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Epidemiology of tuberculous meningitis in the Western Cape: 1979 - 1981

by

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EPIDEMIOLOGY OF TUBERCULOSIS MENINGITIS IN THE WESTERN CAPE 1979 - 1981

Introduction

Tuberculosis meningitis (TBM) is the most serious manifestation of tuberculous disease. The incidence of TBM in a population has been used as an indicator of the extent of control of tuberculosis in that population. Unlike pulmonary TB with its varied natural history and severity, TBM always causes an illness profound enough to require hospital admission. The diagnosis is virtually incompatible with spontaneous recovery without treatment. Accurate ascertainment of all cases is therefore a valuable index of the total extent of tubercular diseases in a region. More specifically it is a measure of the number of children who escape primary or secondary preventive measures.

I have said that TBM is the most serious manifestation of tuberculous disease. The mortality rate from the disease is high and permanent neurological disability is frequent to survivors.[1] It was this specific complication which led the Child Health Unit to initiate this study. Many children with a range of neurological disability whose impairment has followed an episode of TBM were seen at the local Cerebral Palsy Clinic. Meningitis is a known cause of mental and physical handicap.[2,3] It was considered important to determine what the true incidence of this disease was in the local community and how many children were handicapped as a result.

Patients with TBM always have a focus of tubercular infection elsewhere. Most cases occur within two years of primary infection as a development from the stage of initial dissemination. The development of the disease is the classic final stage of TB in children.

The clinical presentation is determined by the nature of the pathological process. The progress of the disease occurs over a period of weeks. The final outcome depends on the extent of the pathological changes in the brain, before appropriate intervention in the form of anti-tuberculosis therapy and anti-inflammatory agents is introduced.

Methods

It was decided to try to identify all cases occurring in children over a specified time period. The geographical boundaries within which cases were to be identified were those of the Cape West Health Region. This area stretches from Namaqualand to Cape Town, Knysna, Beaufort West and Calvinia. (See map, Annexure 1). The disease is notifiable, and such notifications from local authorities within this region are sent to the Regional Offices of State Health at Bellville.

The criteria for age and residence were as follows: Cases occurring in children up to and including fourteen years of age were included. This upper age limit was chosen to match the population denominator. The categories of residence were two-fold:

A: Those normally resident here or resident for six months prior to the disease.

B: Those previously resident here and who had returned for health care because either parent was resident here for work purposes. This latter category specifically refers to children who came from or returned to the Transkei.

Cases diagnosed during the three-year period 1979-1981 only were included. THe sources of information about possible cases comprised notifications to local authorities and the

Regional Offices of state Health, patient records from local provincial hospitals, laboratory reports, and referrals to the neurosurgical and assessment service at the Red Cross Children's Hospital, at Cape Town.

Recognised criteria for the diagnosis were used. Where this was inconclusive the case was discussed by the researchers and a decision reached on its inclusion based on the available evidence.

Results

One hundred and eighty five cases were identified as occurring during the three year period. The actual numbers were 49 in 1979, 61 in 1980, and 75 in 1981. Whether this rise in numbers each year reflects a true change in incidence is uncertain. There was greater difficulty in identifying 1979 cases and in confirming the diagnosis. For the remainder of the presentation the cases from the three years are considered as a whole.

The items recorded for each case were: age, sex, population group, place or residence, stage of the disease, neurological outcome and evidence of BCG vaccine administration.

Age

The age distribution shows the expected higher incidence in the younger children with 102 cases aged less than 2 years and a further 50 in the two to four year age group. (Fig.1) This predominance in infancy and early childhood is in keeping with the findings of other workers. An earlier South African report found 85% of their cases to be less than three years of age.[4]

Sex

The sex distribution was approximately equal.

Population Groups

The distribution by population groups shows a very low incidence in white children and a high incidence in the black group. There were 125 coloured children, 59 black and one white child who had the disease. (Fig.2) These numbers when related to the appropriate denominator shows the highest incidence to be in the black group.

The denominator for the population was derived from the 1980 census. This gave the age-breakdown in 5-year cohorts for certain magisterial districts. The relevant population of the health region was calculated at 822 000. This gives an overall incidence for the disease of 7,5 per 100 000.

The incidence by population group is as follows:

Whites	0,2 / 100 000
Coloureds	7,2 / 100 000
Blacks	28 / 100 000

If black children who were described as intermittently resident in the Transkei are excluded, the incidence is still high at 18 per 100 000. The high incidence in this group reflects that found in total TB notifications. Local Authorities statistics [5] for the last 20 years for TBM cases show a steady decline overall but with the least improvement in the black population group. Recent national (RSA) figures show an incidence rate for children of the same age group (0 - 14 years) of 2,3 per 100 000.[6] This incidence rate is obtained from notifications.

Geography

Of the total population of the health region, just over half live in the area around Cape Town. This area includes the magisterial districts of Simonstown, Wynberg, Cape Town, Bellville and Goodwood and comprises the 01 Economic Region. Of the 185 cases, 95 were from the Cape Town area and 90 from outside, giving an approximately equal incidence from the urban and rural areas as a whole. Each case was classified to its magisterial district of residence since it is by these areas that the census figures are produced.

The rate was calculated for each magisterial district and was found to vary between 0 and 28 per 100 000.

Stage of Disease

The prognosis for this disorder is related to the stage of the disease at the time of commencement of therapy. A 3-stage classification was used [7] in which stage 1 reflected an early presentation, stage II presentation at an intermediate stage, and stage III cases which were at a later stage of the disease. The stage three cases had a depressed level of consciousness with or without other major neurological abnormalities. Of our cases, only 15% were at the early stage, 33% intermediate and 42% were at an advanced stage. (The information for the remaining 10% was incomplete) (See Fig.3)

Mortality and neurological handicap remain high despite improved diagnostic facilities and therapeutic methods. Four categories of outcome were used, similar to that in other studies.[7]

1. Where the child appeared well and had a minor abnormality which did not interfere with his/her life style.

2, The presence of sequelae designated as minor such as epilepsy or deafness or mild mental retardation or behavioural problems.

3. Major sequelae of either severe mental retardation or mild MR with physical abnormalities such as hemiparesis, or athetoid movements.

4. Death

Of the 185 children, approximately one quarter fell in each category.

1 - 49 were well
2 - 43 had a handicap considered "minor"
3 - 45 had a major disability
4 - 44 died

The outcome in two cases was unknown and two children had Cerebral Palsy prior to their TBM and were not classified with the above. (See Fig.4)

It is known that poor outcome correlates with young age and late stage presentation. These facts were confirmed in our cases.

Where outcomes 1 and 2 are combined and 3 and 4, the picture shows the markedly better results in older children. (See Fig.5) 80% of the five to nine year olds and all over the age of ten had a good outcome or only minor handicap.

The outcome when analysed by the stage of the disease shows a picture of deteriorating results in the later stages. (See Fig.6)

How do these results compare to other reports on TBM? Two sources of such information are:

1. Case fatality ratios from notifications, and
2. published series.

1. Published figures for TB in children [6] in the Republic of South Africa give case-fatality ratios for TBM of between 25,0 and 35 - the 1980 figure being 25 which is similar to our group.

2. Though many reviews of TBM cases series have been published, there are difficulties in comparing the results. The age distribution in a series can vary, some including adults amongst their cases. Other series may have had more cases presenting at an earlier stage.

Overall a review of 16 studies in the literature published between 1960 and 1976 and covering 1400 cases with few adults showed 34,8% to have died.[8]

Metropolitan and Rural Differential

The children from the rural areas were at a later stage of the disease and more of them died (31% compared to 17%). This would be in keeping with the poorer access to health care facilities.

BCG Vaccine Administration

BCG Vaccine is believed to provide immunity to 80% of its recipients against tuberculosis. Evidence for vaccination was sought for all cases. The presence of a scar or the local authority card record provided definite evidence of BCG vaccination in 23 cases. For a further 83 cases the clinical or hospital notes recorded that BCG had been given,

this information having been obtained on history taken from the mother or guardian.

Summary of Epidemiological Results

This review of TBM cases in the Western Cape highlights certain important issues.

1. The incidence identified of 7,5 per 100 000 is three times higher than recently published figures.

2. It affects children from both urban and rural areas and certain rural ares had an incidence rate greater than 20 per 100 000.

3. The rural cases were at a later stage and more of them died.

4. Young age and late stage of presentation continue to be associated with a poorer outcome.

5. Tuberculosis meningitis causes about 30 cases of handicap or disability in children in the health region per year.

6. BCG vaccination was not protective against the disease.

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