

THE INCIDENCE OF FEVER

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INTRODUCTION

In the later stages of malaria eradication campaigns, case detection becomes of great importance, and the examination of fever cases is used to facilitate this detection (Göckel, 1963).

The number of cases of fever occurring in the general population in the absence of malaria is still doubtful. Colbourne (1964), reported figures from residential institutions in the United Kingdom but noted that similar figures from non-malarious tropical areas would be of more interest.

This paper reports observations made in Singapore between February 1st 1965 and January 31st 1967.

Initially observations were made in two institutions, the Convent of the Holy Infant Jesus in the centre of Singapore and "Boys Town", a boarding school nine miles from the Convent, on the road to Johore. The average number resident in the Convent was 157; except for a few boys under the age of five all were girls. In "Boys Town" there were 219 boys from 10 to 19 years old. Members of the staff of the Institutions who had had some elementary medical training kept records of all reported cases of sickness. The observations extended from February 1965 until January 1966. Temperatures of all the children who reported sick during this period were measured orally with ordinary clinical thermometers and were recorded. Instructions were given that the thermometer should be kept in the child's mouth for three minutes. Spells of fever were recorded separately for the same individual if they occurred after an interval of more than 14 days. The records were collected by the staff of the Department of Social Medicine at weekly intervals.

In order to gain more information about the cause of fever, additional observations were made in York Hill Girls Home from August 1st 1966 to January 31st 1967. This institution is run by the Social Welfare Department of the Singapore Government and admits orphan children mainly girls, the number resident varying between 180 and 200. There is a resident trained nurse and a doctor visits regularly at least once a week. A diagnosis was made of each case of

fever by the visiting doctor. The temperature of sick children was taken twice a day and the highest level recorded during the spell of fever was noted.

There was no malarial transmission in Singapore at the time of the trial and it can be assumed that the fevers were due to other causes.

RESULTS

The cases of fever have been classified in two groups; those with an oral temperature of 99°F. or above and those with 100°F. or above.

In the initial period between January 1965 and February 1966, the number of children at risk was taken as 376. This number was obtained by taking the mean of the number of children resident at the end of each month during the survey, the number did not exceed 386 nor fall below 360. There were 187 (50% of the group) incidents of fever during the year, of which 132 (35% of the group) were over 100°F. Several children had fever more than once during the period of observation (See footnote to tables I, II, and V). The results have been subdivided to show differences by age groups and between the two institutions (Tables I, II, III and IV). They have also been sub-divided by months to show variation between one time of the year and another. The following points can be recognized.

In February 1965, there were a large number of cases of fever, both in Boys Town and in the Convent. This corresponded with an epidemic of febrile sickness diagnosed as influenza which was widespread in Singapore at that time.

This epidemic affected predominantly the older boys and the younger girls (see Tables III and IV). No reason can be given for this difference.

In the second part of the survey, in the York Hill Home, a much higher incidence of fever was found. During the six months period of observation there were 93 spells of fever in a group averaging 195, and in 87 the fever exceeded 100°F. The results have been tabulated as for the other institutions. (Tables V and VI) Here the younger children had more fever.

TABLE I

CONVENT OF THE HOLY INFANT JESUS —
RECORDED SPELLS OF FEVER, FEBRUARY 1965 — JANUARY 1966

(i) Subdivided by Age Groups

| Age Group | Number at risk | Number with Fever | % of Group | Number with Fever 100° F. & above | % of Group |
|-----------------|----------------|-------------------|------------|-----------------------------------|------------|
| Under 10 years | 86 | 23 | 26.7 | 16 | 18.6 |
| 10 yrs. & above | 71 | 17 | 23.9 | 17 | 23.9 |
| Total: | 157 | 40 | 25.5 | 33 | 21.0 |

(four children had fever twice)

(ii) Occurrence by Months

| | No. with Fever | % | No. with 100° F. and above | % |
|----------------|----------------|------|----------------------------|------|
| February 1965 | 17 | 10.8 | 11 | 7.0 |
| March 1965 | 2 | 1.3 | 1 | 0.6 |
| April 1965 | 3 | 1.9 | 3 | 1.9 |
| May 1965 | 3 | 1.9 | 3 | 1.9 |
| June 1965 | - | - | - | - |
| July 1965 | - | - | - | - |
| August 1965 | 7 | 4.5 | 7 | 4.5 |
| September 1965 | 4 | 2.5 | 4 | 2.5 |
| October 1965 | - | - | - | - |
| November 1965 | 4 | 2.5 | 4 | 2.5 |
| December 1965 | - | - | - | - |
| January 1966 | - | - | - | - |
| Total: | 40 | 25.4 | 33 | 20.9 |

TABLE II

BOYS' TOWN — RECORDED SPELLS OF
FEVER FROM FEBRUARY 1965 TO JANUARY 1966

(i) Subdivided by Age Groups

| Age Group | Number at risk | Number with Fever | % of Group | Number with Fever 100° F. & above | % of Group |
|---------------|----------------|-------------------|------------|-----------------------------------|------------|
| 10 - 14 years | 61 | 33 | 54.1 | 19 | 31.1 |
| 15 - 19 years | 158 | 114 | 72.2 | 80 | 50.6 |
| Total: | 219 | 147 | 67.1 | 99 | 45.2 |

(25 children had fever twice, 7 three times and 1 four times)

(ii) Occurrence by Months

| | No. with Fever | % | No. with 100° F. and above | % |
|----------------|----------------|------|----------------------------|------|
| February 1965 | 49 | 22.4 | 40 | 18.3 |
| March 1965 | 15 | 6.8 | 7 | 3.2 |
| April 1965 | 7 | 3.2 | 7 | 3.2 |
| May 1965 | 8 | 3.7 | 7 | 3.2 |
| June 1965 | 11 | 5.0 | 7 | 3.2 |
| July 1965 | 8 | 3.7 | 5 | 2.3 |
| August 1965 | 3 | 1.4 | 3 | 1.4 |
| September 1965 | 13 | 5.9 | 7 | 3.2 |
| October 1965 | 13 | 5.9 | 3 | 1.4 |
| November 1965 | 7 | 3.2 | 2 | 0.9 |
| December 1965 | - | - | - | - |
| January 1966 | 13 | 5.9 | 11 | 5.0 |
| Total: | 147 | 67.1 | 99 | 45.3 |

TABLE III
BOYS' TOWN
FEVER DURING FEBRUARY 1965

| Age Group | Number at risk | Number with Fever | % of Group | Number with Fever 100° F. & above | % of Group |
|--------------|----------------|-------------------|------------|-----------------------------------|------------|
| 10 - 14 yrs. | 61 | 5 | 8.2 | 3 | 4.9 |
| 15 - 19 yrs. | 158 | 44 | 27.8 | 37 | 23.5 |
| Total: | 219 | 49 | 22.4 | 40 | 18.3 |

TABLE IV
CONVENT OF THE HOLY INFANT JESUS
FEVER DURING FEBRUARY 1965

| Age Group | Number at risk | Number with Fever | % of Group | Number with Fever 100° F. & above | % of Group |
|----------------|----------------|-------------------|------------|-----------------------------------|------------|
| Under 10 yrs. | 86 | 17 | 20 | 11 | 13 |
| 10 yrs. & over | 71 | 0 | - | 0 | - |
| Total: | 157 | 17 | 11 | 11 | 7 |

DISCUSSION

In the two institutions without regular medical attention the results show that, taking into account the children who had more than one attack, about half the group have fever during the year, and more than a third a fever of 100°F. or higher. These are minimum figures; failure to report fever would result in failure to record.

There are, however, several unexpected features.

It had been expected that the younger children would have had more attacks of fever, but the lowest fever rates for temperature over 100°F. are found in the children under ten years in the Convent. In Boys Town the rates are all lower in the 10-14 than 15-19 age group.

The incidence of fever is higher in Boys Town than at the Convent. There are obvious differences between the two institutions; boys only in Boys Town, girls in the Convent; the Convent is in the middle of the city, Boys Town is in a more or less rural area. Neither of these factors seem relevant. It is possible that the girls were less likely to report sick with minor ailments but there is no evidence for this supposition.

The second point of interest is the marked

effect on the rates of the epidemic in February, 1965.

At York Hill a much higher incidence rate has been found. There is a much higher incidence of fever in the younger children and there was, as in the earlier survey, one month, in this case, December 1966, with a well marked epidemic of upper respiratory infection. The age distribution of the fever follows the expected pattern and corresponds with the earlier survey carried out in England (Colbourne, 1964). It supports the contention that fever in younger children may have been overlooked in the other institutions.

The diagnoses made in the 93 spells of fever in York Hill were as follows:

Infections of the upper respiratory tract

| | | | | |
|---|---|---|----|---|
| Influenza | - | - | 6 | |
| Coryza | - | - | 6 | |
| Pharyngitis | - | - | 10 | |
| Tonsillitis | - | - | 13 | (one suspected diphtheria, not confirmed) |
| Bronchitis | - | - | 11 | |
| Upper respiratory infection (unspecified) | - | - | 29 | |

Total: 75

TABLE V

HOME-CRAFT CENTRE YORK HILL
RECORDED SPELLS OF FEVER, AUGUST 1966 — JANUARY 1967

(i) Subdivided by Age Groups

| Age Group | Number at risk | Number with Fever | % of Group | Number with Fever 100° F. & above | % of Group |
|-------------|----------------|-------------------|------------|-----------------------------------|------------|
| Under 1 yr. | 8 | 10 | 125 | 9 | 112.5 |
| 1 - 4 yr. | 19 | 29 | 152.6 | 28 | 147.4 |
| 5 - 10 yr. | 25 | 17 | 68.0 | 16 | 64.0 |
| 11 - 15 yr. | 87 | 24 | 27.6 | 21 | 24.1 |
| 16 - 20 yr. | 56 | 13 | 23.2 | 13 | 23.2 |
| Total: | 195 | 93 | 47.7 | 87 | 44.6 |

(8 children had fever twice and 4 three times)

(ii) Occurrence by Months

| | No. with Fever | % | Number with Fever 100° F. & above | % |
|-----------|----------------|------|-----------------------------------|------|
| August | 15 | 7.7 | 13 | 6.7 |
| September | 10 | 5.1 | 10 | 5.1 |
| October | 10 | 5.1 | 9 | 4.6 |
| November | 16 | 8.2 | 16 | 8.2 |
| December | 32 | 16.4 | 31 | 15.9 |
| January | 10 | 5.1 | 8 | 4.1 |
| Total: | 93 | 47.6 | 87 | 44.6 |

TABLE VI

HOME-CRAFT CENTRE YORK HILL
FEVER DUE TO UPPER RESPIRATORY INFECTION
DURING DECEMBER 1966

| Age Group | Number at risk | Number with Fever | % | Number with Fever 100° F. & above | % |
|-------------------|----------------|-------------------|------|-----------------------------------|------|
| Under 11 yrs. | 56 | 9 | 16.1 | 9 | 16.1 |
| 11 years and Over | 138 | 19 | 13.8 | 14 | 10.1 |
| Total: | 194 | 28 | 14.4 | 23 | 11.9 |

Other causes of fever

| | | | |
|---------------------------|---|---|---|
| Glossitis | - | - | 3 (one child aged 10 years, on three occasions) |
| Gastro-enteritis | - | - | 5 |
| Acute Nephritis | - | - | 2 |
| Pyelonephritis | - | - | 1 |
| Measles | - | - | 3 |
| Boils | - | - | 1 |
| Reaction to T.A.F. | - | - | 1 |
| Pyrexia of Unknown Origin | - | - | 2 |

Total: 18

In comparing the results from York Hill Home with the earlier investigations, it must be remembered that the rates apply to a period of six months. If we double these rates we would get rates for the year of 95% for all fever and 89% for fever over 100°F.

However, it may be said that another month with an epidemic of upper respiratory infection similar to December 1966 is unlikely to occur and that it would be more reasonable to expect the next six months to have rates similar to the non-epidemic months; in that case the annual rates would then be 75% and 69% respectively.

The confidence limits of these four rates lead to the conclusion that spells of all fever during 12 months are likely to amount to between 69% and 98% of the number in the group and between 62% and 93% for fever over 100°F.

CONCLUSION

The confusing difference in incidence at different ages in the three institutions make it impossible to produce a definite figure for the amount of fever to be expected during the consolidation phase of a malaria eradication campaign but it seems reasonable to conclude that it must greatly exceed the 10% which is the figure accepted as adequate for an annual blood examination rate in a malaria eradication campaign (Yekutieli, 1960). It is true that these observations are restricted to children who may

be expected to suffer more fever than adults. But in most malarious countries, about half the population are children. The rates observed in Singapore are well over 20% so that a 10% incidence of fever will be exceeded if adults have no fever at all.

The more intense the medical attention, the higher was the incidence of detected fever.

We are left in doubt as to whether the differences between the institutions are due to a difference in the actual number of spells of fever or merely in the amount of fever detected. This is exactly the problem that faces those organising malaria case detection schemes.

It would seem reasonable to conclude that at least half a group of children is likely to suffer a bout of fever during the year.

Passive case detection could be simplified by permitting the omission of blood films from those with obvious causes for their fever or during a well marked epidemic.

The figures from York Hill suggest that most fevers are due to upper respiratory infections. It would seem hazardous to suggest that such patients should not be examined as possible cases of malaria.

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