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The Results of Treatment of Kwashiorkor in Salisbury with High Protein Diets

BY

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INTRODUCTION

The earliest authorities on kwashiorkor in Africa, Proctor (1926) and Williams (1931-32, 1933), considered it not only a serious disease but a fatal one. Writing in this vein, Proctor stated, "The child, as far as my information goes, nearly always dies." Despite the subsequent claim by several experts on the value of vitamins in the treatment of the disease, the results continued to be disappointing until Altmann (1948) introduced skimmed lactic acid milk, when the whole outlook of the disease appeared to alter. Excluding deaths within the first 24 hours, Altmann obtained a 32 per cent. mortality with his treatment for the three years preceding 1950. In Durban, although Klenerman in 1950 reported a very disappointing death rate of 68.5 per cent. (498 deaths out of the 727 cases he treated), Walt, Wills and Nightingale in the same year obtained encouraging results by treating their cases with "maas," a traditional food made by the addition of a "culture" of previously soured milk to skimmed milk. Their treatment was based on the assumption that the syndrome was due to a low protein intake. Therefore they prescribed a diet rich in protein with limited quantities of carbohydrates and fat. With few exceptions no other food or medicines were given in the first week. For the second week a teaspoonful of skimmed milk powder was added to each feed and the third week mixed feeding was commenced. Generally, within three or four weeks after admission, the infant was on a full

ward diet, complemented with "maas." Their results were excellent. Out of 36 cases there were only four deaths, three within 24 hours of admission. If the three deaths that took place within 24 hours are excluded, the mortality rate was only 2.8 per cent. In this series clinical improvement was not evident until between the third and sixth days, when the oedema began to subside. After this progress was rapid, with loss of irritability, healing of skin lesions and gain in weight.

The extremely valuable observations of Dean and Schwartz (1945) from Uganda and their results on a diet of practically pure protein are well known. They are able to provide excellent nursing and medical care and their recovery rate is between 85 per cent. and 90 per cent.

A fairly recent paper from Kenya by Malcolm Clark (1951) is of interest, as it embodied a study of a large series of cases. Although he agreed that a deficiency of protein was the chief factor in the causation of the disease, Clark gave the infants a mixture of mince meat mashed with vegetables, soup and milk, but avoided *maize*. In addition, he administered two drachms of a mixture of cod liver oil and "ferriphosco." Of the 331 admissions to his hospital at Fort Hill, 106 died, the death rate being 32 per cent.

One of the most important papers on the treatment of kwashiorkor was recently published by Brock and his colleagues (1955) from South Africa, where a large trial was undertaken. Cases were treated simultaneously at Cape Town, Pretoria and Durban and the therapeutic substitutes for dried skimmed milk were tested. A control group treated with dried skimmed milk was also studied. Certain routine procedures were performed. In the first 12 to 24 hours all patients received an electrolytic solution with glucose (Darrow's or Hartman's) either by mouth or when indicated parenterally. In order to combat infection and diarrhoea, procaine penicillin and sulphadiazine were employed for the first week of treatment. The fluid intake was based on the formula of 2½ ozs. per pound

body weight each day. Brock and his colleagues stressed the importance of the degree of water and electrolytic imbalance in determining recovery. This has probably a far more immediate prognostic significance perhaps than has a protein deficiency.

Excluding the deaths occurring within 48 hours, Brock *et al.* obtained a death rate varying from 10 per cent. to 18 per cent. according to the different formulae employed.

- (1) With skimmed milk and vitamin supplement in 28 cases the death rate was 10 per cent.
- (2) With skimmed milk without vitamin supplement the death rate in 33 cases was 18 per cent.
- (3) Casein formulae with vitamin supplement in 44 cases the death rate was 18 per cent.
- (4) Casein formulae without vitamin supplement the death rate in 30 cases was 10 per cent.

The total mortality rate of the series, including 48-hour deaths, was 20 per cent. (27 cases out of 135). The significance of this study was the employment of electrolytes together with protein.

At this stage one might refer to the mortality figures (Gomez (1954) quoted by Galvin (1955)) from South America, where a similarly favourable outlook is found and where the overall mortality rate (including 48-hour deaths) was 23 per cent. in 1953, 21 per cent. in 1954 and 19 per cent. in 1955. Gomez is of the opinion that children do not require vitamins beyond those present in the diet, and like Brock he treats the electrolytic disturbances and any infections present. Forty-six per cent. of the deaths took place in the first 48 hours. Gomez finds that after a week's treatment the sick child begins to take an interest in his surroundings, and between the seventh and fourteenth days the oedema disappears and the skin lesions begin to clear.

From India too the results of protein therapy are most encouraging. Work there, showing a reduced death rate such as is reported from South America and Africa, has been done in Coonoor by the Nutrition Research Laboratories (1954). The mortality in 34 cases treated with skimmed milk alone was 6 per cent., and for 35 cases treated with vegetable protein 3 per cent. In another community from the same centre, Ventkatachalam *et al.* (1954) reports a mortality of 9.3 per cent. (including 48-hour deaths) in 207 cases treated with skimmed milk.

KWASHIORKOR IN SALISBURY

Many cases of kwashiorkor are admitted to the wards of the Native Hospital and, as a rule,

recognition of the typical form of the disease is easy. But there is a large ill-defined group with an incomplete clinical picture which should be included in the syndrome. We have labelled this group "partial kwashiorkor," bearing in mind that the term does not necessarily denote mild cases or those with a good prognosis. Admittedly a certain percentage are mild and recovery follows on even an ordinary hospital diet, but a great number are serious and many die. But the present study includes only cases in which the syndrome was typical. They were selected consecutively provided they conformed to the classical picture of kwashiorkor. The criteria of a typical case were the presence of desquamatus dermatosis, depigmentation, oedema and often diarrhoea and hair changes. Many of the infants were miserable and irritable, but some did not appear to be seriously ill.

The Salisbury cases, on the whole, conform more to the description given in South Africa, where maize too is the staple diet. Diarrhoea is one of the outstanding features in contrast to the cases seen in Uganda, where for no apparent reason it is an unusual finding, at least in a long-continued form (Trowell *et al.*, 1954). In fact, in most of the Salisbury cases the illness appears to be heralded by diarrhoea, after which the rash, oedema and other symptoms associated with the disease appear. Some of our cases are still on the breast when the diarrhoea commences, but the mothers then immediately stop suckling them, owing to the prevalent belief amongst them that the diarrhoea is caused by "bad milk." As a result, the breast milk is either greatly diminished or absent by the time the child is brought to hospital.

Despite the various methods employed in the last 12 years, our results on the whole have been disappointing, but since the introduction of skimmed dried milk and protein hydrolysates there has been a definite improvement. Some ten years ago the mortality was about 90 per cent. (Gelfand, 1946). To-day the recovery rate is definitely better. Our original treatment aimed largely at increasing the vitamins in the diet and at the same time eliminating maize. Later we added various nutritious items, but these attempts proved disappointing, and in the last few years we have directed our attention mainly to correcting the protein lack.

We noticed that a certain number died within the first few days of admission to hospital, whereas another group passed away suddenly in the second or third week and yet a third group

died after three or more weeks in hospital either from an intractable and severe diarrhoea or a broncho-pneumonia. Some of these cases, especially those with diarrhoea, were given glucose saline drip infusions. Antibiotics and sulpha drugs were also administered when indicated, but we remained unconvinced of their efficacy, although it must be admitted that they were not given to all cases or with such consistency as by Professor Brock and his colleagues. We were inclined to attribute our high mortality, in contrast to that reported from Uganda, South America and India, to our present overcrowded wards. We possess no adequate means of preventing cross-infection and we admit that such a risk is a real one here (but from our experience of most African hospitals, cross-infection appears to be unavoidable in the wards). The more experience we have with the disease, the more we appreciate the importance of the nurse in determining the chances of recovery.

During the last war there was an acute shortage of nurses, but this lack has been largely remedied. In the ward, where the cases are cared for, there is a European sister in charge with a fully trained African sister, as well as a number of reliable nursing female aids. We admit that if each one or two cases were given a special nurse to feed them and confine their attentions solely to them, the results would probably have been better.

For some time we experienced great difficulty in preventing the mothers from feeding their babies with additional items of food, such as maize. But we overcame this to a large extent by refusing the mothers admission to the wards or explaining to those admitted the importance of not giving their infants extra food. Mothers and visitors were instructed not to give these infants anything to eat and the sister to guard against this during visiting hours. To-day, in view of Dr. Dean's important observations that removal of the infant from the mother may seriously impair the psychological balance of the infant, we are less strict about refusing the admission of the mothers to hospital. Although most infants are admitted without their mothers, some mothers are allowed to remain with their children if they prefer it.

Such was the position reached in Salisbury in 1952 when we decided to introduce higher protein regimes than hitherto, at the same time limiting the fats and vitamin intake. We tried two such diets (A and B) and finally a treatment modelled on the Brock regime (1955).

PROCEDURE

In this paper we are reporting the results of the treatment of typical cases of kwashiorkor along the three lines of therapy.

- (1) Diet A regime.
- (2) Diet B regime.
- (3) A treatment modelled on the Brock regime (1955).

As mentioned earlier in the paper, the cases were studied consecutively, selected not according to their severity, but provided they fulfilled the criteria for a diagnosis of the syndrome. It might be added that most of our cases could be described as severe.

(1) Diet A

For the first three days the infant was put on 7 g. protein per kg. body weight a day (it was thus given 20 g. dried skimmed milk per kg. body weight). For the next four days he received 10 g. protein per kg. body weight from a rich source of protein (i.e., richer than dried skimmed milk and preferably at least 90 per cent. protein, such as soluble calcium caseinate).

After one week cooked or very ripe bananas were added to the foregoing diet—about 100 g. weighed without skim per kg. body weight. Vitamins were commenced at this stage. The proteolysates and dried milk were diluted not more than one part in six of water.

Subsequent diet.—If the appetite was good and the oedema diminishing, we gradually proceeded to a full round diet (but with reduced starch), giving at least 10 g. protein and 150 calories daily per kg. body weight.

Results.—We started this treatment in October, 1953, and continued it for about 15 months. All deaths within 48 hours were excluded from the series. Although 48 cases were treated, many absconded and thus we were reduced to 26 cases when considering results. Twenty (77 per cent.) died (nine within the first two weeks and the rest after that period) and six (23 per cent.) recovered.

(2) Diet B

The diet consisted of Casilan, dried skimmed milk, glucose and water in proportions according to the severity of the disease. There were four diets depending on those proportions and each amounting to 40 oz. (1,000 ml.) (see Table 1). The feeds for infants were made up twice daily—at 11 a.m. and 5 p.m. At 11 a.m. the 12 noon, 2 p.m. and 6 p.m. feeds were prepared, and at 5 p.m. those for 10 p.m., 6 a.m. and 9 a.m. (The 10 p.m. feed was given only when necessary.)

Each infant was given five feeds of 8 oz. over the 24 hours. To diet 2 bananas were added, to diet 3 dried bananas and rusks, and to diet 4 dried bananas, rusks, thin porridge and meat.

Results.—During 1955, 65 infants treated by this method were studied. All deaths within 48 hours were excluded. Twenty-five died (36.2 per cent.), 30 were discharged (43.5 per cent.) and 14 (20.3 per cent.) absconded. Apart from the patients who absconded, many of those discharged were removed from hospital against advice, and it is difficult to ascertain the true recovery rate.

(3) A Modified Brock Regime

We decided to retain Diet B as outlined in Table I, but in addition each child was given Darrow's solution by mouth (or parenterally when necessary), penicillin by injection and sulphaguanidine by mouth each day. For the first 24 hours, however, only Darrow's solution (2½ fluid ounces per lb. body weight) was allowed as well as penicillin and sulphaguanidine. In this regime we progressed from diet 1 to diet 4

be better if the children were treated with barrier nursing and more personal supervision for each individual case. We do not consider that our cases are seen too late, the mean duration of the illness before treatment is received being 6.6 weeks (Carr and Gelfand, 1956). Nor can we attribute them to inadequate feeding with protein in hospital, because in the series

Table I.—Diet B

Class	Casilan	Dried skimmed milk	Glucose	Water	Total over 24 hours
Class I (for very ill infant)	75 g. 3 ounces	25 g. 1 ounce	25 g. 1 ounce	880 g. 25 ozs.	1,000 ml. 40 ounces
Class II (for fairly ill case)	50 g. 2 ounces	50 g. 2 ounces	20 g. 1 ounce	880 g. 25 ozs.	1,000 ml. 40 ounces
Class III (for convalescence)	25 g. 1 ounce	75 g. 3 ounces	20 g. 1 ounce	880 g. 35 ozs.	1,000 ml. 40 ounces
Class IV (ready for discharge)	— —	100 g. 4 ounces	20 g. 1 ounce	880 g. 35 ozs.	1,000 ml. 40 ounces

N.B.—For easy working, 1 ounce equals 25 grams.

more quickly. The infant was started on diet 1 on the second day. After three or four days it was changed to diet 2, and diet 3 was continued during the second and third weeks. Diet 4 was reached by the third or fourth week.

Results.—Forty-two cases were treated by this method. Excluding deaths prior to 48 hours after admission, 21 died (50 per cent.). Although the death rate was still high we were impressed by the important fact that far fewer patients absconded under this treatment. It probably indicates that the mothers thought their babies were progressing favourably. Further, we noticed that the infants on the Brock regime showed greater and quicker clinical improvement as evidenced by a greater interest in their surroundings and less irritability. The general condition of the child appeared better than under Diets A and B regimes. On the other hand, we were disappointed because the oedema did not subside more quickly and because the treatment did not appear to prevent the onset of a severe gastro-enteritis.

CONCLUSIONS

Our results in the Salisbury African Hospital are poor as compared with those from other parts of the world where kwashiorkor is found. Not only is our mortality higher, but the infant takes longer to recover than appears to be the case elsewhere. He may linger for three or even more weeks, taking little interest in what is going on around him. In other cases, improvement is more rapid and in some instances the infant is sitting up by the second or third week. We cannot find a ready explanation for these differences. No doubt our results would

in which these were estimated the blood levels rose satisfactorily. And we cannot blame the presence or even the absence of the mother in the ward. In some cases the mother was present up to the time of death and in others she was absent from the time the child was admitted.

Although our series reveals a high death rate with the modified Brock treatment, we are favourably impressed with this line of therapy. We believe that protein therapy alone is not sufficient and that the addition of electrolytes, particularly potassium, is of undoubted value. The children, especially moderately severe cases, improve more quickly and pass out of the dangerous condition after seven to 14 days. The rash begins to disappear in several days, the oedema then subsides, and so at about the same time does the diarrhoea. Further, far fewer patients abscond than with the other treatments.

We are aware of the good results obtained elsewhere and find it difficult to explain our failures. It is difficult to compare results. Perhaps the Salisbury cases are more severe or there may be some other factor which we have not been able to discover. We consider the Brock regime the most promising line of treatment, although in our hands the severely ill case has so far proved refractory to this treatment.

SUMMARY

A series of typical cases of kwashiorkor were treated in the Salisbury African Hospital. Our results with a high protein diet were disappointing, but when this was combined with Darrow's solution, antibiotics and sulpha drugs the patients appeared to improve more rapidly, and although the death rate appeared higher, far fewer patients absconded, showing that their mothers were better pleased with this treatment.

We consider that there are other factors necessary to bring about a recovery in kwashiorkor besides a high protein diet, and many of these factors are as yet unknown as far as our cases are concerned. However, it does seem that there needs to be a reduction of carbohydrate in the diet and an addition of electrolytes, particularly potassium. Vitamins do not appear to be essential in the treatment.

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