MEASLES – AN EXPERIENCE IN SANDAKAN HOSPITAL, SABAH, 1990

A Khoo, C K Ho, T K Ong, A Khairul

ABSTRACT

A descriptive study of 143 cases of clinically diagnosed measles in patients under the age of 12 years admitted to the Duchess of Kent Hospital, Sandakan, Sabah, during the year 1990 was carried out. The median age of the patients was one year and 13.3% of the cases were between the ages of 6 and 9 months. The male to female ratio was 1.3:1. The majority of the cases (85.3%) were not immunised against measles while 60.0% of the cases were malnourished. Most of the cases (86.0%) had at least one complication with 32.9% of the cases having more than one complications. The main complications were pneumonia (74.1%) and diarrhoea (38.5%). Other complications were convulsions, otitis media and corneal ulceration/scarring. A case of pneumonia with mediastinal emphysema and subcutaneous emphysema was noted. The case fatality rate was 1.4% while blindness was the long term morbidity in 1.4% of the cases. Measles remains an important cause of morbidity in children in Sabah.

Keywords: *measles, morbidity, clinical epidemiology, Malaysia, paediatric*

SINGAPORE MED J 1994; Vol 35: 595-598

INTRODUCTION

Measles is a preventable cause of morbidity and mortality in children. In developing countries, measles is severe and may be complicated by other infections, such as bronchopneumonia, diarrhoea, otitis media and encephalitis. In the 1960s, childhood mortality in The Gambia due to measles was recorded at 15% and the case fatality rate in Chile was 6.5%[1]. In the 1970s, the case fatality rate in Bangladesh was 3.7%[2]. In 1987, Choudhry et al[3] reported a series of cases of severe measles admitted to hospital in Kabul, Afghanistan where 94.3% of the cases had at least one complication and the overall mortality was high (14.5%). They found that the mortality rate was higher in the malnourished patients.

In Malaysia, all cases of serologically confirmed measles must be notified to the Ministry of Health. In 1990, a total of 563 cases of measles were reported, giving an incidence rate of 3.16 per 100,000 population. During the same year, the coverage of measles immunisation in the country was 70.1%, being estimated to be 66.6% for the state of Sabah[4]. In Malaysia, immunisation against measles is compulsory and is usually given at the age of 9 months.

We noted the paucity of information regarding measles in Malaysia, particularly from the state of Sabah. For this reason, we undertook a study to describe the morbidity and mortality caused by measles in Sandakan, Sabah.

MATERIALS AND METHODS

The district of Sandakan, Sabah, is situated at 118° East and 6° North, along the north-east coast of the island of Borneo. The district had an estimated population of 213,438 persons in 1990. The study was conducted at the Duchess of Kent Hospital, which is the sole general hospital for the district.

Due to the high percentage of complications developing in patients with measles, it was a general policy to admit all cases of measles presenting at the outpatient clinics or the accident and emergency department of the hospital. All cases were diagnosed clinically from the signs and symptoms – fever, typical maculopapular rash, conjunctivitis and coryza. Serological investigations were not available in Sandakan and could not be done due to logistic reasons.

A descriptive study of all cases of measles below the age of 12 years admitted to the Paediatric Ward of the Duchess of Kent Hospital, Sandakan during the year 1990 was carried out. All cases clinically diagnosed as measles were included. The case notes of all the cases were reviewed. Malnutrition was diagnosed as weight less than two standard deviations below the median of the National Center for Health Statistics Weight-for-age Standards (z-score < -2)[5]. Complications due directly to measles which were noted in the case notes were analysed.

RESULTS

There were 143 cases of measles admitted to the hospital in 1990. This was equivalent to 67 hospitalised cases of measles per 100,000 population. Most of the cases (75.9%) were admitted in the first half of the year. The relative humidity and rainfall was low during the months of February to April, when the number of admissions was high (Fig 1).

The age of the patients ranged from 6 months to 11 years. The mean age was 2.2 years (1 S.D. 2.5) and the median age

Biotechnology Centre
Institute for Medical Research
Jalan Pahang
50588 Kuala Lumpur
Malaysia

A Khoo, MBBS, MPH
Medical Officer

Department of Radiology
Faculty of Medicine
Universiti Kebangsaan Malaysia
Kuala Lumpur
Malaysia

C K Ho, MBBS
Medical Officer

Institute of Paediatrics
Faculty of Medicine
Universiti Kebangsaan Malaysia

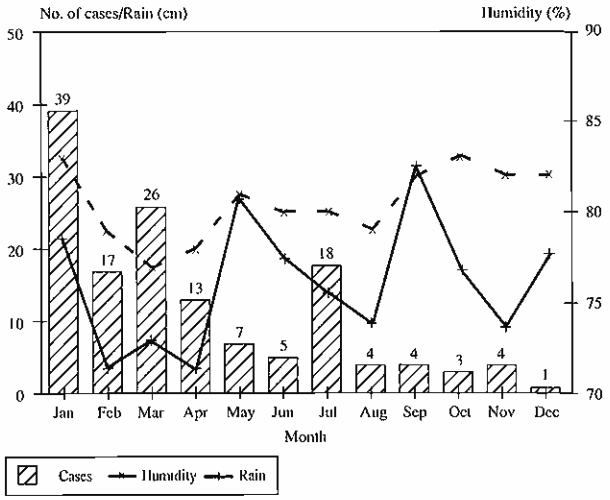
T K Ong, MBBS
Medical Officer

Department of Primary Care Medicine
University Hospital
Kuala Lumpur
Malaysia

A Khairul, MD (UKM)
Medical Officer

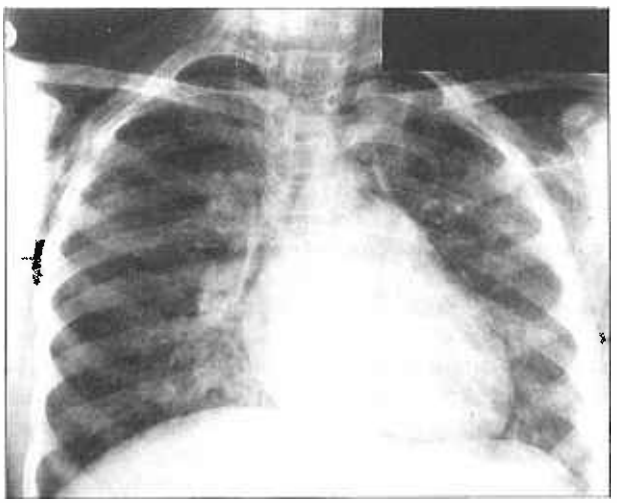
Correspondence to: Dr A Khoo

Fig 1 – Admission of cases of measles, total rainfall and relative humidity by month, Sandakan, Sabah, 1990.



Footnote: Date of admission of 2 cases not known.

Fig 2 – Chest radiograph of an 8-year-old girl with bronchopneumonia, mediastinal emphysema and subcutaneous emphysema complicating measles.



was 1 year. There were 19 cases (13.3%) below the age of 9 months. The largest number of cases were between the ages of 1 to 2 years (30.1%). This was followed by the cases below 1 year of age (25.2%).

There were 82 males (57.3%) and 61 females (42.7%), giving a male:female ratio of 1.3:1. Among the admissions, 71 cases (49.7%) were Malaysian citizens, 70 cases (49.0%) were immigrants and 2 cases (1.4%) were of unknown citizenship.

Most of the cases (85.3%) had not received measles immunisation while 4 cases (2.8%) had received measles immunisation. The immunisation status of 17 cases (11.9%) were not known.

Malnutrition was found in 86 cases (60.1%). The weight of one child (0.7%) was not known.

The complications of measles in these patients are shown in Table I. Most of the cases (86.0%) had at least one complication. The most frequent complications seen were pneumonia (74.1%) and diarrhoea (58.5%). Pneumonia was the sole complication in 61 cases (42.7%), while diarrhoea was the sole complication in 14 cases (9.8%). Over a quarter of the cases (25.9%) had both pneumonia and diarrhoea as the only complications. Almost a third of the cases (32.9%) had more than one complications.

Table I – Complications of measles

Complications	Frequency (n = 143)	%
Pneumonia	106	74.1
Diarrhoea	55	38.5
Convulsions	4	2.8
Otitis media	2	1.4
Corneal ulceration/scarring	2	1.4
Mediastinal emphysema	1	0.7
No complications	20	14.0

A case of pneumonia with mediastinal emphysema and subcutaneous emphysema was found in an 8-year-old girl (Fig 2). She recovered uneventfully and was discharged well.

Most of the cases (95.8%) were discharged well. There were 2 deaths, both due to pneumonia. One of the fatal cases was malnourished (z-score = –3.51) while the other did not fulfil the criteria for malnutrition (z-score = –1.95). The case fatality rate was 1.4%. Two cases (1.4%) suffered from blindness due to corneal scarring. Two other cases (1.4%) discharged against medical advice and the outcome was not known.

The median length of hospitalisation was 4 days. Blindness was the only long-term morbidity noted. Of the two cases, one patient was discharged after 2 days of hospitalisation while the other was discharged after 25 days of hospitalisation. A fatal case died on the day of admission and another died after 2 days of hospitalisation.

DISCUSSION

The diagnosis of measles in our study was made solely on clinical grounds. This is an acceptable method of diagnosis in areas where serological confirmation of measles could not be carried out routinely[6].

The number of admissions of measles cases was high during the months of February to April when the total rainfall and the relative humidity of the month was low. It is interesting to note that Koster et al[2] and Lobo et al[7] found an association between the incidence of measles and dry weather. It was thought that the observation was consistent with the persistence of infective aerosolised droplets in air of low relative humidity. However, our study was limited to a one-year period due to logistic reasons. A study of a longer period would be necessary to establish the relationship between the weather conditions and measles in Sandakan.

More than half of the patients were below the age of 2 years. The high proportion of young patients is expected in an area with high transmission rates[7].

The number of male cases were marginally higher than the number of female cases. This could be due to selection bias where more males were brought to hospital. A marginally higher number of male to female cases were also noted in the studies in Afghanistan (1.2:1)[3], India (1.2:1)[8] and in the United States of America (1.1:1)[9]. It is possible that this could be due to a marginally higher number of males in the population. The sex-specific attack rates could not be calculated due to the lack of data. It is, however, interesting to note Miller's findings that in England and Wales in 1963, admission of cases of measles for social reasons were higher among males than females [10].

Most of the patients (85.3%) were not immunised. It was found that 13.3% of the cases were below the recommended age

for immunisation (9 months). Therefore, even with the current immunisation schedule, these cases would not have been protected. Walsh noted that in developing countries, 15-20% of the children may already have had measles if immunisation is delayed until the age of nine months. However, the efficacy of the vaccination is lower with younger children. He suggested that in areas with severe epidemics affecting many young infants, the age of vaccination be temporarily reduced to six months and when the transmission decreases, the immunisation be delayed until the first birthday[11]. A larger study in areas of intense transmission would be useful to find out if the percentage of young infants suffering from measles was large. On the other hand, immunisation alone is not expected to be fully protective and the occurrence of measles in immunised children is not unknown[12].

The weight of patient was measured on admission. This would over-estimate malnutrition as a reduction of weight could also be due to dehydration which is known to be associated with measles. However, it was the only index of nutritional status available in the records. The height of the patients could not be taken into consideration due to the unavailability of data.

Malnutrition was diagnosed based on the National Center for Health Statistics Standards. The cut-off point of two standard deviations below the median was used as recommended by the World Health Organisation[5,13]. The use of a standard from a developed country could overestimate the occurrence of malnutrition. However, the use of a single standard would facilitate comparisons between different groups.

The interaction between measles and malnutrition is complex. Reports on whether malnutrition increases the complications of measles have been conflicting. Measles is also known to worsen malnutrition suffered by the patients[1,12,14]. Measles and diarrhoea are known to act synergistically to increase the irreversible effects of nutritional deprivation[2].

In our study, the high proportion of patients with malnutrition could also be due to a high level of malnutrition in the community.

The proportion of cases with complications in this study was high at 86.0%. This could be due to a selection of more complicated cases to the hospital in Sandakan. In a large series of measles patients seen at the clinics and hospitals in England and Wales in 1963, Miller found that respiratory tract complications (pneumonia, severe bronchitis, bronchiolitis and croup) occurred in 3.8% of cases, otitis media in 2.5% and fits in 0.2% of cases[10].

Pneumonia was the most frequent complication. This was followed by diarrhoea. A combination of pneumonia and diarrhoea was seen in a large proportion of cases. In rural India, Lobo et al[7] found diarrhoea to be the most frequent complication (13.7%), followed by pneumonia (7.0%). They also found 1.6% of the cases to have more than one complications. Another study of hospitalised paediatric patients over a one-year period in India also noted that pneumonia was the commonest complication[8]. However, the percentage of pneumonia cases was only 16%.

Convulsions was reported in 2.8% of our cases. This is comparable with the series reported by Raote and Bhave[8], where the complication was encountered in 2.6% of cases. Other central nervous system complications, for example encephalitis, meningitis, and limb paresis were not recorded in our patients.

In the United States, Mason et al reported otitis media occurring in 62.7% of patients[9]. The percentage of otitis media in our series was much lower. We are unable to rule out selection or information bias as a cause of our findings.

Measles is a known cause of corneal ulceration which may lead to blindness[14,15]. In our study, 1.4% of cases developed blindness related to measles. Blindness was the only long-term morbidity reported in our series. Vitamin A deficiency could predispose the patient with measles to severe corneal ulceration. The prophylactic use of Vitamin A in patients with measles has been recommended and has been a practice in Sandakan.

A case of mediastinal emphysema with subcutaneous emphysema was reported in our series. This is a known but rare complication of measles, thought to be due to rupture of alveoli following a rise in alveolar pressure, which in turn could be due to a combination of violent coughing and obstructed respiratory airflow[16]. Odita and Akamaguna reported that pneumothorax occurred in 30% of cases of measles with mediastinal emphysema. They reported that this complication had a 12% mortality rate and in the survivors, complete resolution occurred within 14 days[17]. Our patient improved remarkably well and was fit to be discharged after 4 days.

The case fatality rate was slightly lower than the rates reported in most other developing countries[7,12]. This was despite the higher complication rates in this series. This could be due to early attendance by patients with complications and effective treatment of the complications at the hospital. However, we did not have figures of mortality out of the hospital. A study of mortality of measles in the community would be useful. In England and Wales, the case fatality rate among measles patients notified by doctors (from the clinics and hospitals) was 0.02%[10] in 1963.

Pulmonary complications were the cause of deaths in our patients. This was similar to that of other studies[7,10].

This study shows that measles remains as a cause of morbidity in children and reminds us of the importance of measles immunisation for all children. Health education, good management skills, adequate publicity and community support are all essential for successful immunisation of the community to prevent morbidity and mortality from this disease[11].

ACKNOWLEDGEMENTS

The authors would like to thank the Director General of Health of Malaysia for his permission to publish this article. The authors would also like to express their gratitude to Dr Harris Sakunanathan, Medical Superintendant, Duchess of Kent Hospital, Sandakan, and the staff of the hospital for their cooperation. The authors would also like to thank the Director General of the Meteorological Services for the data on the weather conditions, Dato' Dr Abdul Samad Sakijan, Head and Associate Professor, Department of Radiology, Faculty of Medicine, Universiti Kebangsaan Malaysia, for his comments on the chest radiograph, Dr Mak Joon Wah, Head, Biotechnology Centre, Institute for Medical Research, Kuala Lumpur for his advice and the Medical Illustrations Unit, Institute for Medical Research for their technical help.

REFERENCES

1. Morley D. Severe measles in the tropics – I. Br Med J 1969; i:297-300.
2. Koster FT, Curlin GC, Aziz KMA, Haque A. Synergistic impact of measles and diarrhoea on nutrition and mortality in Bangladesh. Bull World Health Organ 1981; 59:901-8.
3. Choudhry VP, Atmar M, Amin I, Aram GN, Ghani R. Effect of protein energy malnutrition on the immediate outcome of measles. Indian J Pediatr 1987; 54:717-22.
4. Malaysia. Ministry of Health. Annual Report 1990. Malaysia. 1990.
5. World Health Organisation (WHO). Measuring change in nutritional status. Guidelines for assessing the nutritional impact of supplementary feeding programmes for vulnerable groups. Geneva. 1983.
6. Coovadia H. Measles. Med Intern 1988; 3:2177-81.
7. Lobo J, Reddaiah VP, Kapoor SK, Nath LM. Epidemiology of measles in a rural community. Indian J Pediatr 1987; 54:261-5.
8. Raote GJ, Bhave SV. Clinical profile of measles – a prospective study of 150 hospital based children. Indian Pediatr 1992; 36:399-400.
9. Mason WH, Ross LA, Lanson J, Wright HT. Epidemic measles in the postvaccine era: evaluation of epidemiology, clinical presentation and complications during an urban outbreak. Pediatr Infect Dis J 1993; 12:42-8.

10. Miller DL. Frequency of complications of measles, 1963. Report on a National Inquiry by the Public Health Laboratory Service in Collaboration with the Society of Medical Officers of Health. Br Med J 1964; 2:75-8.

11. Walsh JA. Selection primary health care: Strategies for control of disease in the developing world. IV. Measles. Rev Infect Dis 1983; 5:330-40.

12. Lamb WH Epidemic measles in a highly immunised rural West African (Gambian) village. Rev Infect Dis 1988; 10.457-62.

13. World Health Organisation Working Group. Use and interpretation of anthropometric indicators of nutritional status. Bull World Health Organ 1986; 64:929-41.

14. Reddy V. Interaction between nutrition and measles. Indian J Pediatr 1987; 54:53-7.

15. Foster A, Sommer A. Corneal ulceration, measles, and childhood blindness in Tanzania. Br J Opthalmol 1987; 71:331-43.

16. Crosse BA. Subcutaneous and mediastinal emphysema complication of measles [letter]. J Infect 1989; 19:190.

17. Odita JC, Akamaguna AI. Mediastinal and subcutaneous emphysema associated with childhood measles. Eur J Pediatr 1984; 142:33-6.