

An Epidemic of Kwashiorkor in the South Kasai, Congo

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An outbreak of kwashiorkor of epidemic proportions occurred among Baluba refugees in the South Kasai in late 1960, and all degrees of severity of the disease were seen among both children and adults. Among the associated conditions were anaemia, malaria, dysentery and, in one child, smallpox. Marasmus was observed in only 3 % of hospitalized patients.

Rapid control of the emergency was made possible through the relief action of the United Nations and co-operating agencies. Except for those most severely affected, who required special fluid and antibiotic therapy, the treatment was mainly dietary (skim milk powder, starchy gruel, fish and palm oil). This treatment brought about a dramatic improvement in the clinical condition of hospitalized persons.

The author considers that, to achieve lasting improvement, a long-range educational programme in nutrition is required in addition to emergency control measures.

Between October and December 1960 an outbreak of kwashiorkor occurred in the South Kasai, in the former Belgian Congo. This outbreak reached epidemic proportions, affecting several thousand children and even some adults, and is, for this reason, unique. The social and political circumstances leading to this outbreak were determined by the inter-tribal warfare between the Lulus and Balubas which had broken out in July 1960 about the time when the Belgian administration left the Congo. About 150 000 Balubas had been forced to leave their homes in the north and west of Kasai province and arrived completely destitute and famished in the South Kasai, which they consider their homeland. Many of them had been on the road for weeks or months with very little food, and that of the poorest kind. The only food usually available to them was cassava. Although the Government of South Kasai had given some land to many of these refugees, they were not able to plant either early enough or in sufficient quantity the food for their needs; not infrequently they were too weak from their long, hungry migrations to do any planting to speak of. About half of the total had settled in an area north-west of Bakwanga, the capital; this area had been practically uninhabited because of poor soil and lack of water. The author arrived in

Bakwanga early in December 1960 and travelled through most of the territory of South Kasai. The picture which presented itself was one of great helplessness and suffering. The five regular hospitals in the area and several makeshift emergency "hospitals" were all overcrowded with hundreds of children of all ages, many of whom were in a critical condition due to severe protein-calorie malnutrition. The seriousness of the situation became more obvious when the woeful inadequacy of the most important item—namely, sufficient food of good quality and of a high protein content—became apparent. Such items as intravenous saline and glucose or plasma, lifesavers in patients with severe dehydration, were unobtainable. However, thanks to a most generous relief action organized through the United Nations Operation in the Congo with help from various other international agencies, supplies of food—dried skim milk, dried and canned fish, maize flour and rice—began to arrive by airlift from Léopoldville together with some medical supplies. This enabled the author to organize some sort of rational treatment for these hundreds of sufferers from protein-calorie malnutrition.

KWASHIORKOR

Severity

A scheme was devised dividing the children suffering from kwashiorkor into four groups according to

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TABLE 1
GROUPING OF KWASHIORKOR
ACCORDING TO SEVERITY

Sign	Group 1	Group 2	Group 3	Group 4
Changes of hair colour and shape	±	±	±	±
Oedema of feet and tibiae	+	++	++	+
Oedema of face and eyelids	-	+	+	-
Ascites	-	±	+	±
Skin changes:				
Depigmentation	-	-	+	+
Excoriations	-	-	+	+
Lack of subcutaneous fat	-	-	±	++
Atrophy of muscles:				
Shoulders and arms	-	-	±	++
Generalized	-	-	-	+

+ = Present. ++ = Marked. - = Absent. ± = Doubtful.

severity, in order to establish firm guide lines for treatment. Table 1 shows the principal signs found in the four groups.

This grouping comprises the whole spectrum of protein-calorie malnutrition from the children who appear relatively well nourished and in whom oedema is the only presenting sign ("sugar-baby" type) (Group 1) to the highly emaciated children with skin changes in addition to the oedema who had lost 40% or more of their "normal" weight (Group 4) (Fig. 1).

Treatment

The basic therapeutic diet used consisted of skim milk powder (minimum 60 g per day) most of which was reconstituted with boiled water, usually with sugar added (5%), at the ratio of 1 tablespoon of milk powder to 125 ml of water (13%). A child in Group 1 would receive four cups of reconstituted milk during 24 hours, usually either with the meal or between meals; if given between meals, the milk was accompanied by some starchy food (e.g., a gruel made from maize and cassava, which is the local staple, called *chima*) in order to avoid the use of the milk protein for energy. The two or three meals consisted of a starchy food (rice, *chima*) with a

protein food (usually fish, either canned or dried and salted), and some palm oil; and they provided an average of between 1700 and 2600 calories a day per child. A child in group 2 received more milk (6 cups) and a child in group 3 still more (8 cups). Some of this milk powder was not reconstituted, but used dry, usually mixed with banana, if available, or added to rice at the table. Since palm oil was plentiful we experimented by mixing the dry skim milk powder with palm oil at 15% and adding this enriched milk powder to rice at the table. This was well accepted and provided valuable provitamin A and calories. However, it proved impossible to add the palm oil to reconstituted skim milk as it separated shortly after it had been emulsified in a Waring blender.

The treatment of the children in the first three groups was essentially dietary. Children in Group 4, however, were usually in such a critical condition, owing either to dehydration as a consequence of severe diarrhoea or to the extreme weakness of marasmus, that they needed special treatment (i.e., fluids and antibiotics) until they were able to take full nourishment by mouth. Many times they had to be tube-fed until the anorexia usually present had subsided. As one would expect, mortality was highest in this group.

Between December 1960 and March 1961 the author visited the hospitals and dispensaries in the territory at least twice. Wherever possible he took a count of all the children hospitalized and did a screening examination for the presence or absence of kwashiorkor, marasmus or both. More than 2000 children were examined in this way—1133 during the first visit, 353 of them with kwashiorkor; and 1036 during the second visit, when 374 were seen with kwashiorkor.

Fig. 2 shows the percentage distribution of kwashiorkor patients in the four groups as found in eight hospitals on these two visits. The dramatic change which had taken place between the first visit in December 1960 and the second, in February-March 1961, is reflected in the histograms.

Age distribution

In one hospital (Miabe) it was possible to collect some information on the distribution by age of patients in December.¹ The following tabulation shows the number of patients in each group and their mean ages:

¹ This information was gathered by Dr J. McFee.

FIG. 1
CHILDREN WITH KWASHIORKOR OF GROUP 2 AND GROUP 3



From left to right: 2-3-year-old child in kwashiorkor Group 3; 12-year-old child in kwashiorkor Group 2; 10-11-year-old child in kwashiorkor Group 3.

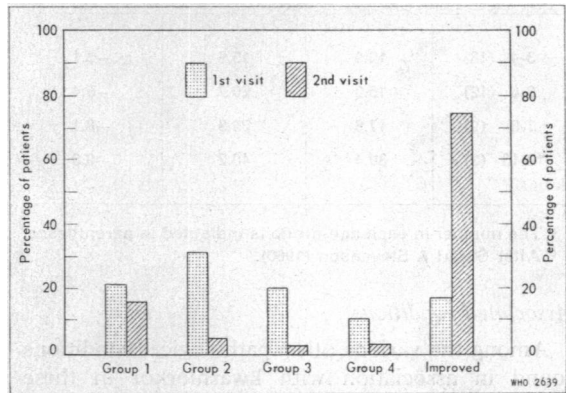
	No. of children	Mean age (years)
Group 1	17	3.6
Group 2	11	5.5
Group 3	7	6.0
Group 4	0	—

This age distribution may be considered as typical. It was observed in other hospitals that the more severe conditions occurred in older children.

Mortality

No reliable data exist on the *mortality* from kwashiorkor in this population of refugees. Data became available, however, from two hospitals: at the Bibanga Hospital (American Mission) two of a total of 22 admissions with kwashiorkor (9%) died during January 1961; at the Disele Hospital in Bakwanga (Compagnie Minière) 15% of a total of 113 admissions with kwashiorkor died during February.

FIG. 2
PERCENTAGE DISTRIBUTION OF KWASHIORKOR PATIENTS IN SOUTH KASAI ACCORDING TO DEGREE OF SEVERITY (MEAN OF 8 HOSPITALS)



^a The histograms for the "Improved" group refer to improvement in the condition of the children between the time of their hospitalization and the time they were seen by the author.

Weight

Serial observations over a period of four to five months became available for 97 children aged 1-14 years treated at the dispensary at Tchibata under the direction of a young Baluba girl who had taken a course in dietetics.¹ It was the only dispensary where records, including monthly weights, were kept in fairly satisfactory condition. Of these 97 children 25 were classified in Group 2, 70 in Group 3 and 2 in Group 4. There were 66 males and 31 females. Of the total, 45 were below 6 years of age, 35 in the group 6-11 years, and 17 in the group 12-14 years. Most of the ages, however, were estimated, as birth certificates were available in only a few instances.

The weight curves gave some indication of the effectiveness of the dietary treatment given. Out of the 97 children, 77% gained weight whereas 23% remained stationary or lost, if the weight at the last weighing in February-March 1961 was compared with that at the first weighing in November-December 1960. The great majority had lost weight at the second weighing in December as a result of the loss of oedema fluid. Table 2 shows the mean initial weights in four age-groups as compared with mean weights of North American children of the same age. It will be seen that the weight difference between the Congolese and North American children increases with age.

TABLE 2
WEIGHTS OF 97 BALUBA CHILDREN
WITH KWASHIORKOR, COMPARED WITH MEANS FOR
HEALTHY NORTH AMERICAN CHILDREN

Age-group ^a (years)	Mean initial weight of Balubas (kg)	Mean North American weights ^b (kg)	Difference be- tween Balubas and North Americans (kg)
3-4 (13)	12.5	15.6	-3.1
5-6 (12)	15.3	20.7	-5.4
7-8 (9)	17.8	25.9	-8.1
12-13 (8)	30.4	40.2	-9.8

^a The number in each age-group is indicated in parentheses.

^b After Stuart & Stevenson (1960).

Associated conditions

Among the various other pathological conditions found in association with kwashiorkor in these children, anaemia stands out as the most widespread.

Estimation of the presence of anaemia had to be based on inspection only (usually of the lower palpebral conjunctiva and the oral mucosa) since equipment, solutions and in most places personnel as well were inadequate to do a Sahli test. Some 52% of all the children thus examined (564) presented pale mucosae suggesting a moderately severe anaemia; in 9% the mucosae were white, and these children were considered to suffer from severe anaemia. In one hospital where Sahli tests were done the majority of the children showed haemoglobins of 50% or less.

Of the non-viral infectious diseases, the two most frequently observed in the kwashiorkor patients were malaria and the dysenteries. A rough estimate—based on the monthly reports from the Disele Hospital in Bakwanga, which has good diagnostic facilities and technicians—suggests that 10% of the

FIG. 3
KWASHIORKOR CHILD WITH SMALLPOX



¹ These data were collected by Dr M. Hasselmann.

FIG. 4

YOUNG WOMAN IN KWASHIORKOR GROUP 3 AND CHILDREN WITH KWASHIORKOR OF VARYING DEGREES OF SEVERITY



children had an active malaria infection, including cerebral malaria which ended fatally. Severe diarrhoeas, most likely of bacterial origin, were present in 20%, though most children when first seen had mild diarrhoea which responded quickly in most cases to dietary treatment alone.

Of the viral infections, smallpox (variola) was seen in 74 children, or 3.4% of the total. It was, however, seen only once in a child with kwashiorkor (Fig. 3); most of the children with smallpox were apparently in a good nutritional state.

Kwashiorkor in adults

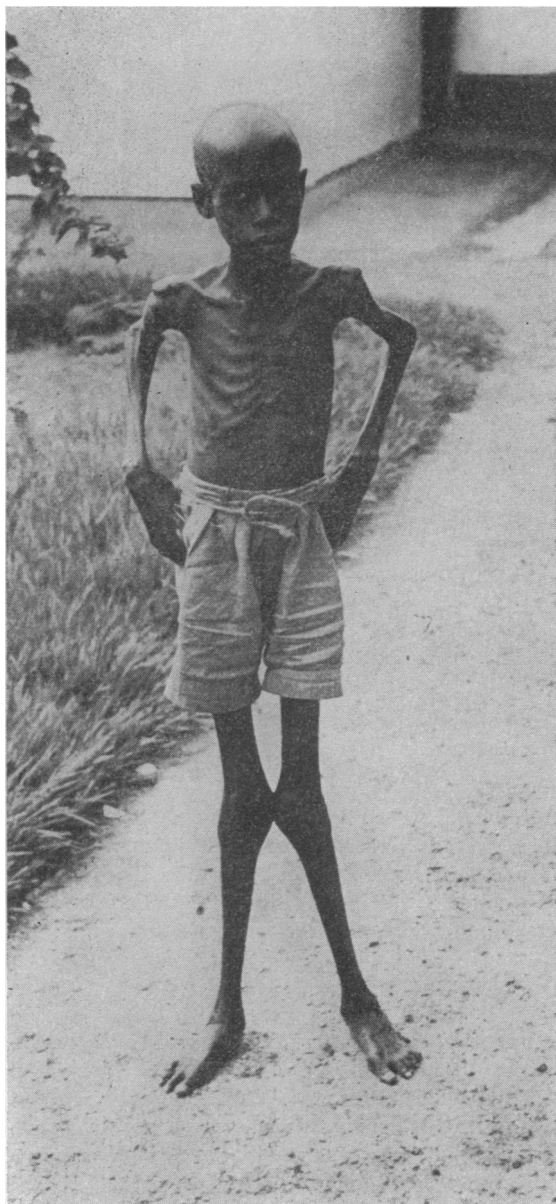
Typical kwashiorkor was also seen in adults. In December a total of 19 adults with oedema, changes of colour and texture of hair and skin and emaciation were observed (Fig. 4); four of these were severe (Groups 3 and 4). In March, 55 adults were found with some signs of kwashiorkor, of whom 52 had lost their oedema and were considered on the way to recovery. The proportion of males to females was 1 : 2. All ages were represented, but most of

the females were relatively young (20-34). Among these were several mothers with infants suffering from either kwashiorkor or marasmus. The response to treatment was usually slower in the adults. The great majority of them showed signs of anaemia.

MARASMUS

Pure marasmus (in contrast to marasmic kwashiorkor, usually Group 4), was found at the second visit in 30 children, or 2.9% of the total. This is about one-twelfth of the percentage of kwashiorkor found. Most of these marasmic children were very young; a few, however, were of school age (Fig. 5). The marasmic infants seen were typical: the infant starving at the dry breast of a mother who herself usually presented signs of severe malnutrition. Where the nursing mothers had managed to maintain a fair state of nutrition, the suckling infant was also usually in good condition, though one or several older brothers and sisters might be suffering from either kwashiorkor or marasmus.

FIG. 5
MARASMUS IN 10-YEAR-OLD BOY



DISCUSSION AND CONCLUSIONS

Division of the kwashiorkor patients into four groups according to severity was done mainly to give the Congolese medical assistants, nurses and auxiliaries a guide for applying the dietary and other therapeutic measures as outlined above. It has proved its

value in the circumstances found in the South Kasai in December 1960. In different circumstances modifications would be necessary. Dean (1960) differentiates only three groups: his "slight" group corresponds in most features to the author's Group 1, his "moderate" group to the author's Group 3 and his "severe" group to the author's Group 4, except for the one big difference that in the South Kasai children the subcutaneous fat was not usually well retained.

The therapeutic diet used was composed of the foods available in hospitals and dispensaries and supplied through the United Nations relief action. It was not a good diet as a cure for kwashiorkor, but it was the best diet possible under the circumstances. It supplied an average of 2-3 g of protein per kg of body-weight, and this was apparently enough to replenish depleted protein stores in most cases, as witnessed by the loss of oedema usually within two weeks and gain in weight and strength thereafter. Whenever children were found with persistent oedema beyond two weeks and with a stationary weight after the oedema had disappeared, their condition was more often than not traced to inadequate feeding. This was due either to lack of adequate supplies or to ignorance (and sometimes indifference), or to both.

The finding that the clinical picture was often more severe in the older children is perhaps unexpected, since the younger child, with relatively higher protein requirements, is usually considered more vulnerable.

Mortality figures reported from the two hospitals mentioned must be considered rather low, considering that in at least one centre, Disele, usually only children in Groups 3 and 4 were hospitalized. Comparative figures known to the author from West Africa show a mortality as high as 40% for one large hospital.

Although the comparison between the mean weights of acutely ill children in four age-groups in Tchibata and of healthy North American children of similar age cannot be considered valid, the fact that the older children showed a larger weight deficit may again be a reflection of the greater severity of the malnutrition in the older children.

The fact that anaemia is frequently associated with kwashiorkor has been reported by various authors (Cravioto et al., 1953; Adams, 1954; Trowell et al., 1954). It is usually of the microcytic, hypochromic type and often responds to a good diet alone. Unfortunately, it was not possible to do any investigations in order to define either the anaemia present

in over 50% of the cases, or to follow its course. In the consideration of etiological factors, however, the presence of such infections as malaria must be taken into account.

It was gratifying to see the great majority of the mild to moderate diarrhoeas present at the beginning disappear within a few days of dietary treatment. This suggests that most of these diarrhoeas were of nutritional origin due to lack of enzyme production in the intestinal tract (Gomez et al., 1953).

The observation that smallpox—a virus disease—and kwashiorkor appear to be almost mutually exclusive deserves further investigation. It is entirely in line with observations reported during epidemics of poliomyelitis—another virus disease—where the well-nourished child is also usually stricken. Scrimshaw et al. (1959), in their review of the literature on nutrition and infection, suggest that virus infections may behave differently from most other infections in relation to the nutritional status of the host. Whereas bacterial and parasitic infections are usually synergistic with malnutrition, virus diseases seem to be antagonistic, i.e., they attack the well-nourished rather than the malnourished.

That kwashiorkor occurs in the adult also shows that it is not necessarily a disease of the growing child, although the latter is certainly much more susceptible owing to his relatively greater requirements for protein of high biological value. It is understandable that women of child-bearing age are more frequently affected than men of any age, because of the former's greater requirements during pregnancy and lactation. In addition, it should not be forgotten that in the Central African cultures it is usually the woman who does the heavy work, such as planting and harvesting, besides her domestic duties.

The proportion of marasmus to kwashiorkor differs markedly from that reported by Rao et al. (1959) in South India. The two situations, however, are not comparable: whereas in the Congo a sudden shortage of almost all foods except cassava hit the people while they were forced to flee for their lives, the situation in South India was the "normal" one of chronic shortage of food due to poverty and low productivity in an area which is relatively overpopulated. Though much less frequent, marasmus is by no means the less severe problem; the treatment is very similar in both conditions, although as a rule the patients with marasmus respond much more slowly.

Rapid control of this emergency was possible only as a result of the relief action of the United Nations and the co-operating agencies. It is clear that, in addition to continuation of control measures of a more or less emergency nature, a long-range educational programme in nutrition of mothers through the health and agricultural extension services needs to be planned and started as soon as the political conditions have become sufficiently stabilized. A beginning has been made by two FAO nutritionists, who arrived in March 1961 and started a training programme with local young men and women of the Junior Red Cross. After finishing the course, these young people were sent to hospitals and dispensaries where they were most needed to help with the feeding of the sick children. However, owing to the unstable situation in May 1961, international personnel had to be withdrawn from the South Kasai and to date only two WHO physicians have returned there. It is hoped that at least one of the FAO nutritionists will also be able to return to continue her extremely useful work.

RÉSUMÉ

Une poussée de kwashiorkor, qui prit l'allure d'une épidémie, a été observée en décembre 1960 dans une population de réfugiés du Sud Kasai: 31% des enfants, lors de la première visite, et 36% lors de la deuxième, présentaient des signes de gravité variable. Chez 50% de 564 enfants, on relevait des symptômes d'anémie, modérée ou grave. Le paludisme affectait environ 20% des enfants atteints de kwashiorkor, et la diarrhée grave, 20%. La variole a été diagnostiquée chez 3,4% des enfants, mais chez un seul de ceux qui étaient atteints de kwashiorkor.

Les adultes n'en étaient pas exempts. Le kwashiorkor affectait un nombre de jeunes femmes double de celui des hommes de tous âges. L'anémie existait chez la plupart des adultes des deux sexes.

L'intervention rapide de secours des Nations Unies et d'autres organismes a permis d'améliorer la situation par la fourniture d'aliments, envoyés par avion, entre le 15 décembre 1960 et le 20 janvier 1961. Outre ces mesures d'urgence, il faut prévoir une action à long terme d'éducation des mères en matière d'alimentation, entreprise par les services sanitaires et agricoles. Un début d'activité dans ce sens a été organisé sous la forme d'un cours s'adressant aux jeunes gens et jeunes filles affiliés à la Croix-Rouge, qui furent ensuite envoyés dans les dispensaires et hôpitaux pour s'y occuper de l'alimentation des enfants malades.

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