Rev. Saúde públ., S. Paulo
14:300-9, 1980

NUTRITIONAL STATUS OF CHILDREN, INMATES OF A SMALL INSTITUTION FOR HOMELESS CHILDREN IN THE CAPITAL OF THE STATE OF S. PAULO, BRAZIL

Donald Wilson *
Maria José Roncada *
Rosa Nilda Mazzilli *
Maria Lucia F. Cavalcanti *
† Dino B. G. Pattoli **

RSPUB9/510

WILSON, D. et al. *Estado nutricional de crianças internadas em um pequeno orfanato particular na capital do Estado de São Paulo, Brasil.* **Rev. Saúde públ.**, *S. Paulo*, **14**:300-9, 1980.

RESUMO: *Foram realizados, em um pequeno orfanato, inquéritos nutricionais (alimentar, clínico e bioquímico) cujos resultados mostraram que 30% das crianças tinham ingestão inadequada de calorias, metade ingestão inadequada de cálcio e todas ingestão adequada de proteínas. A manipulação, o processamento e a distribuição dos alimentos eram inadequados e o desperdício era alto. Mais da metade das crianças apresentaram peso abaixo dos padrões, mas a maioria estava acima de 90% para altura, segundo idade. A medida da prega cutânea revelou apenas uma criança obesa. Com relação à vitamina A, a maioria das crianças revelou sinais clínicos atribuíveis à hipovitaminose A, predominantemente sinais cutâneos. Cerca de metade dos examinados revelou sinais de arriboflavinose. Foi baixo o número de crianças que apresentaram sinais clínicos de carência de proteína, ferro e ácido ascórbico. Os dados bioquímicos revelaram que 63,6% das crianças apresentavam níveis séricos abaixo do normal, enquanto que todas apresentaram excreção normal de riboflavina. Com relação à anemia, apenas 4 crianças apresentaram hematócrito abaixo do normal mas todas apresentaram níveis normais de hemoglobina. Os exames de fezes mostraram coeficientes altos para protozoários e* Hymenolepis nana, *um dos mais altos da literatura brasileira.*

UNITERMOS: *Inquéritos nutricionais. Criança, nutrição. Dieta. Dieta de proteínas. Dieta de cálcio.*

INTRODUCTION

One of the major problems in the State of São Paulo, Brazil, is the homeless child. Besides those who actually do not have a home, there is a much larger number of children who only apparently have one. Attention to these children is a very complex problem and government institutions, although the best is done, can only

* From Department of Nutrition, School of Public Health, University of S. Paulo. Av. Dr. Arnaldo, 715 — 01255 — São Paulo, SP — Brazil.
** From Department of Epidemiology, School of Public Health, University of S. Paulo.

cover a part of these children. Private institutions cover another part; these are charity institutions, mostly run by religious groups. Most private institutions are small but numerous so they afford coverage to a significant number of homeless children. Nutritional status of institutionalized children is also a very complex matter, for most of them reach the institution already severely malnourished, on the one hand, and litlle is known about what furnished is in such institutions, on the other.

In order to contribute to the knowledge on nutritional aspects of children from small institutions, the present study was planned. A small private institution was selected and a comprehensive study of nutritional conditions was conducted. Data obtained can not be generalized to all such institutions but we have reason to believe that many operate under similar conditions.

POPULATION

The study was carried out on the inmates of a small charity institution for homeless children directed by a group of volunteers; the person in charge of the children, known as "the mother" is helped by 5 employees (1 cook, 1 washerwoman and 3 housemaids) all of which of low educational level. There are 27 inmates, all males, with ages varying between 1 and 13 years of age. School age children are enroled in governmental schools and of the pre-school age children 5 are enroled in private schools. Table 1 shows age distribution of the children.

METHODOLOGY

In order to attain the objectives of this study the following surveys were performed including, as far as possible, all inmates: food consumption, clinical, biochemical and parasitological. The methodology of each survey will be presented separately.

TABLE 1

Age distribution of the inmates of the institution under study. S. Paulo, Brazil, 1978.

Age groups (years)	Frequency	
	N.	%
1 |—— 3	2	7.3
3 |—— 6	11	40.8
6 |—— 9	3	11.1
9 |—— 14	11	40.8
Total	27	100.0

Food consumption survey

Individual food consumption was obtained weighing food as it was served and weighing leftovers every one of seven days and at each meal. The average daily consumption of each child was analysed in terms of calories and nutrients, the determination of which was accomplished by the use of a table of chemical composition of food* to estimate adequacy of diet; data were related to values encountered in Recommended Daily Dietary Allowances of the Nutritional Research Council [5]. In order to obtain data on food handling procedures, two nutritionists remained on the premises all day long. Quantities were registered on a form specially prepared for the occasion. Gross and net weight of foodstuffs were registered in order to estimate wastage.

Criteria:

Calory adequacy: 100% of Recommended Daily Dietary Allowances (RDA).

Nutrient adequacy: 80% of RDA or more. To allow a better analyses of data concerning nutrient adequacy, results were grouped as follows:

* Table of food composition compiled by the Department of Nutrition, School of Public Health, University of S. Paulo.

%
0 |—— 60
60 |—— 80
80 and over

Clinical Survey

All subjects were submitted to clinical examination regarding clinical signs of deficiency disease. If signs of diseases other than deficiency disease were apparent they were duly recorded. A special form prepared by the Department of Nutritition was used for recording data. Anthropometric data was also recorded: height, weigth, arm circumference and skinfold thickness. For height, weight and arm circumference a inextensible tape was used. For skinfold thickness a Lange Skinfold Caliper was employed. Eye examinations were performed with the aid of a Rose Bengal 1% colirium with previous administration of an isotonic anaesthetic colirium.

Biochemical survey

Determinations:

The following determinations were carried out:

- Riboflavin in urine (daily specimens)[11];
- Vitamina A and carotene in plasma [11];
- Proteins (total and electrophoresis on cellulose acetate) in blood [11];
- Haemoglobin [11,12];
- Packed blood cell volume[11];
- Creatinine in urine [11]

Criteria:

Data concerning vitamin A, carotene and riboflavin related to creatinine excretion were classified according to ICNND criteria [11].

Haematological data were classified according to W.H.O. criteria [6].

Parasitological survey

Stool specimens were colected in MIFC and examined by the methods of Faust and col.[1] and Hoffman and col.[2].

RESULTS AND COMMENTS

Food consumption survey

Calorie ingestion

Only 30% of the children presented a caloric adequacy of 100%. The remainder 70% presented deficient calorie intake of wich 33% were between 60% and 80% adequacy.

Protein consumption

Protein consumption on the average was satisfactory; all had 100% or more adequacy. However it must be kept in mind that 70% had a deficient calorie intake.

Regarding nature of protein, only 3 inmates received a diet which contained 60% of animal protein in relation to total proteins. Of these two received a yolk of egg as a daily supplement and one consumed large quantities of animal protein foods.

Iron Consumption

Regarding iron, 3 children (11%) between 1 and 3 years of age consumed a daily average of about 30% of the recommended amount; for 3 others daily adequacy was about 60%. The remainder consumed over 90% of recommendations.

Vitamin A consumption

Most children consumed circa 90% of recommendations; however, 1 child consumed only 5% of recommendations and 3 consumed between 60% and 80%.

Thiamine, riboflavin and niacin consumption

Regarding thiamine, only 8 children presented adequacies below 80%. Considering riboflavin, consumption was adequate for almost all children (80% and over adequacy); 1 child, however, presented a 40% level adequacy ,not only for riboflavin but for other vitamins and minerals (excepting calcium and phosphorus) as well. Regarding niacin, only 12 children (44%) presented adequate consumption (80% to 100% adequacy). In the remaining 14 (52%) adequacy levels fell between 8% and 57% levels. Of these, 13 fell into the 1 to 5 years age group, and were only allowed ground beef (which was not served daily).

Vitamin C consumption

Vitamin C consumption proved to be deficient, again among children of younger age groups; 22% of children revealed consumption below 2/3 of recommendations.

Calcium consumption

Almost half of inmates consumed less than 2/3 RDA of calcium. It must be stressed that all these children belong to the younger age groups, which are more susceptible to health impairment regarding this nutrient.

Food handling, processing and distribution

Activities of storing, processing and portioning as well as distribution of meals are carried out by a person of low scholastic level without the slightest notion of nutrition, feeding or hygiene. It is this same person that makes decisions regarding composition of diets and which foods can be taken or not by children above and below 7 years of age. In this respect, all meat dishes (except minced beef) are excluded from the diet of children under 5 years of age, because they are considered "improper foods for small children".

Although the Institution has adequate storing facilities (such as refrigerator and freezer) storage is inadequate for many items that should be kept under refrigeration are stored on common shelves.

Thawing methods are absolutely inadequate. Frozen food is thawed just before use by immersion in water at room temperature; the portion which is to be used is taken and the remainder refrozen for future use. On one occasion it was observed that fish received at 9 o' clock a.m. remained at room temperature until 4 o'clock p.m. before handling. It was then, cleaned, seasoned and stored in the unlighted oven of the stove until lunch time next day.

Wastage is very high regarding vegetables (between 28% and 30%). Concerning certain items, carrots presented wastage of 29% on account of peeling instead of scraping, and tomatoes 31% instead of the usual 3%.

Diets are monotonous, although the budget allows for a satisfactory variety of supplies. Menus are not planned in advance, which would afford greater variety.

Numerical data concerning food consumption can be seen in Table 2.

Clinical survey

Weight and height

Regarding weight, results show that 15 children (55.5%) were below 90% of desirable weight, 5 children (18.5%) were above 100% and 4 (14.8%) were below 80%. More than 1/4 of the inmates were between 95% and 100% of desirable weight. Children above 100% were of younger age groups whereas those below 80% all belonged to the older age groups [4].

TABLE 2

Distribution of subjects according to percent adequacy of nutrients. S. Paulo, Brazil, 1978.

Percent adequacy	Calcium		Phosphorus		Iron		Vitamin A		Thiamine		Riboflavin		Niacin		Ascorbic acid	
	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%
0 |—— 60	2	7.4	0	0	3	11.1	1	3.7	3	11.1	1	3.7	14	51.9	2	7.4
60 |—— 80	11	40.8	3	11.1	3	11.1	3	11.1	5	18.5	0	0	1	3.7	4	14.8
80 and over	14	51.8	24	88.9	21	77.8	23	85.2	19	70.4	26	96.3	12	44.4	21	77.8

Regarding height only 4 inmates (18.1%) of the older age groups showed heights between 90% and 95% of standards. The remainder showed heights of 95% and over of which 8 (36.3%) were above the 100% level.

Skinfold measurements

All children 5 years of age and over presented measurements far below those established by Seltzer and Mayer [10]. Those under five years presented measurements far below the standards for the 5 years old group but one child, 1 year old, presented a measurement of 16 mm which corresponds to the age 10 years old.

Vitamin A

In Table 3 it can be seen that only 3 children did not present clinical signs attributable to vitamin A deficiency, 11 (40.7%) presented one clinical sign, 10 (37.0%) presented 2 signs, of which 5 (18.5%) presented xerosis conjunctivae in addition to skin lesions. Only 3 inmates (11.1%) presented 3 clinical signs and all presented xerosis conjunctivae besides skin lesions. Bitot spots, xerosis corneae, keratomalacia, corneal ulcers and leucomata were not encountered but 8 (29.6%) of the children presented xerosis conjunctivae a higher rate than those encountered in others of our studies.[7,9]. It must be kept in mind that only in the present study Rose Bengal was used as a diagnostic aid.

Riboflavin

Table 4 shows clinical signs attributable to riboflavin deficiency presented by inmates.

It can be observed that about half of inmates presented at least one clinical sign attributable to this deficiency. However, only 4 (14.8%) presented 2 signs and 1 (3.7%) presented 3. These results differ

TABLE 3

Subjects presenting clinical signs attributable to vitamin A deficiency. S. Paulo, Brazil, 1978.

Clinical signs	Frequency	
	N.	%
Absent	3	11.1
Cutaneous xerosis	10	37.0
Follicular keratosis	1	3.7
Cutaneous xerosis + follicular keratosis	5	18.5
Xerosis conjunctivae + cutaneous xerosis	4	14.8
Xerosis conjunctivae + follicular keratosis	1	3.7
Xerosis conjunctivae + cutaneous xerosis + follicular keratosis	3	11.1
Total	27	100.0

NOTES:

1. Total xerosis conjunctivae — 8(29.6%)
2. Xerosis conjunctivae diagnosed with aid of Rose Bengal

TABLE 4

Subjects presenting clinical signs attributable to riboflavin deficiency. S. Paulo, Brazil, 1978.

Clinical Signs	Frequency	
	N.	%
Absent	14	51.9
Lesion of nasal vestibule	4	14.8
Angular stomatitis	2	7.4
Seborrhea	1	3.7
Angular blepharitis	1	3.7
Lesion of nasal vestibule + angular stomatitis	2	7.4
Lesion of nasal vestibule + seborrhea	2	7.4
Lesion of nasal vestibule + seborrhea + angular stomatitis	1	3.7
Total	27	100.0

from those of previous studies; lower results were found in one — 48.1% [14] and higher in the other — 68.0% [13].

Protein, iron and ascorbic acid

None of the children presented clinical signs attributable to protein deficiency.

Regarding iron deficiency 9 inmates presented atrophy of lingual papilae (33.3%).

Considering clinical signs attributable to ascorbic acid deficiency only one child presented perifollicular hyperkeratosis.

Biochemical survey

Vitamin A and carotene

Blood was drawn from 22 of 27 children for determination of vitamin A and carotene plasma levels (5 were missed owing to technical reasons).

Table 5 shows results. It can be observed that although only 5 inmates (22.7%) presented carotene levels below normal, 14 (63.6%) presented vitamin A below normal.

These results roughly agree both with those obtained in the clinical survey and in other studies [7,8,9]. It must be noted that of 7 out of the 8 children presenting xerosis conjunctivae 4 had "acceptable" levels and 3 "low".

The only inmate which presented "deficient" plasma level did not present other clinical signs besides skin xerosis.

Of the 13 children presenting "low" levels 2 did not present clinical signs, 4 only skin xerosis, 4 skin xerosis and follicular keratosis, 1 xerosis conjunctivae and skin xerosis, 1 xerosis conjunctivae and follicular keratosis.

Of the children presenting "acceptable" levels 1 did not present clinical signs, 3 skin xerosis, 2 xerosis conjuctivae and skin xerosis and 2 xerosis conjunctivae, skin xerosis and follicular keratosis.

The combined clinical and biochemical results show that there is poor correlation between blood levels and clinical signs.

TABLE 5

Vitamin A and carotene plasma levels of 22 inmates. S. Paulo, Brazil, 1978.

Levels according to ICNND	Vitamin A		Carotene	
	N.	%	N.	%
Deficient	1	4.5	—	—
Low	13	59.1	5	22.7
Sub-total	14	63.6	5	22.7
Acceptable	8	36.4	16	72.7
High	—	—	1	4.6
Total	22	100.0	22	100.0

Riboflavin

Table 6 shows 7 day average results of *riboflavin excretion*. It can be noted that all children presented averages distributed between "acceptable" and "high" levels. "High" levels strongly predominated (70.4%).

TABLE 6

Riboflavin excretion of 27 inmates. S. Paulo, Brazil, 1978.

Levels according to ICNND	Frequency	
	N.	%
Deficient	—	—
Low	—	—
Acceptable	8	29.6
High	19	70.4
Total	27	100.0

Hemoglobin and packed blood cell volume

Table 7 shows results of 26 children from which blood could be drawn for these determinations. It can be observed that all presented normal levels regarding hemoglobin and 4 children presented abnormal results for packed blood cell volume.

TABLE 7

Hemoglobin and packed blood cell volume of 26 inmates. S. Paulo, Brazil, 1978.

Results	Packed blood cell Volume		Hemoglobin (g/100 ml)	
	N.	%	N.	%
Normal	22	84.6	26	100.0
Below Normal	4	15.4	—	—
Total	26	100.0	26	100.0

Protein

All results were normal.

Stool examination survey

The stool examination, for intestinal parasites showed that 50% of inmates presented one or more parasites (Table 8).

TABLE 8

Stool examinations for intestinal parasites of 24 inmates. S. Paulo, Brazil, 1978.

Parasites	Prevalence	
	Nº	%
Absent	12	50.0
Hymenolepis nana	5	20.8
Giardia lamblia	5	20.8
Entamoeba coli	5	20.8
Endolimax nana	2	8.3
Trichocephalus trichiurus	1	4.2
Entamoeba histolytica	1	4.2

Considering only protozoa considered pathogenic, although infection rate is high (20.8%), it does not differ considerably from results encountered in surveys carreid out in other populations of the State of São Paulo, in comparable groups. As the group represents a closed community, specific treatment should greatly reduce prevalence, or even erradicate the infection.

Regarding *Entamoeba histolytica* the only case encountered proved to be of the *minuta* form, presenting cysts larger than 10μ indicating infection alone. However it is convenient to treat this case to remove an efficient carrier from the environment.

Regarding helminths only one subject presented infection by *Trichocephalus trichiurus* which is very difficult to cure by polyvalent treatment.

Prevalence of *Hymenolepis nana* is very high (20.8%). This rate is one of highest registered in Brazilian literature, second only to the rate encountered by Kalil et al. in a school in the city of Curitiba, State of Paraná (23.2%)[8].

Owing to the fact that fecal contamination of hands is the most important factor in transmission from person to person, as well as in auto-infestation, specific treatment must be carried out and at the same time education regarding the parasite, for the former will prove useless without the latter.

RSPUB9/510

WILSON, D. et al. *[Nutritional status of children, inmates of a small institution for homeless children in the capital of the State of S. Paulo, Brazil]* **Rev. Saúde públ.**, *S. Paulo*, **14**:300-9, 1980.

ABSTRACT: *Nutritional surveys (food consumption, clinical and biochemichal) were conducted in a small institution for homeless children. Results showed that only 30% of the children presented adequate calorie intake. Most of the children presented adequate protein intake, but almost half consumed less than 2/3 of the calcium RDA considered necessary. Food handling, processing, and distribution also proved inadequate and wastage, high. Skinfold measurement showed up one case of obesity. Furthermore, most of the children presented clinical signs of vitamin A deficiency, mostly skin lesions; while about half presented clinical signs of riboflavin deficiency. Biochemical data showed that 63.6% had deficient plasma levels of vitamin A, none showed abnormal results for riboflavin excretion, four showed packed blood cell volume below normal, and all had normal hemoglobin levels. Stool examinations revealed a high rate of pathogenic protozoa* (Hymenolepis nana), *in fact, one of the highest in Brazilian literature.*

UNITERMS: *Nutrition surveys. Child nutrition. Diet. Dietary proteins. Calcium, dietary.*

WILSON, D. et al. Nutritional status of children, inmates of a small institution for homeless children in the capital of the State of S. Paulo, Brazil. *Rev. Saúde públ.*, S. Paulo, 14:300-9, 1980.

REFERENCES

1. FAUST, E. C. et al. Comparative efficiency of various technics for the diagnosis of protozoa and helminths in the feces. *J. Parasit.*, 26:241-62, 1939.

2. HOFFMAN, W. A. et al. Sedimentation concentration method in Schistosomiasis mansoni. *Puerto Rico J. publ. Hlth*, 9:238-98, 1934.

3. KALIL, F. A. et al. Himenolipíase nana em um Educandário de Curitiba com adendo sobre "Um caso de Himenolipíase diminuta". *An. Fac. Med. Univ. Paraná*, 8:119, 1965.

4. MARQUES, R. M. et al. *Crecimiento de niños brasileños: peso y altura en relacion con la edad y el sexo y la influencia de factores socioeconomicos.* Washington, D. C., Organizacion Panamericana de la Salud, 1975. (OPAS — Publ. cient., 309).

5. NATIONAL RESEARCH COUNCIL. Food and Nutrition Board. *Recommended dietary allowances; a report.* 7th ed. Washington, D.C., National Academy of Sciences, 1968. (National Research Council. Publication, 1694).

6. ORGANIZACION MUNDIAL DE LA SALUD. Grupo de Estudio sobre la Anemia Ferropenica, Ginebra, 1958. *Informe.* Ginebra, 1959. (Ser. Inf. técn., 394)

7. RONCADA, M. J. Hipovitaminose A. Níveis séricos de vitamina A e caroteno em populações litorâneas do Estado de São Paulo, Brasil. *Rev. Saúde públ.*, S. Paulo, 6:3-18, 1972.

8. RONCADA, M. J. Inquérito entre migrantes atendidos pela Central de Triagem e Encaminhamento, na Capital do Estado de São Paulo, Brasil. II — Aspectos bioquímicos da hipovitaminose A. *Rev. Saúde públ.*, S. Paulo, 9:313-29, 1975.

9. RONCADA, M. J. et al. Hipovitaminose A em filhos de migrantes nacionais em trânsito pela Capital do Estado de São Paulo, Brasil. Estudo clínico-bioquímico. *Rev. Saúde públ.*, S. Paulo, 12:345-50, 1978.

10. SELTZER, C. C. & MAYER, J. A simple criterion of obesity. *Postgrad. Med.*, 38:101-7, 1965.

11. UNITED STATES. Interdepartmental Committee on Nutrition for National Defense. *Manual for nutrition surveys.* 2nd ed. Washington, D. C., 1963.

12. VENTURA, F. et al. Hemoglobina: dosagem pelo método da cianometa-hemoglobina. Uso de solução artificial para calibração dos aparelhos colorimétricos. *Rev. Hosp. Clín.*, S. Paulo, 22: 303-4, 1967.

13. WILSON, D. et al. Arriboflavinose clínica em pré-escolares, filhos de migrantes em trânsito pela Central de Triagem e Encaminhamento, na Capital do Estado de São Paulo, Brasil. *Rev. Saúde públ.*, S. Paulo, 12:351-5, 1978.

14. WILSON, D. et al. Estudo da riboflavina: exames bioquímico e clínico em comunidades do Estado de São Paulo, Brasil. *Rev. Saúde públ.*, S. Paulo, 11:13-26, 1977.

Recebido para publicação em 26/09/1979

Aprovado para publicação em 16/05/1980