile convulsions and 24 (27.0%) of those with complex febrile convulsions. Thus, a significantly higher proportion of children with complex febrile convulsions than those with simple febrile convulsions had family history of convulsions ($P = 0.02$).

3.6 Aetiology of the Fever in the Children with Febrile Convulsions

In the 158 children with febrile convulsions, malaria was the most common aetiology of fever, accounting for 127 (80.4%) of them, upper respiratory tract infections (URTI) in 29 (18.4%) while two (1.2%) children had pneumonia. All the cases of simple malaria were due to *Plasmodium falciparum*. Out of the 29 children with URTI, one (3.4%) had pharyngotonsillitis, three (10.4%) had otitis media and the remaining 25 (86.2%) had rhinitis.

3.7 Duration of Hospitalization

Of the 155 that were discharged, 70 (44.2%) were discharged within 24 hours of admission while 74 (46.8%) were discharged between 24-72 hours of admission. Majority of the children 128 (81.01%) discharged within 72 hours of admission had malaria as the aetiology of the febrile convulsion. The patient who was on admission for more than one week had convulsion due to pneumonia and had aspirated feeds before he was admitted.

3.8 Outcome

Out of the 158 children with febrile convulsions, 155 (98.1%) were managed and discharged

home without neurologic deficits while the remaining three discharged against medical advice. None of the children died.

4. DISCUSSION

Febrile convulsion is a very common cause of convulsions in the children's emergency room as shown by various studies [4-9]. The prevalence of febrile convulsions remains highly variable in Nigerian studies due to variations in patients' selection and study type. There may be need to conform to the standard definitions in patient selection. The prevalence rate of 18.0 percent in this present study is comparable to 21.5 percent obtained from Enugu [7] but higher than that obtained in Jos [6], Benin [21] and Kaduna [22]. The reports of 8.1 percent from Jos [6] and the 3.9 percent from Benin [21] and 2.7 percent from Kaduna [22] are products of retrospective studies with possible adverse effects of data loss. However, the difference from the Ilorin prevalence may be attributable to the patients in the present study having been seen mainly in the rainy months of the year which have been adduced by the Ilorin [9] and Jos [6] studies to have more cases of febrile convulsions than the dry months. This latter reason of more cases of febrile convulsions in the rainy months may account for the present study recording higher incidence of febrile convulsions than the 9.7 percent obtained from a twelve-month study [5] in Ilesa some years earlier. Thus, there has been no significant change in the age and sex prevalence of febrile convulsions as majority of the convulsions in the present study occurred in children that were less than three years of age particularly, the second year of life. This finding is similar to that found in Jos [6], Ilorin [9] and Kaduna [22]. In the present study, febrile convulsion is more common in males, a finding which is in agreement with many others [4,6-7,22]. Most Nigerian studies record higher prevalence than in more advanced countries because of higher prevalence of infections particularly holoendemicity of malaria in the

country [23]. Malaria has been shown to be the commonest cause of febrile convulsions in this environment [4-6,8-9]. The fact that 80.4 percent of cases of febrile convulsions in this study is due to malaria is similar to 74.8 percent [6] and 71.7 percent [9] found in Jos and Ilorin respectively. The key to the reduction in prevalence of febrile convulsions lies in the effective control of malaria through the use of insecticide-treated mosquito nets and environmental manipulations such as cutting of bushes around houses, residual indoor spraying, eliminating stagnant water and puddles, clearing of drainage channels and planting of insect-repelling plants among others. These should be intensified in addition to ensuring that children should wear protective clothings especially in the evenings [5,24].

The other causes of fever resulting in febrile convulsions in this study are similar to those reported by other researchers [5-6,9,25]. These included rhinitis, otitis media, pneumonia and tonsillopharyngitis. Thus, elimination of malaria may align the prevalence of febrile convulsions in Nigeria with the rest of the world. A large proportion of febrile convulsion in the developed countries are due to viral agent [2,26]. In this study, five (3.2 percent) of the 158 children with febrile convulsions were outside the six months to five years age range, two of them were three and five month old while the remaining three were six year olds. These five children had fever, convulsed and regained consciousness soon after. They were found to have malaria parasitaemia. They had serum calcium, magnesium, and glucose levels within the normal limits and there was no other cause to which their convulsions could be attributed as their CSF analysis was normal. Although the percentage is very small, this may be the reason for the consensus [2]. This finding of children outside the normal age range for febrile convulsions has been reported in other studies [9,25,27]. It is not an unusual occurrence though rarely considered, probably because the criteria in the NIH Consensus statement and the Joint Working Group-Royal College of Physicians/British Paediatrics Association has wider acceptance. Even ILAE accepts the occurrence of febrile convulsions in children as young as one month. There is the need for greater awareness of this fact which, if adhered to, will reduce the discrepancy in patient selection as a source of wide variation in the prevalence rates for febrile convulsions. In this study, about 80 percent of the patients denied family history of convulsions, but those with positive family history of

convulsions were more likely to have complex febrile convulsions. Other authors [5-6,14] have reported the prevalence of positive family history in children with febrile convulsions to range from 20.9 to 43.5 percent. A higher percentage (56 percent) of the children in this study had complex rather than simple febrile convulsions, this is in contrast to findings in a number of other studies from Nigeria [5,9] and elsewhere [19,27]. However, it could be inferred to be in agreement with a study in Jos [6] in which using the number of convulsions as the only distinction between complex and simple febrile convulsion, forty-seven percent of the 153 patients studied had single convulsion. If we consider the other characteristics i.e. duration of convulsion and parts of the body involved, then the true percentage of simple febrile convulsions can only be less. Therefore, a larger possibly multi-centred study may be required to draw definite conclusions on this.

We appreciate the fact that viral studies which were not done in this study could have better helped to identify some specific aetiologies of febrile convulsions in our patients. Also haemogram and blood chemistry were also not routinely done in all the patients recruited for the study due to limited available funds for the study. Nonetheless, our study has been able to show that febrile convulsion is a relatively benign condition with good outcome when the convulsions are well managed [16,17]. The good outcome in the present study is in agreement with many others including those from the developed world [2]. Most unfavorable outcomes that have been reported are usually due to poor management of the convulsive episodes giving rise to complication [4,6,19]. There is therefore need for continual education on the proper home management of convulsions in children to prevent avoidable morbidity and mortality.

5. CONCLUSION

Febrile convulsion is a significant cause of admission to the CHER of the WGH, Ilesa though with very good prognosis. Malaria remains the commonest cause of febrile convulsion in the study area. We therefore advocate for effective malaria control measures as a means of reducing the burden of febrile convulsions in Ilesa, Nigeria.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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