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SUBJECTIVE ASSESSMENT OF CHILDHOOD FEVER BY MOTHERS UTILIZING PRIMARY HEALTH CARE FACILITIES IN OSOGBO, OSUN STATE, NIGERIA.

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ABSTRACT

Objective: To assess the accuracy of tactile examination by mothers as a method of fever determination in their children and thus determine the reliability of mothers' history about the presence or absence of fever in their children.

Methodology: A descriptive cross-sectional study conducted in four health centers randomly selected in Osogbo metropolis. Three hundred mothers were studied, a semi-structured questionnaire was utilized.

Results: The study found the sensitivity and specificity of tactile examination for mothers as a means of detecting fever in their children to be 82.3% and 54.1% respectively. Mother's socio-demographic characteristics and the age of child did not affect mother's subjective assessment of childhood fever ($p>0.05$).

Conclusion: Mothers are able to provide accurate information about the presence or absence of fever in their children by palpation without the use of a thermometer. Tactile examination was found to be adequate for mothers as a means of detecting fever in their children. Physicians should accept as reliable mothers' history of fever and give prompt management.

Key Words: Subjective assessment, childhood fever, tactile examination, mothers, sensitivity, specificity.

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INTRODUCTION

Fever, also known as pyrexia, is a frequent medical symptom that describes an increase in internal body temperature to levels that are above normal. It is most accurately characterized by a temporary elevation in the body's thermoregulatory set-point, which is usually by about 1-2°C.[1] A rectal temperature of 38ºC or more; an oral temperature of 37.5ºC or more; or an axillary temperature of 37.2ºC or more is considered as fever.[1] It is a complex physiological response to disease characterized by a rise in core temperature.[1]Fever is a common complaint in pediatric practice, and one of the most frequent problems presenting as an emergency. Every year, about 10 million under-five children in low and middle income countries die, with 70% of these deaths due to preventable and treatable diseases such as acute respiratory tract infections, malaria, measles, malnutrition, diarrheal diseases or a combination of the above,[2] all of which could present with fever. Employing a reliable method of temperature measurement is essential in making informed and appropriate decisions in febrile children. It should be stressed that all temperature measurements are estimates of the true body core temperature. Several methods for body core temperature assessments include; tactile (palpation), axillary, oral, oesophageal, rectal and tympanic thermometry. Among these, the rectal temperature because of its accuracy and lack of variation in response to environmental factors is considered the "gold standard" for temperature assessment and it is considered to be the method of choice for infants.[3] The main limitation is that the accuracy of rectal temperature measurement is poor at extremes of temperature, because it is slow to measure change.[4,5] The ability of mothers to detect fever accurately in children by tactile examination is critical in preventing a first stage delay in the management of childhood illnesses. In poor countries where first level health facilities lack diagnostic support, there's often a heavy reliance on the history, signs and symptoms to determine a course of management that makes the best use of the available resources.[6] This further attests to the important role that mothers' accurate detection of fever in their children plays in managing childhood illnesses. Unlike most other symptoms that can be visually assessed, the history obtained about the onset, duration and pattern of fever is often based on the mothers' subjective tactile evaluation of their children's body temperature, due to the inability to afford thermometers as well as a

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high level of ignorance that has seriously restricted the use of thermometers in this environment. There is a dearth of information on the reliability of mothers' history about the presence or absence of fever in their children especially in the tropical environment. This study was therefore designed to determine the ability of mothers to subjectively assess their children for fever and to compare their assessments with temperature measurements made with the use of axillary mercury in glass thermometer.

Specific Objectives

1. To assess the accuracy of palpation by mothers as a method of fever determination in their children.
2. To determine the relationship between selected socio-demographic characteristics of the respondents and their children and subjective assessment of childhood fevers.

PATIENTS AND METHODS

Description of Study Area

The descriptive, cross-sectional study was conducted in Osogbo metropolis, the capital of Osun State, Southwest, Nigeria. It is situated on latitude $7^{\circ}47'$N and longitude $4^{\circ}33'$E. The projected population for 2006 from census of 1991 for Osogbo is 291,956 with women of child-bearing age making up 64,230 and children between ages 0-15 years accounting for 100,264.

Sample Size Determination

The sample size was determined using the Fisher's formula[7] for single proportion. The sample size calculation assumed that 75.0% of mothers have the ability to correctly assess fever by tactile method[8]; this is represented by 'p' in the formula while 'q' is 1-p. Confidence interval was set at 95%, hence the standard normal deviate 'Z' =1.96 and 'd' which is the level of accuracy was set at 0.05. A minimum sample size 'N' of 288 was arrived at using the $N= Z^2pq/d^2$ expression and an anticipated 5.0% non-response rate were added to arrive at a sample size of 302.

Sampling Technique

A simple random sampling technique utilizing the ballot method was used to select 25% (four of sixteen) of all the primary health care centres in Osogbo metropolis. A total sampling approach was then adopted to select the respondents. Mothers that reported in the selected health centres who had met the inclusion criteria were interviewed with the aid of a pre-tested, semi-structured questionnaire. Clinical mercury thermometers were used by trained interviewers to objectively check the child's axillary temperature.

Inclusion Criteria for mothers

- Had children between the ages of 1 month to less than 12 years.
- Children accompanied their mothers.

Exclusion Criteria

- Children acutely ill-looking from suspected febrile illnesses because they needed immediate management and mothers were too anxious to cooperate with the interviewers.

Data Analysis

The data collected was analyzed using Statistical Software Package for Social Scientists (SPSS). Information was presented in forms of Tables, Bar Charts and Pie Charts. Cross tabulations of variables were constructed and Chi-square, P-value, Specificity, Sensitivity, negative and positive predictive values, accuracy, and false negative and positive rates were calculated to determine their statistical significance.

RESULTS

A total of 300 respondents were studied. Table 1 shows the socio-demographic characteristics of the mothers and children with 34% of mothers being between 25-29 years, mean age was 27.7 $\pm$ 6.7years. Majority (97.3%) of the mothers were ever-married, 66.0% were Muslims, 49.7% were traders, 95.3% were of the Yoruba tribe and only 9.7% had attended tertiary educational institutions. Further, 3.0% were older than 44 years, 2.7% were single mothers, and 10.0% had no formal education. The table also shows the sex and age distribution of the children of the respondents. Majority (68.4%) were between the ages of one month and 2 years, (mean age was 22.22 $\pm$ 20.95 months), and 51.7% were female. Table 2 shows the methods used by mothers in assessing body temperature. The neck and the forehead were the parts palpated mostly frequently. Majority of the mothers used the dorsum of their hands.Mothers' perception of causes of fever is presented in Table 3. Malaria was the most frequently (73.3%) thought-of cause of fever, while others causes mentioned included upper respiratory tract infection (ARI)(48.6%), measles (43.3%) and diarrhoea (40.0%) respectively. Figure 1 shows the various home management options employed by the mothers when they perceived fever in their children. Drug administration was the commonest option utilized.Table 4 describes the mothers' knowledge about the use of a thermometer. About two-thirds of mothers knew it is used for temperature measurements: majority (79.7%) agreed that it can be placed in the armpit while one respondent (0.3%) was aware that it can also be placed in the anus. The association between correct assessment of fever and socio-demographic variables like age, occupation and marital status of the mothers were tested in Table 5. None of the variables was significantly related to mother's ability to detect fever (p-values > 0.05). Table 6 compares the thermometer results (objective assessment) with the mothers' subjective assessments (diagnostic tool-'palpation'), and the following were deduced; subjective tactile assessment for body temperature in children by mothers in this study had a sensitivity of 82.3%, specificity of 54.1%, a negative predictive value of 77.5%, a positive predictive value of 61.4% and an accuracy of 67.3%. The false negative rate was 17.7%, the false positive rate of 45.9% and a yield of 38.7% Twenty one (7.0%) mothers had personal thermometers at home; while 93.0% did not. Most mothers (68.0%) were correct about the temperature of their children when compared with the thermometer reading.

Figure 1: Respondents' Home Management of Childhood Febrile Conditions

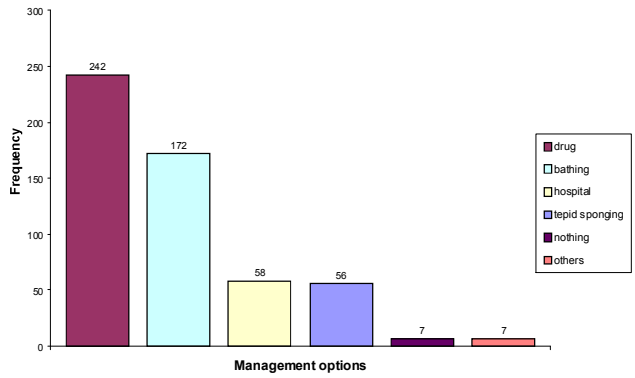

Table 1: **Sociodemographic Characteristics of Mothers and Children (N=300).**

Characteristics	Freq.	Perc. (%)
Age (years)		
<20	48	16.0
20- 24	46	15.3
25- 29	102	34.0
30- 34	52	17.3
35- 39	31	10.3
40- 44	11	4.7
45 and above	10	3.0
Marital Status		
Single	8	2.7
Married	282	94.0
Divorced	3	1.0
Widowed	7	2.3
Education Level		
Primary school	93	31.0
Secondary school	148	49.3
Tertiary school	29	9.7
None	30	10.0
Religion		
Islam	198	66.0
Christianity	98	32.7
Traditional	2	0.7
None	2	0.7
Tribe		
Yoruba	286	95.3
Hausa	6	2.0
Ibo	5	1.7
Others	3	1.0
Occupation		
Student	16	5.3
Professional	7	2.3
Civil Servant	16	5.3
Trader	149	49.7
Artisan	86	28.7
Others	26	8.7
Children		
Age		
1 month-2 years	204	68.4
> 2 years	96	31.6
Sex		
Male	145	48.3
Female	155	51.7

Table 2: **Tactile Assessment of Fever by Mothers.**

Variables	Frequency	Percent. (%)
Site palpated		
Neck	131	43.7
Forehead	129	43.0
Chest	85	28.3
Back	38	12.7
Others	1	0.3
Part of the Body used		
Back of the hand	210	70.0
Palm	107	35.7
Others	9	3.0

*Some mothers palpated more than one site; while others used more than one part of their body.

Table 3: **Perceived Causes of Fever in Children by the Mothers.**

Cause	Frequency	Percent (%)
Malaria	220	73.3
Upper airway infections	146	48.6
Measles	130	43.3
Diarrhoea	120	40.0
Malnutrition	81	27.0
Others	99	33.0

*Some mothers had more than one explanation for fever. Others included teething and placing under the sun.

Table 4: **Mothers' Knowledge about Thermometer and Its Use.**

Variables	Frequency	Percentage (%)
Use of thermometer		
Temperature measurement	202	67.3
Others	98	32.7
Site of use		
Armpit	239	79.7
Mouth	46	15.3
Forehead	6	2.0
Neck	4	1.3
Abdomen	4	1.3
Anus	1	0.3

Table 5: **Association between Socio-Demographic Characteristics and Ability of Mothers to Correctly Detect Fever.**

Socio-Demographic Variables	Correct Assessment (%)	Incorrect Assessment (%)	X^2	Df	P-Value
Mother's Age					
<20 years	32 (66.7)	16 (33.3)			
20-24 years	29 (63.0)	17 (37.0)			
25-29 years	69 (67.6)	33 (32.4)	1.99	5	0.851
30-34 years	34 (65.4)	18 (34.6)			
35-39 years	24 (77.4)	7 (22.6)			
40 years and above	14 (66.7)	7 (33.3)			
Child's Age					
1 month – 2 years	140 (68.6)	64 (31.4)	0.03	1	0.869
> 2 years	63 (65.6)	33 (34.4)			
Marital Status					
Never married	4 (50.0)	4 (50.0)	Fisher's exact		0.236
Ever Married	199 (68.2)	93 (31.8)			
Occupation					
Student	8 (50.0)	8 (50.0)			
Professional	5 (71.4)	2 (28.6)			
Civil Servant	10 (62.5)	6 (37.5)	6.37	5	0.271
Trading	108 (72.5)	41 (27.5)			
Artisan	58 (67.4)	28 (32.6)			
Others	14 (53.8)	12 (46.2)			
Educational Status					
No formal education	21 (70.0)	9 (30.0)	0.08	1	0.773
Formal Education	182 (67.4)	88 (32.6)			
Ownership of thermometer					
Own thermometer	13 (61.9)	8 (38.1)			
Do not own Thermometer	171 (61.3)	108 (38.7)	0.00	1	0.956

Table 6: **Validity of Mothers' Methods of Assessing Febrile Conditions.**

	Thermometer Results		
Mothers' Tactile Assessment	**Febrile**	**Non Febrile**	**Total**
Febrile	116 (TP)	73 (FP)	189
Non Febrile	25 (FN)	86 (TN)	111
Total	**141**	**159**	**300**

TP = True positive
FP = False positive
FN = False negative
TN = True negative

DISCUSSION

Palpation has, for a long time, been employed by many mothers in determining the presence or absence of fever in their children. However, the accuracy of this method has been the subject of much debate owing to its subjective nature and conflicting results have been obtained from studies assessing the accuracy of the palpation method as a means of detecting the presence or absence of fever in children by their mothers. In this descriptive cross-sectional study assessing the ability of Nigerian mothers to subjectively detect the presence of fever in their Children, the results showed that palpation may be adequate for mothers as a means of detecting the presence or absence of fever in their children. This is an important finding in the light of the fact that many acute childhood illnesses present first with fever. Therefore, to ensure prompt presentation to a health care facility and early management, the ability of the mothers to detect this tell-tale sign of ill-health is crucial. The sensitivity observed in this study is high (82.3%) and it is comparable with results obtained in similar studies conducted in Brazil[8] (75.9%), Chicago, USA (84%)[9], Malawi (82.2%)[10], and Chandigarh

India (100%).[11] It is also corroborated by results obtained in Maharashtra, India[12] which assessed the ability in caregivers (70.5%) and medical staff (78.0%). The sensitivity which is the ability to detect the true positives is very crucial because it will prompt the mothers to seek help in time instead of waiting till the complications of fever occur. The specificity observed, however is moderate (54.1%) and corroborates those observed in studies done in Malawi (67.8%)[10] that assessed the ability in mothers and Maharashtra, India[12] that assessed the ability in caregivers (40.9%) and medical staff (63.6%) but low compared with other studies carried out in Brazil (90.6%)[8], Chicago, USA (76%)[9], and Chandigarh, India (92.2%)[11] that all assessed the ability in mothers. The lower results observed in this environment might be due to the presence of low-grade fever or elevated body temperature in some mothers as a result of the endemicity of malaria in the region, thus limiting their ability to correctly assess fever in their children. Febrile illnesses in children are conditions that are responsible for majority of childhood mortality especially in this environment and their treatment is relatively safe even if it was false positive, hence a screening test with high sensitivity and relatively moderate specificity is very good for such conditions. Unlike the study done in Brazil[8] in which more than half of the mothers had less than four years' formal education, majority of the mothers interviewed in this study were literate with at least six years' formal education (Table 1). A higher percentage of the literate mothers could correctly assess fever in their children as compared with their Illiterate counterparts. This difference was however found not to be statistically significant, which implies that the educational status of the mother does not affect her ability to assess fever in her child by tactile method. This is similar to the findings observed in the study done in India.[11] According to the results of this study, neither the age of the mother nor that of the child was found to be statistically significantly associated with correct assessment of childhood fever using the tactile method (Table 5). This is important because it is contrary to the general believe that older mothers have better experiences while younger ones are often anxious and usually give false complaints. It may also suggest that the complaints of the mothers should be taken seriously irrespective of their ages and that of their children. Of all the occupations, the traders had the highest percentage of mothers who could correctly assess the presence of fever in their children while students had the lowest percentage. This may be attributable to the relatively greater experience of the traders (who fell within the older age groups) in child-rearing as compared with the student-mothers. However, mothers' occupation is not a determinant of their ability to correctly assess childhood fever by tactile method since the differences in their abilities was not found to be statistically significant ($P>0.05$). The study discovered that although a majority of the mothers interviewed were familiar with and knew what a thermometer is used for, however, greater than four-fifth of them did not own thermometers. Similar results were obtained in the study done in Brazil[9] in which only about one-fifth of the families had thermometers and less than half of these knew how to use it properly. The relatively high cost of thermometers and subsequently low priority accorded to it in this environment may explain this finding. This further emphasizes the practical importance of maternal screening of fever by palpation. Also, the association between mothers' knowledge of the use of thermometers and accurate assessment of fever in their children was not statistically significant. Therefore, mothers do not necessarily need to know what a thermometer is in order to accurately detect fever in their children. The study also revealed that most mothers believed malaria to be the commonest cause of fever in their children and as such, anti-malarial drug administration was the commonest intervention employed. As a result of this, only very few of the mothers present their children at the hospital within the first twenty-four hours of detection of fever.

CONCLUSION

The study concludes that mothers are able to provide accurate information about the presence or absence of fever in their children by palpation and without the use of a thermometer, although the use of a thermometer remains the best method of assessing and documenting fever. The mothers' history of fever assessed by palpation should be accepted by physicians as accurate, irrespective of the age, educational status, occupation and ownership of thermometer by mothers. It is recommended that physicians should accept as accurate mothers' history of fever and subsequently commence prompt investigation and appropriate management especially in low resources centres.

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