ORIGINAL ARTICLE

The Preschool Child in Suka Village, North Sumatera. I. Feeding Practices and Measured food Intake

by

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Abstract

Childfeeding practices were recorded for 398 children, age 0 - 5 years. Breastfeeding was continued for about 2 years.

Supplementary food during infancy consisted mainly of rice in the form of gruels or porridge. After one year of age fish was introduced, at 2 years children were given part of the family diet composed of rice, fish and some vegetables mainly of the non-leafy type.

In 2 seasons food consumption of 59 children, age 1 - 5 years was weighed.

The habitual diet was somewhat low in energy (65 - 98% of RDI), ample in protein (108 - 158% of RDI) but inadequate in calcium (36 - 86% of RDI), iron (44 - 48% of RDI), retinol equivalents (26 - 44% of RDI) and riboflavin (34 - 41% of RDI).

The inadequacy of the diet was mainly due to improper use of available foods, cultural habits and permissiveness of the mother towards the child. In this village nutrition and health education as well as a better childcare can make a contribution to the diversification and improvement of the preschool child's diet.

Compared with dietary intakes of preschool children on Java, the Suka diet was superior to the Javanese diet in energy and protein, similarly inferior in fat, calcium, riboflavin and retinol equivalents.

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Introduction

Studies in developing countries suggest that growth rates and ultimate stature achieved by children are a function of their environment. Genetic potentials are generally masked by unfavourable external factors (Djumadias, 1976; Habicht et al., 1974).

Inadequate food consumption and infectious diseases are most commonly responsible for faltering of growth and malnutrition among young children. The few studies and surveys of food intake in Java show that the majority of children in the vulnerable preschool years consumed diets which were inadequate in energy and most nutrients, the deficit in energy being larger than that in protein (Blankhart, 1962; Blankhart, 1967; Karyadi et al., 1971; Bernardo et al., 1972; Prawiranegara et al., 1972; Kardjati et al., 1978; Husaini and Karyadi, 1980). The children studied belonged to low income families from rural areas where presumably environmental sanitation was unsatisfactory. Limited food availability apart from traditional childfeeding practices, affected the quality and quantity of the food given to those children.

We had the opportunity to study feeding practices and food consumption of preschool children living in the same poor environmental conditions as in Java, but who belonged to families who produced sufficient food for home consumption and had a cash income large enough to cover basic needs.

The prospective study was conducted in the period July 1976 — August 1977 as part of the joint project of the University of North Sumatra, Medan (Dept. of Biochemistry) and the University of Amsterdam (Department of Medical Enzymology). The central objective of the investigation was to determine the duration of prevention against hypovitaminosis A by one oral dose of 300.000 IU vitamin A (Kusin et al., 1980).

At 3-monthly intervals children were examined clinically, fresh stool specimens were analyzed on the presence of parasite ova and protozoa, blood specimens were collected for analysis of protein and vitamin A status. Anthropometric measurements were scheduled at monthly (weight, height) and 6-monthly intervals (upper arm circumference and skinfolds).

A dietary history was taken at the start of the study. Food consumption was measured separately. In this article only the dietary aspects of the study are reported.

Background Information

Suka is a typical village in the Karo highlands, about 100 km south of Medan and about 25 km north east of Lake Toba.

Dwellings were clustered along 2 unpaved streets. About 90% of the houses were constructed of wood and bricks with thatch roofing. Kitchen, living and sleeping quarters were often in the same room.

Environmental sanitation was a serious problem. Only 6 of the about 500 houses in the village had a latrine. Garbage was discarded in the yard; chicken and pigs roam freely. Drinking water was connected from 2 springs where people also bathed and did their laundry.

According to the census in May 1976 the village was inhabited by a homogenous Karo Batak population of 2515 people who were predominantly Christians. The majority of the families (49%) had 1 - 3 children.

Surprising for a rural population was the great emphasis put on education. Only 13% of mothers and 4% of fathers never went to school, 20% of the parents had attended secondary school. For children school enrolment was allmost complete (95%).

Agriculture and horticulture were the the main means of living. The majority of the families were self-sufficient in rice, harvested February and July. Maize and vegetables were cultivated intermittently and formed important cash crops. The latter include tomatoes, chillies, carrots, cabbage, chinese cabbage ("sawi", "sayur pahit"), string beans ("buncis"), eggplant ("terong") and amaranth ("bayam").

In this ethnic group the mother was the central figure of the household. She was not only in charge of household duties and child care but also of most agricultural activities,
buying of products in the markets. A women's typical day starts at 5.30 a.m. and ends between 8.00 - 10.00
For this period
children of 2 years and over was the responsibility of older siblings or the grandmother. Only infants and young toddlers, who can still be carried by the mother, accompanied her to the field. Men were only engaged in work requiring extra physical effort such as ploughing, harvesting and house building. As such activities were seasonal, men were frequently seen in coffeeshops playing chess or chatting.

Traditionally 3 meals were taken a day. The morning and evening meals were usually consumed together by all family members. Part of the food cooked in the morning was used for lunch which women ate in the fields, men and children at any time in the afternoon at home.

Material and methods

Families with children, age 0 - 5 years were included in the prospective study. Childfeeding practices were recorded by interview
recall method for types of foods eaten) and by observation during home visits. In a subsample of preschool children food consumption was determined by the weighment method on two non-consecutive days of the week in 2 seasons viz. March-April 1977 (2 months after the rice harvest) and July - August 1977 (during the rice harvest).

For the first period 59 children, age 1 - 4 years were chosen at random from

the total number of children in the respective age group. In the second period in 39 of the same children and in 13 of their older siblings food weighment was repeated.

Two assistant nutritionists were in charge of the study in the first period (March-April 1977), one assistant nutritionist and a nurse in the second period (July-August 1977). They were trained and supervised by the nutritionist (K.P.) or medical nutritionist (JAK).

The procedures were adapted to the activity early in the mothers. They cooked early in the morning, around 6:00 a.m. and late in the evening around 7.00 p.m., after they returned from the fields, bathed and fetched water. Foods were weighed raw and cooked. The amount given to the child and the leftovers were weighed at the time of eating during the morning and evening meal. The food meant for the child's lunch was put in a separate container in the morning and weighed. Leftovers were weighed in the evening at dinner time. Snacks, if any, were recorded at the end of the day and the approximate amount was weighed afterwards. No problems were encountered during the food weighments and it is unlikely that results are biased. There was no need to impress the enumerators and there was no chance to fool them as they were known to the community.

The energy and nutrients intakes were calculated, using the Indonesian Food Composition Table.

Results

Child feeding practices

As in most rural areas in Indonesia infants were put to the breast after birth and breastfeeding was continued for about 2 years. At the end of the first year almost all infants were still breastfed. Thereafter the percentage of children nursed dropped gradually, 88% at age 12 - 17 months, 76% at age 18 - 23 months and 14% at age 24 - 35 months. Exclusive breastfeeding was practiced by the majority of the mothers during the first 5 months (Table 1).

Few mothers supplemented her own milk with fresh cow's milk or milk formulae. The first was not available, the second was considered too expensive. The first suplementary food given to the infant was almost exclusively rice in different consistencies. In general during infancy few other food items were given, because they were regarded as unsuitable at such a young age. After one year of age the daily menu became more varied, but only after 2 years of age children were given the family diet.

Food consumption (recorded by the weighment method)

It should be mentioned that breastmilk intake was not included in this study. The results of food intake of breastfed children thus only refer to the additional foods given.

Rice and fish were the main components of the family diets eaten with a

"sayur". The latter was composed of vegetables without commercial value such as bottlegourd ("Jipang", "labu"), potatoes, yam ("tales"), unripe papaya and jackfruit ("nangka muda"), cassava and bottlegourd leaves, to which onions, sometimes tomatoes and coconut milk ("santan") was added. Pulses, meat eggs and fruit were included irregularly. In general children received the same food as eaten by adults when they were 2 years or older. Unfortunately leafy vegetables were not appreciated by children. They were usually picked out and left on the plate.

The mean daily intake of foods in grammes for the 2 seasons combined is presented in Table 2. Wide variations were found in the individual child's intakes. The figures may, therefore, be misleading. The distribution according to classes in amounts consumed, such as shown in Table 3 gives a better impression of the habitual diets of children.

On average children of one year ate 183 g rice (raw weight), 13 g of fish and 22 g of vegetables per day.. Children of 2 - 3 years consumed about 270 g rice per day, children of 4 - 5 years about 315 g. The range of fish consumption at 2 - 5 years age was 22 - 32 g, of vegetable consumption 33 - 37 g per day. The vegetables were mainly of the non-leafy type.

The mean energy and selected nutrients intakes per day according to season are shown in Table 4. There was a marked increase between one and 2 years of age except for retinol equivalents, and a more gradual increase in energy and most nutrients in the age period 2 - 5 years, indicating the change in type of diet at 2 years of age (Table 2).

The seasonal differences in energy and nutrients intake were visible at each year of age, except for retinol equivalents. Compared to the period March - April, the intakes in July-August were lower viz. 11 - 24% for energy 9 - 14% for protein, 13 - 37% for fat, 8 - 20% for calcium, 16 - 26% for iron and 9 - 29% for riboflavin with some exceptions.

Expressed per kg body weight, preschool children received 82 - 107 kcal and 2.5 - 3.0 g protein per day (Table 5). It is interesting to note that breastfed children got less food than that non-breastfed age mates. Taking the recommended daily intake for Indonesia (Djumadias et al., 1978) as a yardstick, the diet of preschool children in Suka appeared to be slightly low in energy, more than adequate in protein, low in calcium and iron but grossly inadequate in retinol equivalents and riboflavin (Fig. 1). Fish was an important source of protein, but also of calcium and iron. The poor consumption of leafy vegetables and pulses was the reason for such low intakes of retinol equivalents and riboflavin.

Compared with energy and nutrients intakes of preschool children in Java, the Suka age mates had higher intakes of energy and protein, an equally low

intake in fat, iron and retinol equivalents (Table 6).

The much better intake of energy and protein was due to a larger consumption of rice and fish. Iron in our children was mainly derived from these 2 food items as well and not from leafy vegetables as these were irregularly eaten and if consumed, the amouts were small. Apparently the consumption of leafy vegetables by Suka children was similar to that of Javanese children having rice as staple food. Madura is an exception as yellow maize formed a good part of the staple food.

Discussion

For infants and young children the best form of feeding to prevent malnutrition and diarrhoeal disease is exclusive breastfeeding for 4 - 6 months, followed by semi-solid "multimixes" of locally available foods, preferably with continuing lactation (WHO/Unicef, 1979). As far as breastfeeding practices are concerned, those in Suka were in line with these recommendations. Mothers were no yet influenced by the "modern" trend away from the breast although they lived just 10 km from town.

The duration of breastfeeding was similar to that in rural East Java (Kardjati et al., 1978) and other provinces (Tan et al., 1970) but longer when compared with that of urban mothers in Jakarta (Suradi et al., 1980).

Additional food was introduced later in Suka, between 2 - 5 months of age than for instance in East Java where it was given to infants in the first week. The reason for this observation needs further clarification.

The data collected clearly show that the primary bottleneck in childfeeding also in Suka, was the type of supplementary food, particularly for infants who were given rice only. After one year of age the habitual diet provided ample amounts of protein but it was low in energy and inadequate in vitamins and minerals. It is obvious that an increase in energy intake can only be a higher fat consumption and not by a larger amont of the bulky diet. Although there is no need to stress protein-rich foods such as pulses, some amount of these is necessary as a source of B-vitamins such as riboflavin. However, pulses were not popular and its products "tahu" and "tempe" not so well-known as in Java. Leafy vegetables were regularly eaten by adults but disliked by children. Papaya, a good source of beta-carotene, grew very well in the village. Unfortunately, it is more often fed to pigs than consumed by humans.

Two other observations are worth mentioning. First, breastfed toddlers received less food apart from breastmilk than the non-breastfed age mates. Mothers believed that the child does not need much additional food as long as it is breastfed. Second, during the harvest season food intake was lower. This mainly caused by the fact that mothers came home late in the evening. By the time dinner was prepared, around 9.00 -

10.00 p.m., young children were too sleepy and fretful to eat.

In Suka, the inadequacy of the diet was thus not due to lack of foods but to improper use of available foods, cultural habits and permissiveness of the mother towards the child as well as neglect of the young child due to the mother's working pattern. Nutrition education should stress the need for a balanced diet in proper amounts; health education should primarily focus on improvement of environmental sanitation.

However, in this village (and the region) the lack of child care is difficult to overcome unless fathers take a greater part in the income generating daily activities to relieve the mothers.

Compared to preschool child diets in Java, that in Suka was certainly superior with regard to energy and protein. The lower socio-economic status of families in Java is most probably the reason for the difference observed. On the other hand, the vitamin and mineral intakes were just as low in both areas due to the low priority of side dishes in a child's diet.

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TABLE 1 : *Breastfeeding pattern of children age 0 - 5 years (precentages).*

Age group in months	N	Excl. BF	Mixed	Weaned
0 — 1	5	80	20	—
2 — 5	22	68	28	4
6 — 11	39	34	66	—
12 — 17	33	3	85	12
18 — 23	37	—	75	25
24 — 29	58	—	16	84
30 — 35	15	—	7	93
36 — 41	70	—	1	99
42 — 72	119	—	—	100

TABLE 2: *Food intake of children 1-5 years in grammens of food per day: seasons combined (mean of all consumption days, median and range).*

Food item	Age:	1 year	2 years	3 years	4 years	5 years
	Number:	N = 48	N = 50	N = 78	N = 28	N = 15
Rice	Mean	183	260	275	313	320
	Median	173	245	270	295	317
	Range	50 — 360	138 — 480	120 — 557	205 — 565	184 — 465
Fish	Mean	13	21	24	22	32
	Median	12	18	22	20	21
	Range	0 — 37	0 — 66	0 — 27	0 — 82	19 — 53
Vegetables	Mean	22	37	33	33	39
	Median	15	25	25	20	21
	Range	0 — 120	0 — 240	0 — 151	0 — 140	0 — 140
Roots, tubers	Mean	8	27	15	17	11
	Range	0 — 60	0 — 340	0 — 140	0 — 172	11 — 100
Pulses & its products	Mean	4	5	8	6	9
	Range	0 — 88	0 — 110	0 — 148	0 — 118	0 — 70
Meat	Mean	—	1	1	1	2
	Range		0 — 35	0 — 30	0 — 15	2 — 18
Eggs	Mean	3	%	2	7	—
	Range	0 — 47	0 — 16	0 — 50	0 — 60	—
Fruits	Mean	8	9	15	7	12
	Range	0 — 100	0 — 90	0 — 130	0 — 120	0 — 124
Sugar	Mean	6	5	6	1	—
	Range	0 — 53	0 — 26	0 — 56	0 — 19	—
Fats	Mean	%	%	%	1	%
	Range	0 — 5	0 — 10	0 — 10	0 — 20	0 — 4
Miscell.	Mean	4	8	1	14	—
	Range	0 — 100	0 — 120	0 — 100	0 — 200	—

N = number of consumption days

% = less than 0.5 grammes

TABLE 3 : *Amount of foods consumed according to classes, seasons combined; Percentage frequency distribution.*

Food item	Raw weight, g	Age in years			
		1 (48)	2 (50)	3 (78)	4—5 (43)
Rice	less than 100	8	—	—	—
	100—	48	24	14	2
	200—	38	44	44	47
	300—	6	28	35	35
	400—	—	4	8	16
Fish	0	25	4	12	12
	less than 10	19	6	6	2
	10—	23	40	23	19
	20—	23	26	29	28
	30—	10	18	14	30
	40—	—	6	15	9
Vegetables	0	31	22	24	21
	less than 25	36	26	23	33
	25—	21	26	29	21
	50—	6	12	9	9
	75—	6	14	14	16
Pulses	0	94	82	78	86
	less than 25	2	12	9	5
	25—	—	4	8	5
	50—	4	2	5	5
Meat-eggs	0	81	78	90	84
	less than 10	2	8	1	2
	10—	4	12	3	5
	20—	12	2	6	9
Roots, tubers	0	90	86	78	86
	less than 25	—	2	3	2
	25—	—	—	4	5
	50—	10	12	15	7

Between parentheses number of consumption days.

TABLE 4: *Energy and nutrient intake per day, children 0 - 5 years, exclusive breastmilk.*

Age in years	N	Kcl mean	Kcl S.D.	Protein (g) mean	Protein (g) S.D.	Fat (g) mean	Fat (g) S.D.	Calcium (mg) mean	Calcium (mg) S.D.	Iron (mg) mean	Iron (mg) S.D.	Vit. A (ug) mean	Vit. A (ug) S.D.	Bcarotene (ug) mean	Bcarotene (ug) S.D.	Vit. B_2 (mg) mean	Vit. B_2 (mg) S.D.
March/ April																	
1 year	30	779	329	20.6	8.3	3.6	2.0	143	124	4.2	2.6	22	55	448	864	0.21	0.12
2 years	32	1181	329	32.2	9.0	5.7	4.1	237	231	6.1	2.6	5	14	332	676	0.27	0.09
3 years	46	1241	279	36.1	10.4	6.4	3.7	317	267	7.5	3.8	26	116	309	374	0.25	0.07
4 years	10	1390	424	39.3	11.5	5.5	2.5	290	229	8.3	3.3	30	95	514	373	0.30	0.11
July/Aug.																	
1 year	18	690	165	23.1	8.1	3.0	1.4	243	245	4.6	2.5	1	2	321	820	0.15	0.06
2 years	18	897	192	28.0	7.7	3.6	1.1	217	280	5.1	2.6	1	2	439	392	0.20	0.06
3 years	32	1020	252	32.9	9.7	5.6	5.0	347	333	6.8	3.4	9	39	973	1711	0.26	0.10
4 years	18	1198	232	33.9	7.5	6.9	0.7	231	275	6.1	2.4	42	94	559	866	0.27	0.07
5 years	15	1286	319	41.6	7.5	5.8	2.3	433	285	8.4	2.4	1	2	768	1797	0.28	0.11
Seasons combined																	
1 year	48	758	281	21.6	8.1	3.3	1.8	181	183	4.4	2.6	14	44	400	841	0.19	0.10
2 years	50	1079	317	30.7	8.7	4.9	3.5	230	247	5.8	2.7	4	12	370	587	0.25	0.09
3 years	78	1135	308	34.8	10.2	6.1	4.3	329	294	7.2	3.6	19	92	581	1170	0.25	0.08
4 years	28	1266	316	35.8	9.3	6.4	5.7	525	257	6.9	2.9	40	93	543	720	0.28	0.10

N = absolute number of consumption days.

FIG 1 : *Mean Energy and Nutrient intake per day as percentage of recommended daily intake exclusive breastmilk*

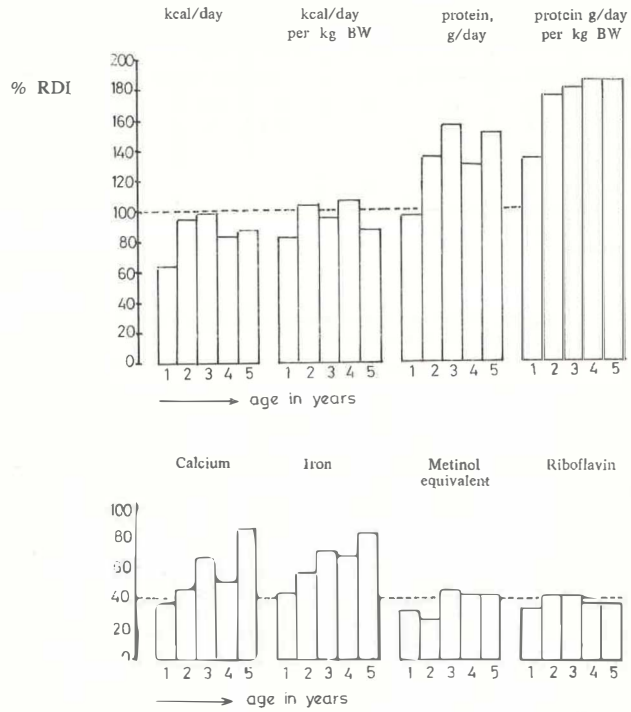

TABLE 5: *Average daily energy and protein intake per kg body weight: exclusive breast-milk (seasons combined)*

Age in years	N	Energy (Kcal)			Protein (g)		
		BF	Not BF	Total	BF	Not BF	Total
1	48	83	93	86	2.4	2.6	2.5
2	50	86	115	107	2.4	3.3	3.0
3	78		96			2.9	
4	28		97			2.8	
5	15		82			2.7	

N = number of consumption days
BF = breastfed

TABLE 6: *Average daily energy and protein intake of preschool children in some areas in Java and in Suka, north Sumatra*

Location	1 — 3 years			4 — 5 years		
	N	Kcal	Protein, g	N	Kcal	Protein, g
Bogor (ref. 8)	37	667	19	19	905	26
Bogor (ref. 11)	26	725	19	18	1015	26
Bogor (ref. 1)	42	736	16	38	1218	38
Sukabumi (ref. 7)	43	817	20	32	953	25
Sidoarjo * (ref. 9)	112	750	24	81	830	22
Madura * (ref. 9)	509	700	17	345	940	24
Suka (this study)	88	1005	30	23	1273	38
Recommended daily intake (ref. 3)		1160	22		1450	27

N = number of children

* = median intake, non-breastfed children