ORIGINAL ARTICLE

Pattern of Diseases Associated with Fever Among Infants Aged 1 - 6 Months

by

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Abstract

This study was carried out retrospectively to evaluate the pattern of diseases associated with fever among infants aged 1-6 months at Gunung Wenang General Hospital Manado. During the period of January 1988 - December 1989, 189 infants with age ranging 1-6 months, were evaluated. Diseases associated with fever predominantly occurred in infants of 3 months old (73.0%).

The final clinical diagnosis of diseases associated with fever were gastroenteritis (39.15%), pneumonia (28.05%), meningitis (9%), respiratory tract infection (15.4%), post vaccination (4.20%) and septicemia (4.3%).

The fever ranged from 37.8 - 38.3° C (38%); 38.4 - 39.5° C (49%), 39.6 - 41° C (10%) and more than 41° C (3%). The elevated body temperature was significantly related to the duration of fever (p 0.01).

Increased erythrocyte sedimention rate and thrombocytopenia were not correlated significantly ($p > 0.05$) with elevated body temperature while the total white cell count had a significant relationship ($p < 0.05$).

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Introduction

Fever is the most common presenting symptoms in most pediatric clinics. Recent investigation have emphasized the diagnostic challenge of the young infants with fever. There has been a continuing effort to develop criteria which are indicators of serious illness in febrile infants with fever. There has been a continuing effort to develop criteria which are indicators of serious illness in febrile infants (Mc Carthy, 1977).

From a practical point of view, it appears that the initial clinical impression of the febrile infant is the best clinical predictor of bacteremic or viremic illnesses. Therefore, the evaluation of febrile illness in infants needs clinical experiences and practical approached to solve this problem (Godard, 1984).

Pantell et al. (1980) suggested that infants less than 3 months of age with fever exceeding 38.3° are calculated to have 21.5 times the risk of a serious underlying infection than infants older than 3 months with a similar temperature elevation.

Materials and methods

This study was undertaken retrospectively during the period 1988 - 1989. All febrile infants with age ranging from 1 to 6 months admitted to the Pediatric Department of Gunung Wenang General Hospital were evaluated.

Fever is defined as body temperature elevation exceeding 37.8°. It was taken rectally on admission by nurse, using nonelectronic thermometer and charted as a part of the vital signs, recorded everyday. The initial clinical impression of each infant was recorded, and to confirm the diagnosis, further laboratory and other diagnostic studies were done. The treatment was given on the basis of established clinical diagnosis. The patients data were analysed statistically by using chi-square analysis.

Results

In the 24-month-period, 189 infants ranging from 1 to 6 months with a body temperature (rectally) of 37.8° C were studied.

Table 1 shows the distribution of age and sex in which 73.0% of infants more than 3 months of age presented fever on admission. Forty nine percent of patients presented fever ranging from 38.4°C to 39.5°C and only 3% of cases had body temperature more than 41°C. The highest recorded temperature was 41.2°C.

Table 1 : *Distribution of patients with fever by age and sex*

Temperature °C	Sex	1 - 2 month	2 - 3 month	3 - 4 month	4 - 5 month	5 - 6 month	Total
37.8 - 38.3	Boy	8	6	7	6	8	35
	Girl	6	3	10	14		37
37.4 - 39.5	Boy	11	1	11	12	11	46
	Girl	4	6	7	20	10	47
	Boy	2	2	3	2		13
	Girl	2	0	1	2	1	6

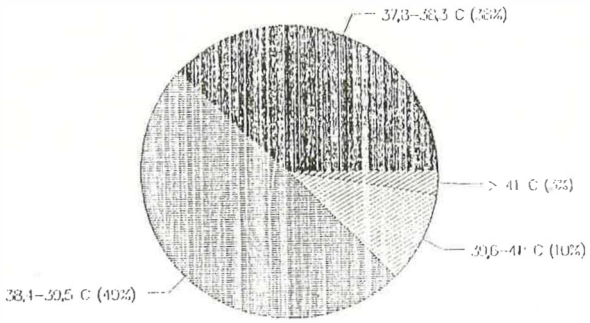

Figure 1 : *Distribution of cases by body temperature*

Table 2 : *Correlation between elevated temperature and final clinical diagnosis*

Body temperature °C	GE	PNEU-MONIA	MENINGI-TIS	RES. TRACT	POST-VACCINATION	SEPTI-
37.8 - 38.3	29 (39.2%)	24 (45.3%)	5 (29.4%)	11 (37.9%)	1 (12.5%)	2 (25%)
38.4 - 39.5	35 (47.3%)	23 (43.4%)	7 (41.2%)	16 (55.2%)	7 (87.5%)	5 (62.5%)
39.6 - 41	8 (10.8%)	3 (5.65%)	5 (6.9%)	2 (6.9%)	0	1 (12.5%)
41	2 (2.7%)	3 (5.65%)	0	0	o	0
T o t a l	74 (39.2%)	53 (28.1%)	17 (9%)	29 (15.4%)	8 (4.3%)	8 (4.3%)

Table 3 : *Correlation between elevated temperature and duration of fever*

Body temperature	1 - 3 Days	4 - 7 Days	8 - 10 Days	10 Days	T o t a l
37.8 - 38.3	49 (68.1%)	14 (19.4%)	6 (8.3%)	3 (4.2%)	72
38.4 - 39.5	49 (57.7%)	30 (32. 3%)	6 (6.5%)	8 (8.6%)	93
39.6 - 41	6 (31.6%)	7 (36.8%)	5 (26.3%)	1 (5.3%) 1 (5.3%)	19
41	0	4 (80%)	0	1 (5.26%)	19
T o t a l	104	55	17	189	

The final diagnosis is listed in Table 2. The most common diagnosis was gastro-enteritis (39.15%), followed by pneumo-nia (28.05%).

The elevated body temperature was sifnificantly related to the duration of fever ($p < 0.01$), although the duration of fever was most commonly less than 7 days (84.13%) (Table 3).

Table 4 : *Correlation between elevated body temperature and consciousness*

Body temperature °C		Irritability	Apathy	Somnolence	Sopor	Coma
37.8 - 38.3	52	10	8	0	2	0
38.4 - 39.5	68	12	7	4	2	0
39.6 - 41	11	2	5	1	0	0
41	0	1	1	2	0	1
Total	131	25	21	7	4	1

Table 5 : *Correlation between elevated temperature and WBC, platelets and ESR*

Body temperature °C	Leucocytes/ul			Platelets/ul			ESR	
	5000	5000	15000	100000	100000	1500000	30 mm	30 mm
37.8-38.3	2 2.74%	29 41.1%	41 56.15%	9 12.5%	16 22.2%	47 65.3%	54 75%	18 25 %
38.4-39.5	1 1.08%	35 37.63%	57 61.29%	8 8.6%	15 16.13%	70 75.27%	69 74.19%	24 25.81%
39.6-40	1 5.26%	4 21.05%	14 73.68%	0 0%	4 21.05%	15 78.95%	13 68.42%	6 31.58%
41	0 0	0 0	5 100%	1 20%	0 0%	4 80%	2 40%	3 60%
Total	4	68	117	18	35	136	138	51

$p < 0.05$ $p > 0.05$ $p > 0.05$

The elevated body temperature was not significantly correlated with the consciousness state (Table 4).

Table 5 shows that the elevated body temperature was significantly related to the elevated white cells count ($p < 0.05$), but not significantly correlated to platelet's level ($p > 0.05$) and increased erythrocyte sedimentation rate (ESR) ($p > 0.05$).

Table 6 : *Correlation between elevated body temperature and mortality in 189 infants*

Body temperature °C	Recovery	Death
37.8 - 38.3	69	3
38.4 - 39.5	86	7
39.6 - 40	18	1
41	5	0
Total	178	11

Discussion

Since Traube recommended the use of the thermometer for children in 1850, fever has been appreciated as the single most common chief complaint presented to the physician providing child health care. It account for at least 20-30% of the outpatient visits (Pizzo, et al. 1975; Sinclair, 1984). Nevertheless, the evaluation of a febrile child is also one of the most common challenges for the physician and remain a source of anxiety for most of the parents. Sometimes it signals the begining of an infective process which may have the most serious consequences. It therefore seems to be usefull to set out a practical approach in solving these problems. No previous report had ever been documented concerning the exact prevalence of fever among infants less than 6 months old (Pantell et al., 1984). Of all infants with the age of 1-6 months hospitalized in our department only 39.4% presented fever on admission.

This study also documented that 49.3% of these infants presented fever ranging from 38.4°C - 39.5°C; mild elevation (37.8°C - 38.3°C) was accounted for 38%; and none of the infants less than 3 months old presented fever exceeding 41°C (Figure 1). Pantell et al., (1980) noted 20.7% infants with mild elevation and elevated temperatures higher than 38.3°C were seen more frequently in older infants.

As in other developing countries, diarrhea and respiratory tract infection are leading causes of morbidity and mortality in infants. Our study also showed that the predominantly causes of morbidity were gastroenteritis and pneumonia as listed in Table 2.

The correlation between the elevated white blood cells count and the elevated temperature had been reported by some investigators (Teele et al., 1975; McCarthy, 1977). Concerning the value of the elevated W.B.C. counts in bacterial infection there were different opinions. Some workers regard it as an excellent indicator for bactrial infection while others do not consider it essential (Godard, 1984). Mc Carthy et al. (1977) who had analysed it in more detail

found that white cells count greater than 15.000/ul has a predictive value for a bacterial infection in pyrexial children aged less than 2 years.

Our series showed that there was a significantly correlation between the elevated while cells count of 15.000/ul ($p < 0.005$).

Godard (1984) stated that thrombocytopenia is regarded as a useful sign for the early detection of bacterial infection. He also pointed out that it was equally common is septicemia in infants as well as in order children. In our present series thrombocytopenia was found only in 13.3% and it was not correlated significantly with the elevated temperature ($p > 0.005$).

The value of erythrocytes sedimentation rate (ESR) though very frequently used in clinical practice is still controversial (Godard, 1984). Some investigators recommend that a Wintrobe ESR higher than/or 30 mm/hour is more useful than an elevated polymorphonuclear (PMN) count and/or band form count in the evaluation of bacterisemid in children less than 2 years of age. But in this study the increased ESR was documented only in 27.0% and not correlated significantly with the elevated temperature ($p > 0.05$).

Unfortunately, blood culture was not obtained in this present study. Though studies had been done which showed that the risk of bacteremia increased with increased white blood cells count, high erythrocytes sedimentation rate (ESR) and the height of fever (Godard, 1984; McCarthy 1977; Teele et al., 1975).

The overall mortality was 5.8% in our present series. It was also not correlated with the elevated temperature ($p > 0.05$) (Table 6).

Summary

This study was conducted retrospectively during the period of January 1988 – December 1989. One hundred and eighty nine infants with the ages ranging from 1-6 months who suffered from diseases associated with fever were evaluated. Fever predominantly occurred in infants less than 3 months old (73.02%), most of them mainly presented fever ranging from 38.4–39.5°C (49%). The most common final diagnosis was gastroenteritis (39.15%) and pneumonia (28.05%). This study also showed that white blood cells count was significantly correlated to the elevated body temperature ($p < 0.005$).

REFERENCES

1. GODARD, C.: Fever in childhood practising paediatrician's point of view. Annals Nestle: 42/2: 11-30 (1984).
2. Mc CARTHY, P.L.; JEKEL, J.F.; DOLAN, T.F.: Temperature greater than or equal to 40° C in children less than 24 months of age. A prospective study. Paediatrics : 59/5 : 663-668 (1977).
3. PANTELL, R.H.; NABER, M.; LAMAR, R.; DIAS, J.K.: Fever in the first six months of life. Risks of underlying serious infection. Clin. Pediatr. 19: 77-82 (1980).
4. PIZZO, P.A.; LOVEJOY, F.H.; SMITH, D.H.: Prolonged fever in children; Review of 100 cases. Pediatrics 55 : 468-473 (1975).
5. SINCLAIR, J.C.: The control of body temperature and the pathogenesis of fever. Annales Nestle 42/2 : 1-10 (1984).
6. TEELE, D.W.; PELTON, S.I.; GRANT, M.J.A.; HERSKOWITH, J.; ROSEN, D.J.; ALLEN, C.E.; WIMMER, R.S.; KLEIN, J.O.: Bacteremia in febrile children under 2 years of age; results of cultur of blood of 600 consecutive febrile children seen in awalk in clinic. J. Pediatr. : 227-230 (1975).