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The issue of body temperature in Nigerian neonates has not been addressed in the literature. The present study was therefore aimed at obtaining normal body temperatures for Nigerian newborn babies and recommending a simple, safe, sensitive and appropriate method for its determination.

Subjects and methods

One hundred and four healthy full-term neonates of appropriate weights for gestational age, delivered at a general hospital in Ibadan and admitted to the normal newborn ward of the hospital between January and March 1988, were studied within the first 48 h of life. They comprised 60 females and 44 males. Informed consent was obtained from the parents of the babies. The children were seen between 09.00 h and 12.00 h. Room temperature throughout the study period varied from 25°C to 28°C.

New mercury-in-glass thermometers were used for the measurements. Temperatures were measured in the axilla and rectum simultaneously by the authors (F.O.A. recorded rectal temperature and A.S. the axillary temperature) while a nurse served as the time keeper. The thermometer was placed in the right axilla with the right arm held firmly at the side to prevent any air pocket in the axilla. For the rectal temperature, the second thermometer was lubricated and placed at a depth of 2-3 cm into the rectum. Temperatures were read at 1, 2, 3, 5 and 7 min without removing the thermometers. The number of children that passed stool during the study was recorded. The time for temperature stabilization was later determined; this was the time at which the temperature failed to rise any further over the monitoring period.

The paired *t*-test was used to compare the mean temperature readings from the two different routes and the Pearson correlation coefficient applied to the minute for minute temperature readings.

Results

Table 1 shows the mean axillary and rectal temperatures. The mean temperature, minute for minute, ranged 36.61-36.76°C (rectal) and 36.44-36.67°C (axillary). The rectal temperature at each minute was significantly higher than the corresponding axillary temperature. A strong positive relationship was found between axillary and rectal temperatures at every minute (r = 0.9). Rectal temperature stabilized in 95% of the neonates within 3 min, while the axillary temperature stabilized within 5 min. At stabilization, mean rectal temperature (36.76°C ± 0.42) was higher than mean axillary temperature (36.68°C ± 0.38) by a factor of 0°C-0.4°C, mean difference 0.08 ± 0.1 (Table 2). The difference between mean stabilized temperature taken at the two sites was not significant (P > 0.05). One-third of the babies opened their bowel when the thermometer was inserted in the rectum.

Discussion

Body temperature, a good measure of body metabolism in the individual, is essential for the proper assessment of health. It is influenced by the environmental temperature and varies from one place to another and with the time of the day. There is, therefore, the need for every region to have its own reference data, which

Time (min)	Rectal temperature (°C)		Axillary temperature (°C)				
	Mean	SD	Mean	SD	D	ı	P
1	36.61	0.44	36.44	0.35	0.17	8.32	< 0.001
2	36.69	0.41	36.57	0.38	0.12	6.78	< 0.001
3	36.74	0.42	36.63	0.37	0.11	5.94	< 0.001
5	36.76	0.42	36.67	0.39	0.09	6.0	< 0.001
7	36.76	0.42	36.67	0.39	0.09	5.86	< 0.001

Table 1. Comparison of mean temperature at rectal and axillary sites, minute for minute

Body temperature in the Nigerian neonate — comparison of axillary and rectal temperatures

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Summary

Body temperature was measured in 104 healthy full-term neonates of appropriate weights using the rectal and axillary routes simultaneously at 1, 2, 3, 5 and 7 min after placement of the thermometer. Normal body temperature in the Nigerian newborn, irrespective of the site where it was obtained, ranged from 35.9° C to 37.5° C. There was a strong positive correlation between axillary and rectal temperatures (r = 0.9).

Prior to stabilization, mean rectal temperatures at every minute were significantly higher than axillary temperatures, (P < 0.001). Although rectal temperatures stabilized earlier than axillary temperatures (3 min and 5 min respectively), the difference between mean stabilized temperature taken at the two sites was not significant (P > 0.05). This study provides normal reference data on body temperature in the Nigerian newborn. It is suggested that the axillary route be used more frequently when taking temperature in the newborn because of its safety and its good correlation with the rectal temperature readings.

Résumé

La température du corps était mesurée chez 104 nouveaux-nés en bonne santé et de poids propres, employant les routes rectales et axillaires simultanément à 1, 2, 3, 5 et 7 min après avoir placé le thermomètre. La normale température du corps chez le nouveau-né nigérien indépendamment d'où elle est obtenue range de 35.9°C à 37.5°C. Il y avait une forte corrélation positive entre les températures axillaires et rectales (r = 0.9).

Antérieurement à la stabilisation les températures rectales moyennes à chaque minute étaient significativement plus élevées que les températures axillaires (P < 0.001). Quoique les températures rectales se stabilisent plus tôt que les températures axillaires (à 3 et 5 min respectivement), la différence entre les moyennes température stabilisées prises n'était pas significative (P > 0.05). Cette étude pourvoit une normale donnée à consulter sur la température du corps du nouveau-né nigérien. Il est proposé que la route axillaire soit employée quand on prend la température chez le nouveau-né à cause de la sécurité et la bonne corrélation avec la température rectale.

Introduction

Body temperature is important for the provision of appropriate nursing support in the newborn nursery. Such temperature is usually determined using the axillary or rectal route. The rectal temperature has been reported by some workers [1,2] to be higher than the axillary reading, although Torrance [3] found mean axillary reading to be higher than mean rectal readings. A common assumption in clinical practice is that rectal temperatures are more accurate than recordings at the axilla. Despite this assumed advantage of rectal over axillary temperature, most authors [1,2,4-6] still recommend the axillary route for taking temperature in children because of its safety, hygiene and easy accessibility. The rectal route carries some risks for the neonate such as rectal perforation [7,8].

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born, we believe the axillary temperature will suffice. Also, in those babies with high risk of developing perforation, the axillary route will be more suitable and safer to use in recording the temperature. However, in infants in whom even a narrow amplitude of temperature variation will be important, viz. those with hypothermia, it will be important to know the core temperature using the rectal route. Whenever the rectal route is being used to record the temperature, the risk of perforation should be borne in mind and more caution exercised.

In conclusion, we suggest more frequent use of the axillary site for routine measurement of temperature in Nigerian newborns and that the thermometer should be left in the axilla for 5 min before being read.

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	Stabilized ten				
	Rectal	Axillary	D	1	Р
Mean	36.76	36.68	0.08	1	> 0.05
Standard deviation	0.42	0.39	0.11		
Range	36.0-37.5	35.9-37.4			

Table 2. Mean stabilized temperatures at rectal and axillary sites

this study has thus provided for Nigerian neonates. The present study has shown that body temperature in the Nigerian newborn, irrespective of the site where it is obtained, ranged from 35.9°C to 37.5°C.

We measured temperature simultaneously at two sites in each subject and at the same time of the day throughout the study period for proper comparison. In this study, mean rectal temperatures at every minute were significantly higher than axillary temperatures. These results are similar to those obtained by Schiffman [2]. However, the mean difference of 0.08°C (range 0-0.4°C) between axillary and rectal temperatures at stabilization in this study was not significant. This corroborates the findings of Kunnel et al. [5], but is much less than the mean difference obtained by Schiffman [2]. In the study by Schiffman [2], the measurements at the two sites were not taken simultaneously. The results obtained in our study have further confirmed the strong positive relationship between axillary and rectal temperature from previous studies [2,4,5].

When taking temperature, the thermometer must be left at the recording site for the minimum length of time needed to obtain an accurate reading. The temperature recording time should depend on the time it takes the thermometer reading to stabilize. There is no consensus in the literature on how long the thermometer should be left at the recording site. Mayfield et al. [4] obtained between 3 and 5 min stabilization time for four different recording sites. Kunnel et al. [5] obtained 3 min for rectal and 6 min for axillary recordings, while with Schiffman [2] 80% of the axillary recordings did not stabilize during the 10 min observation time. This, therefore, stresses the need for further evaluation of temperature

stabilization time. From the results of this study, thermometer placement times for rectal and axillary temperatures are 3 and 5 min respectively. This conforms with the result obtained by Mayfield *et al.* [4].

For practical purposes, any method recommended for temperature measurements must be safe, simple and economical, and yet give reliable measurements. Rectal temperature is assumed to represent the body core temperature and to stabilize earlier than axillary temperature. However, whether in practice a difference of 0°C-0.4°C (mean 0.08°C) between readings at the two sites will influence how the neonate is managed is doubtful. Rectal temperature measurement may appear relatively safe in the newborn, but it still carries the risk of rectal perforation with its attendant high mortality, especially in sick neonates with friable gut, such as those with severe birth asphyxia. sepsis with disseminated intravascular coagulation and necrotizing enterocolitis [7-9]. It is not easily accessible and may be accompanied by defaecation, necessitating a change of napkin, a practice which is no longer economical for many mothers in Nigeria given the present economic situation. Rectal catheter or thermometer can also be used to ensure the potency of the rectum, but this is not a safe practice [8] and should be avoided. Most obstructive lesions of the anal canal may be evaluated satisfactorily by inspection and inquiries made regarding the passage of meconium.

Axillary temperature measurement, if properly taken, correlates well with rectal temperature measurement, even in preterm infants with spárse subcutaneous fat [4]. In addition, it is simple, easily accessible, more hygienic and, more importantly, safer to do.

Thus, for routine examination in the new-