Outside Europe

Control of diarrhoeal disease in Tonga 1978-83

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Abstract

Tonga, like many developing countries, suffers from a shortage of medical staff and a high morbidity and mortality from paediatric diarrhoeal disease. In 1980 a programme was started to train medical assistants and village administrators in the correct use of oral rehydration salt solution for rehydration. The effect on morbidity, mortality, and admission to hospital over the six years 1978-83 was assessed. After the introduction of the scheme the number of deaths due to diarrhoea fell considerably and the state of hydration in children admitted to hospital with diarrhoea greatly improved.

It is recommended that similar programmes be adopted where clinical problems of diarrhoea with dehydration persist. Instruction in the use of oral rehydration fluid was most effectively given by non-medical staff to groups of mothers, rather than by paediatricians in their inevitably brief, although important, explanation given in hospital.

Introduction

Childhood diarrhoea or gastroenteritis is a common cause of death and morbidity throughout the developing world. Roughly five million deaths each year are due to this group of diseases.¹ Deaths occur mostly in poorer countries that have low health care budgets, a shortage of trained medical staff, and poor water supplies with lower standards of sanitation and hygiene. In 1964 Philipps showed that absorption of water and sodium chloride mediated by glucose remains intact during diarrhoea.² Much research has been done on the aetiological factors in diarrhoea and the prevention and treatment of dehydration using oral rehydration fluids.^{3,4} The World Health Organisation has encouraged national diarrhoeal disease control programmes aimed at early intervention at the village level. The effect of such a programme was studied in Tonga.

Patients and methods

The kingdom of Tonga consists of small, widely scattered islands extending over some 300 000 km² of the Pacific Ocean, about 2400 km north east of New Zealand. The study population comprised 60 000 of the 100 000 Tongans living on the most southerly and largest island, Tongatapu. The capital, Nuku'alofa, is served by Vaiola Hospital, which serves as a referral centre for the other hospitals and the clinics on Tongatapu, which are staffed by a public health nurse and a locally trained health officer. Five of these officers finished their training and started work in January 1982. About 13% of the government budget in 1983 was devoted to the health ministry (which also runs the public water supply), giving an expenditure of T\$21.5⁵ or £13.00 per person. This compares with an expenditure of £278 per person in Dumfries and Galloway, with a population of 150 000.

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Two phases of a national programme for the control of diarrhoeal diseases were undertaken.⁵ A two day training programme for mid-level practitioners, public health nurses, and health officers was completed by July 1981; and a one day training course for volunteers from villages to learn how to store and administer oral rehydration salt solution to children with diarrhoea was completed by December 1982. The volunteers also learnt to identify those children with dehydration who required referral to public health nurses or health officers. Training was funded by the World Health Organisation and concentrated on the extensive use of locally developed audiovisual materials, especially for the volunteers.

The programme was evaluated by the hospital paediatricians; the years 1978-80, before introduction of the programme, served as a control period. This retrospective study of admissions to the 35 beds for children at Vaiola Hospital from January 1978 to December 1983 inclusive analysed the children with gastroenteritis. Relevant information was cross referenced with data from the statistics department of the Ministry of Health as we wanted to know the total number of deaths from gastroenteritis in the community and not just the deaths in the hospital. To compare improvements in the health services over a similar period a retrospective analysis of perinatal deaths in the hospital was also undertaken.

Results

Table I shows the numbers of deaths due to gastroenteritis recorded in children under the age of 5. As the reporting system improved in 1979 and 1980 the numbers of such deaths before 1980 were probably even greater than those indicated. There was a significant fall in mortality in 1981, 1982,

TABLE I—Deaths from gastroenteritis among children under 5 years, 1978-82

	Hospital deaths	Community deaths	All deaths from diarrhoea
1978	11	17	28
1979	8	4	12
1980	11	11	22
1981	3	2	5
1982	1		1
1983	1		1

and 1983 compared with the previous years (χ^2 test, $p < 0.001$). Table II shows the numbers of children with diarrhoea admitted each month from 1979 to 1983. The pronounced fluctuation in admissions corresponded with epidemics. There was an obvious decline in both admissions and deaths in the last three years of the survey.

During a severe epidemic in August 1981 up to 120 children with gastroenteritis attended the hospital as outpatients each day. This created an excessive workload for the two paediatricians, so two members of the health education staff were recruited to explain to groups of five to 10 mothers how to make up and administer rehydration salt solution by mouth. This continued for six weeks until the epidemic ended and resulted in a considerable change in the condition of children admitted. Before the epidemic the paediatricians received over 35 calls a month from the doctor on night duty to assess children with gastroenteritis, about 21 of whom received intravenous infusions for dehydration. Subsequently the paediatricians did not receive any night calls for gastroenteritis and only five children with diarrhoea required intravenous fluids. Admissions were either for social reasons or for chronic diarrhoea with only mild dehydration. The duration of admission did not fall, but there was a striking decrease in the demand for paediatric beds.

To assess whether the improved figures for diarrhoeal disease reflected merely better general health or more efficient services perinatal mortality was analysed for the years 1978-82 (table III). Despite uncertainty about the accuracy of figures for the first three years there was no obvious improvement in mortality. This contrasts with the striking improvement in morbidity and mortality due to gastroenteritis.

TABLE II—Admissions to children's ward for diarrhoeal disease (deaths given in parentheses) before and after introduction of training programme

	1979	1980	1981	1982	1983
January	15	20	16	26	17
February	14	52	15	12	15
March	21	45	16	16	5
April	21	33	14	19	6
May	20	33	13	14	17
June	72	17	8	8	6
July	46	4	9	5	10
August	14	5	99	5	15
September	8	17	37	43	35
October	17	14	42	10	12
November	12	5	9	10	5
December	12	5	27	6	3
Total	272 (12)	250 (22)	215 (5)	174 (1)	136 (1)

TABLE III—Perinatal mortality statistics from obstetric department

	Live births	Stillbirths	Early neonatal deaths	Total deaths	Deaths/1000 live births
1978	1108	14	8	22	19.7
1979	1076	19	5	24	21.9
1980	1105	13	6	19	17.9
1981	1094	17	9	26	23.4
1982	1203	16	6	22	18.6

Discussion

Morbidity and mortality from diarrhoeal disease can be influenced by many factors: changes in breast feeding practice, weaning diets, and food hygiene, water supplies, personal and environmental cleanliness, the epidemiology and virulence of pathogens, population movements, and medical interventions and health education. Which of these factors could have influenced the improvements in Tonga in recent years?

In 1964 about 60% of mothers bottle fed their babies from birth, but after a health education campaign a survey in 1979 in one district showed that 94% breast fed from birth even though 40% of these gave supplements in feeding bottles during the first month of life.⁶ Another nationwide review of infant feeding practices in 1982 showed no further change in the incidence of breast feeding. However, the most destructive cyclone this century, Hurricane Isaac, which caused extensive damage in March 1982, influenced dietary habits (M Malola, report to the Tongan Ministry of Health). It destroyed all the breadfruit and banana crops and halted coconut production for seven months. The consequences on the diet of infants were prolonged breast feeding and a switch from the traditional diet to imported supplies of sugar and flour. A minor epidemic of infantile diarrhoea occurred in March and April 1982 in the areas most affected by the cyclone. This did not, however, make a major difference to admissions to Vaiola Hospital (table II). There have been no major improvements in water supplies over the past six years. The population is stable, and there is no information about any change in the epidemiology or virulence of organisms.

The improvements in mortality and morbidity from infantile gastroenteritis were probably brought about by a combination of three factors: firstly, the adequate instruction in the use of oral rehydration fluids given to a sizable proportion of the total population during the epidemic in August 1981, when people were particularly receptive to advice; secondly, the national diarrhoeal disease control programme, which made available packets of oral rehydration salt solution; and thirdly, the deployment in January 1982 of five newly trained health officers, who knew the value and method of oral rehydration, to village dispensaries.

Senior paediatricians in developed countries may be aware of the changes over the past 20 years in the state of children presenting at hospital with severe diarrhoea. In the 1960s infants arrived dehydrated, in shock, and often with hypernatraemia. In the 1980s most infants present in a reasonable state of hydration. In Tonga this change occurred suddenly in the last quarter of 1981 after a major epidemic and coincided with the health education unit teaching mothers about oral rehydration. The parents were receptive and were instructed in a practical way, the health infrastructure had been developed, the health officers were in position, and oral rehydration salt solution was available. The results were satisfactory for both the public and health staff. These principles, which were successful in this small nation of islands, are applicable on a wider scale in many larger countries.

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What treatment is advised for a patient with hyperhidrosis, sufficiently severe to cause social embarrassment and an anxiety state?

Provided that an underlying disorder—primary anxiety state, obesity, chronic febrile disease, hyperthyroidism, pituitary disorder, malignant disease—is excluded, the treatment of severe hyperhidrosis depends on the site affected. Firstly, an explanation of the mechanism of sweating should always be given so that the patient understands the problems of treatment. The output of eccrine sweat glands may be diminished by atropine like drugs, by topical remedies that damage the glands, by sympathetic denervation of the glands, and, finally, by actual excision of the gland bearing area. Severe axillary sweating often constitutes a social embarrassment because the sweat stains the clothing, and all modes of treatment need to be considered. A simple first line remedy is aluminium hexachlorhydrate 20% in ethyl alcohol (Anhydrol forte 10 ml, Driclor 60 ml) applied just before retiring when sweating usually stops anyway. The area must be dry before application because in contact with water it forms hydrochloric acid; this remedy is potentially caustic and is available only on prescription. Used nightly for a week it will stop most unwanted axillary hyperhidrosis. This sweat gland poison has only a temporary effect, so that the treatment must be repeated after a few days and then at regular intervals. If this treatment fails then surgical treatment may be needed, either assault on the cervical sympathetic ganglia or local excision of the apex of the axillae, usually a mutilating operation but sometimes justified.

Hands and feet can pour sweat when these patients are under the slightest stress. The aluminium hexachlorhydrate treatment is sometimes effective and worth trying, but if it fails twice weekly tap water electrophoresis may work. By passing a current through the skin the sweat glands can be inactivated for several weeks. All four limbs can be similarly treated in turn. It may be helpful to add an atropine like drug, poldine methosulphate (Nactone), to the water. If this fails then cervical sympathectomy may be tried but there is a risk of compensatory generalised hyperhidrosis if more than two limbs are so treated. Effective drugs taken by mouth naturally have side effects on other autonomic functions. Propantheline (Probanthine) 15 mg one to three times a day can help, but atropine itself needs to be taken in toxic doses before it produces adequate control of severe hyperhidrosis. Topical application of atropine like substances, even in bases designed to transport them into the dermis, do not seem to be effective. Other drying agents such as formalin (irritant and offensive) and potassium permanganate (staining) are cosmetically unacceptable.—ALAN B SHRANK, consultant dermatologist to Shropshire Health Authority, Shrewsbury.