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Body temperature in apparently healthy African children under 10 years of age

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Summary

Body temperature was determined weekly for a period of 3 weeks in 346 healthy children aged 5 months to 10 years. Individual axillary temperatures in the 346 children ranged from 35.05°C to 37.28°C and fell into normal distribution curve. This study has thus determined normal body temperatures in Nigerian children and will serve as reference data for future comparison.

Résumé

La température du corps était déterminée par semaine pendant 3 semaines chez 346 enfants en bonne santé âgés de 5 mois à 10 ans. Les températures axillaires individuelles chez les 346 enfants s'étendaient de 35.05°C à 37.28°C et étaient dans la courbe de distribution normale. Cette étude a donc déterminé la température du corps normale chez les enfant nigériens et servira comme une donnée à consulter pour les comparaisons futurs.

Introduction

Body temperature measurement is an important part of routine medical care. Although there are differences in both temperate and tropical environments, it is generally assumed that normal body temperatures are roughly of the same range in both Caucasians and Africans. However, situations where data obtained from one racial group are extrapolated and used for another may not always be valid.

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Despite the common occurrence of fever, there is a dearth of information on the range of normal body temperature in children in the tropics. We therefore undertook this study to determine the normal range of body temperature in apparently healthy Nigerian children, as a preliminary step towards establishing the normal values in an African population.

Subjects and methods

Four hundred and fifty-one apparently healthy children aged 5 months to 10 years, who attended the Clinical Pharmacology Day Care Unit and the Children's Out-Patients Clinic of the University College Hospital, Ibadan, between April 1988 and September 1988, were initially recruited for the study. Informed consent was obtained from the parents/guardians of the children. All children were seen between 7.00 am and 11.00 am on each day of the study. After being seated for at least 30 min, the left axilla was wiped with a dry towel and an electronic thermometer (model MC-7, Omron Tateisi Electronics Co., Japan) was placed in the left axilla with the arm held at the side. The thermometer was left in place until the temperature stabilized. Two sets of measurement were taken, at least 2 h apart, in all subjects and the mean values recorded. In order to prevent the children from crying which might have affected the temperature measurement, this was carried out first, before physical examination was performed and thick and thin films obtained, to exclude asymptomatic malaria parasitaemia.

After the first visit, the children were seen every 7 days for 3 weeks (i.e. on days 1, 7, 14 and 21). At each visit, the temperature was determined, physical examination done and blood films obtained for malaria parasites.

Readings obtained from children with a history of fever, abnormal physical findings or demonstrable malaria parasitaemia were excluded from the analysis. The range and mean temperatures were determined for each visit, and the difference between temperature values compared using Student's *t*-test.

Results

The room temperature ranged between 25.5 and 27.0°C throughout the study period. Three hundred and forty-six of the 451 children, completed the study. At the first visit, axillary temperature ranged from 35.05 to 37.28°C with a mean of 36.48 ± 0.47. At the second, third and fourth visits, the corresponding values were 35.47–37.17°C (mean 36.64 ± 0.40); 35.87–37.25°C (mean 36.70 ± 0.32); and 35.76–37.27°C (mean 36.70 ± 0.32). Individual axillary temperatures in the 346 children also fell into normal distribution curve (Fig. 1). These values are summarized for the four different visits in Table 1 and are similar for each visit.

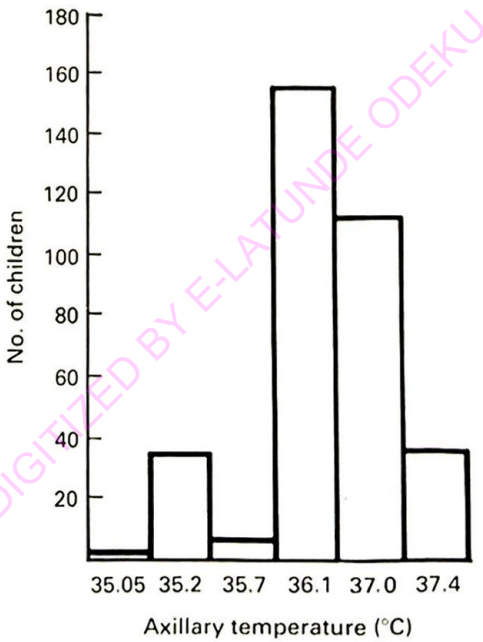

Fig. 1. Frequency histogram of axillary temperature in apparently healthy Nigerian children.

Table 1. Frequency distribution of axillary temperatures in 346 children measured at weekly visits

Temperature (°C)	Number of cases			
	Day 1	Day 7	Day 14	Day 21
35.05	2	0	0	0
35.2–35.7	35	43	41	53
35.8–36.1	6	19	30	42
36.2–36.6	155	173	179	155
36.7–37.0	112	80	84	90
37.1–37.3	36	31	12	6

When compared, mean values obtained at the four visits do not differ significantly from one another ($P > 0.05$).

Discussion

Although fever is a common occurrence in children in the tropics, there are few studies devoted to the measurement of body temperature in healthy African children. In the present study, we had sought to exclude malaria — the commonest cause of fever in tropical Africa — in our subjects by repeated peripheral film examinations while repeated physical examinations were also carried out to exclude other causes of fever. We, therefore, feel justified in calling these children apparently healthy African children. The possible effect of circadian rhythm on body temperature was controlled in this study by making all necessary measurements between the hours of 7.00 am and 11.00 am.

Although the range of axillary temperature obtained in our study is similar to that obtained by Kresch [1], in a group of Caucasian children, in none of our subjects was the recorded axillary temperature lower than 35.05°C or higher than 37.28°C. In the study cited above, axillary temperatures of 34.8°C and 37.9°C were recorded in a group of 62 Caucasian children. The influence of environmental temperature and socio-cultural factors may, in part, explain the differences noticed between these studies, although a mercury-in-glass thermometer was used in that study.

In this study, we have chosen the axillary route because of its safety, easy accessibility and acceptability. In addition, rectal temperatures in Nigerian neonates have been shown not to be significantly higher than axillary temperature at stabilization, when measured simultaneously (Akinbami, unpublished data). This further validates the use of the axillary route in recording body temperature in children.

Reference

1. Kresch MJ. Axillary temperature as a screening test for fever in children. J Pediatr 1984;104: 596–9.

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