Effect of supplementary feeding on the prevention of mild-to-moderate wasting in conditions of endemic malnutrition in Guatemala

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Objective To estimate the effect of supplementary feeding on the prevention of wasting in preschool children in a rural area of Guatemala with a high prevalence of malnutrition.

Methods Children aged 6–48 months, with a weight-for-length exceeding 90% of that of the median NCHS/WHO/CDC reference population, received either Atole, a drink with a high protein and moderate energy content, or Fresco, a drink with no protein and a low energy content. Children consuming amounts of Atole equivalent to more than 10% of the age-adjusted recommended dietary intake for energy were termed ''supplemented''. A comparable group of children consuming Fresco was termed ''non-supplemented''. The energy intake in the supplemented group was higher than that in the non-supplemented group by 16–18% of the recommended daily intake. The corresponding difference in protein intake was 45–80% of the recommended daily intake. The children were followed up at intervals of three or six months in order to evaluate their weight-for-length development. The difference between supplemented and non-supplemented children in the proportions maintaining their weight-for-length category at the end of the study intervals represented the prevention of wasting attributable to supplementary feeding (attributable prevention). Households were used as units of analysis in order to avoid cluster effects.

Findings The attributable prevention in children aged 6–24 months with weight-for-length between 90% and 99.9% of the reference population at entry ranged from 0.21 to 0.26 and was statistically significant after three and six months of supplementation. However, it was not significant in children at or above 100% weight-for-length or in older children. Children above 100% weight-for-length did not become overweight as a result of supplementation.

Conclusion Supplementary feeding of children aged 6–24 months in populations with inadequate dietary intakes can prevent the onset of wasting in a large proportion of children.

Keywords Deficiency diseases/therapy/prevention and control; Cachexia/prevention and control; Endemic diseases; Dietary supplements/utilization; Energy intake; Bias (Epidemiology); Child, Preschool; Controlled clinical trials; Guatemala (*source: MeSH, NLM*).

Mots clés Carences nutritionnelles/thérapeutique/prévention et contrôle; Cachexie/prévention et contrôle; Maladie endémique; Compléments alimentaires/utilisation; Ration calorique; Biais (Epidémiologie); Enfant âge préscolaire; Essai clinique contrôlé; Guatemala (*source: MeSH, INSERM*).

Palabras clave Enfermedades carenciales/terapia/prevención y control; Caquexia/prevención y control; Suplementos dietéticos/utilización; Enfermedades endémicas; Ingestión de energía; Sesgo (Epidemiología); Infante; Ensayos clínicos controlados; Guatemala (*fuente: DeCS, BIREME*).

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Voir page 931 le résumé en français. En la página 932 figura un resumen en español

Introduction

Moderate-to-severe wasting, i.e. weight-for-length less than – 2 standard deviations from the median value of the National Center for Health Statistics (NCHS)/WHO/Centers for Disease Control and Prevention (CDC) distribution (*1*), continues to be a public health problem in developing countries. It has been estimated that 9.4% of preschool children in the developing world, i.e. about 50 million children, were affected by wasting in 1995. The highest prevalences were about 15.5% in the southern part of Central Asia and in West Africa and 10.4% in South-east Asia (*2*).

Considerable experience in the management of severe cases of wasting has been gained over the last 50 years (*3*). Children with mild-to-moderate wasting are often referred to supplementary feeding programmes. The efficacy of community-based supplementary feeding in curing such wasting has been difficult to demonstrate because of weaknesses in study design and implementation (*4*). However, we have shown that a cure can be achieved in this way for an outpatient population with inadequate dietary intake at home (*5*); that the effects are larger in children aged 6–24 months than in older children; and that the effects increase with decreasing weight-for-length and

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with increasing duration of supplementation and with the occurrence of diarrhoea (*6*).

The present study considers whether supplementary feeding can prevent wasting in a population in which endemic malnutrition and infection results in mild-to-moderate wasting in a sizeable proportion of children. In principle, the availability of supplementary food for children during their preschool years, when they are particularly vulnerable, should prevent such wasting. We have investigated whether the supplementary feeding of Guatemalan children aged 6–48 months prevents them from becoming wasted.

Methods

Study design

The analysis was carried out on data collected during a controlled supplementation trial conducted in rural Guatemala between 1969 and 1977. Detailed descriptions of the design, the sample and the methods and quality control of data collection have been published elsewhere (*7*). The four villages selected for the study each had 500–1000 inhabitants of similar ethnicity and social development. The physical environments of the villages were also similar. Two of the villages were randomly allocated to receive Atole,[a] a drink with a moderate-energy content (90 kcal/100 ml) and a high protein content (6.3 g/100 ml). The other two villages received Fresco,[a] a drink with a low-energy content (33 kcal/100 ml) and no protein. The usual diet of the children given Atole was thus supplemented in significant amounts, whereas that of the children given Fresco was not (*5*). The drinks, which contained similar amounts of vitamins and minerals, were distributed centrally at supplementary feeding centres and were available, on a voluntary basis, to all members of the communities during two daily sessions each lasting three hours. Preventive and curative health services were offered in the four villages (*8*).

Data used in the analysis

The analyses were based on data for children aged 6–48 months. The intake of supplement was measured to the nearest 10 ml for each child at every session. The dietary intake at home was determined once every three months for children aged 18–24 months by means of a 24-hour dietary recall method. Anthropometric data were collected every three months for children aged 6–24 months and every six months for older children. Values of the percentage median weight-for-length were obtained from reference data held by WHO, NCHS and CDC (*9*). This statistic was adopted rather than the Z-score because of its more frequent use in the screening of wasted children in feeding programmes. Children above 90% weight-for-length were classified as belonging to one of the following categories: 90–94.9% (mildly wasted); 95–99.9% (thin); or $\geqslant 100\%$.

Children who fell below 90% in the course of the study became moderately wasted. The cut-off points used, 90% and 95%, corresponded approximately to Z-scores of –1.30 and –0.65, respectively, for weight-for-length in the population studied.

Data analysis

Age intervals

The data were analysed separately for the age categories 6–24 months and 24–48 months because supplementary feeding was known to be effective in curing mild-to-moderate wasting in children in the lower age range but not in older children (*6*). Prevention was considered to have been achieved if a mildly wasted or thin child at the beginning of an age interval had not dropped to a lower wasting category by the end of interval. In contrast, if a child dropped to a lower wasting category during the course of an age interval, prevention was considered not to have been achieved. For the younger group (6–24 months) the results are presented by both three-month intervals (6–9, 9–12, 12–15, 15–18, 18–21, 21–24 months) and six-month intervals (6–12, 12–18, 18–24 months) because we wished to assess the duration of supplementation as an independent variable. Only six-month intervals (24–30, 30–36, 36–42, 42–48 months) were used in the older age category (24–48 months).

True supplementation

True dietary supplementation was considered to have been achieved when a child's average supplement intake in the villages receiving Atole was above 10% of the age-adjusted recommended dietary intake for energy. Depending on the particular age and weight-for-length category, between 33% and 59% of the children in these villages achieved this level of supplementation. They are subsequently termed the "supplemented" groups.

Control for self-selection

As Atole was consumed on a voluntary basis, there was a possibility that self-selection bias would affect the results. In order to control for self-selection, the Atole supplementation groups were compared to equivalent Fresco groups within each age and weight-for-length category. These groups were matched by percentile level of intake ingested at the feeding centre. Thus the children in these Fresco groups had a similar degree of participation to those in the Atole-supplemented groups but their diets were practically not supplemented with macronutrients because of the low energy and lack of protein in the Fresco. These Fresco groups are referred to as the "non-supplemented groups". The main analyses were restricted to the supplemented groups (upper 33–59% of the distribution of Atole), to ensure the inclusion of only those that were truly supplemented, and to the corresponding children with a high level of participation in the villages where Fresco was given in order to control for self-selection.

Even so, the results of the analyses described above could have been biased if self selection for the ingestion of Atole favoured children who would have responded well in any case, while self selection for Fresco did not favour such children. This could occur if, for example, the more highly educated mothers in the villages allocated Atole chose to take their children to the feeding centres because they knew that Atole was nutritious, while well-educated mothers in the villages allocated Fresco did not do so because they knew that Fresco was less nutritious. If no such bias occurred there should be an overall effect, i.e. combining both high-level and low-level consumers, although this would be attenuated because the diet of low-level consumers in both the Atole and Fresco villages would not be supplemented. A differential self-selection bias between the Atole and Fresco villages would eliminate this overall effect. Moreover, if there was no bias the low-level consumers should be similar because both groups were unsupplemented. In

[a] Designed and produced by the Institute of Nutrition of Central America (INCAP), Guatemala, specifically for this study.

contrast, differential self-selection would result in a difference favouring the Fresco group among low consumers because the responders would be more equally distributed among the low consumers than would be the case for the Atole group. In order to determine whether such self-selection bias was present, analyses like those conducted for high consumers were carried out for low consumers and for the total samples of combined high-level and low-level consumers.

Micronutrient levels

Atole contained 0.4 g of calcium and 0.3 g of phosphorus; Fresco did not contain these minerals. Both drinks contained iron, fluoride, thiamin, niacin, ascorbic acid, and vitamin A in the same concentrations. As the average amount of Atole consumed was two to three times greater than that of Fresco, however, children in the Atole villages received more micronutrients from the supplement than those in the Fresco villages.

Effect of supplementary feeding on prevention of wasting

Children were considered to have maintained their original nutritional status if their weight-for-length percentage after three or six months had not fallen below the lower limit of their category and included children who had moved to a higher weight-for-length category.The proportion of children in each non-supplemented group who maintained their nutritional status was subtracted from the proportion maintaining their nutritional status among the corresponding supplemented group. The difference was termed the "attributable prevention". Some children maintained their weight-for-length across multiple age categories and many of the children examined at three-month intervals were also examined at six-month intervals so that the observations across these intervals were correlated. However, this did not affect the statistical significance within an interval. No statistical tests were applied across these intervals, nor were they necessary to support the inferences made in this paper.

Control for cluster effects

A child could contribute data to more than one interval within a single age category, and one or more siblings could be included in some comparison groups. Differences in nutrition between siblings were probably smaller than those between families. Observations on the proportion of prevention within child intervals are therefore not independent of one another. Consequently, the variances of the proportion of prevention are likely to be biased because of cluster effects. In order to avoid potential bias in the estimation of variances, household intervals were used instead of child intervals as units of analysis. The proportions of prevented wasting within households were obtained, and the means of these proportions and their variances were used for calculating household attributable prevention. The mean household proportions for the non-supplemented groups were subtracted from those for the supplemented groups to obtain the household attributable prevention. These attributable preventions, their 95% confidence intervals, and the corresponding statistical significance ($P<0.05$) were computed and are presented along with the data used to calculate the attributable prevention values (the mean proportions of households maintaining their nutritional status in the supplemented and non-supplemented groups). Similar attributable prevention values were collected among the total sample (high-level and low-level consumers) and among the low-level consumers by comparing the Atole to Fresco groups in the same fashion as we had compared the supplemented (Atole) and non-supplemented (Fresco) groups among the high consumers.

Supplementary feeding and the possibility of development of overweight

The possibility that supplementary feeding would lead the children to become overweight was assessed by comparing the proportions of supplemented and non-supplemented children whose weight-for-length was between 100% and 110% initially and exceeded 110% after six months of supplementation.

Results

As expected, the energy intake from the supplement was higher in the supplemented than in the non-supplemented groups by 16–18% of the energy recommended daily intake, depending on the age intervals and weight-for-length categories. The differences in energy intake were accompanied by even larger differences in protein intake: 45–80% of the recommended daily intake.

Table 1 shows the mean proportion of prevented wasting within households in the supplemented and non-supplemented groups, by age category, and supplementation time interval. The attributable prevention values calculated from these proportions are also indicated. Among children aged 6–24 months, two distinct patterns emerged. First, the mean proportion of prevented wasting within households in the two lower weight-for-length categories (90–94.9% and 95–99.9%) were substantially greater in the supplemented than in the non-supplemented groups. The attributable prevention values in these categories were large, ranging from 0.21 to 0.26, and statistically significant for both the three-month and six-month supplementation intervals. Second, in the high weight-for-length category (100%), however, the attributable prevention values were lower (range: 0.01–0.08) and the 95% confidence intervals included zero.

Among children aged 24–48 months, mean proportions of prevented wasting within households were large for both supplemented (0.76–0.94), and non-supplemented groups (0.65–0.87). Consequently, there was little effect of the supplement in the older age group, the attributable prevention values ranging between 0.06 and 0.11, and all confidence intervals included zero.

The potential effects of supplementary feeding leading to overweight were also assessed. The mean proportions within households that did not cross the upper limit in the 100–110% weight-for-length category were 0.97 in the supplemented group and 0.98 in the non-supplemented group. The difference between the groups (the proportion of overweight attributable to supplementary feeding) was –0.01 (95% confidence interval: 0.04, –0.06).

The next analysis includes all the children in Atole and Fresco groups, combining the high participants (supplemented and non-supplemented groups analysed above) with the low participants The same statistically significant effects were demonstrated for all these children (combining high-level and low-level participants) aged 6–24 months in the six-month supplementation interval but, as expected, the results were attenuated (Table 2). The attributable prevention values were

Table 1. **Mean proportion of prevented wasting within households and attributable prevention in high-level participants**

Age category (months)	Duration of supplementation (months)	Initial weight-for-length category (%)	Treatment groups		Attributable prevention
			Atole (*n*)[a]	Fresco (*n*)	
6–24	3	90–94.9	98 (0.81)[b]	112 (0.55)	0.26 [0.17–0.36][c, d]
	3	95–99.9	116 (0.59)	116 (0.38)	0.21 [0.07–0.35][d]
	3	⩾100	111 (0.53)	149 (0.52)	0.01 [–0.09–0.11]
6–24	6	90–94.9	92 (0.80)	100 (0.54)	0.26 [0.11–0.42][d]
	6	95–99.9	101 (0.56)	107 (0.30)	0.26 [0.10–0.42][d]
	6	⩾100	106 (0.42)	133 (0.34)	0.08 [–0.06–0.22]
24–48	6	90–94.9	84 (0.94)	106 (0.87)	0.07 [–0.04–0.17]
	6	95–99.9	90 (0.78)	104 (0.72)	0.06 [–0.08–0.21]
	6	⩾100	97 (0.76)	81 (0.65)	0.11 [–0.06–0.28]

[a] No. of households.
[b] Figures in parentheses are mean proportions of prevented wasting within households.
[c] Figures in square brackets are 95% confidence intervals.
[d] Statistically significant, $P<0.05$.

Table 2. **Mean proportion of prevented wasting within households and attributable prevention in all participants (high- and low-level)**

Age category (months)	Duration of supplementation (months)	Initial weight-for-length category (%)	Treatment groups		Attributable prevention
			Atole (*n*)[a]	Fresco (*n*)	
6–24	3	90–94.9	154 (0.74)[b]	172 (0.61)	0.13 [0.06–0.20][c, d]
	3	95–99.9	193 (0.58)	190 (0.41)	0.17 [0.09–0.24][d]
	3	⩾100	217 (0.52)	208 (0.46)	0.06 [–0.00–0.13]
6–24	6	90–94.9	137 (0.73)	162 (0.55)	0.18 [0.09–0.27][d]
	6	95–99.9	180 (0.52)	171 (0.33)	0.19 [0.10–0.28][d]
	6	⩾100	204 (0.38)	198 (0.29)	0.09 [0.02–0.15][d]
24–48	6	90–94.9	141 (0.89)	158 (0.84)	0.05 [–0.02–0.11]
	6	95–99.9	162 (0.81)	158 (0.71)	0.10 [0.03–0.18][d]
	6	⩾100	162 (0.74)	121 (0.62)	0.13 [0.03–0.22][d]

[a] See footnote a, Table 1.
[b] See footnote b, Table 1.
[c] See footnote c, Table 1.
[d] See footnote d, Table 1.

0.18 ($P<0.05$) and 0.19 ($P<0.05$), respectively, in the groups with initial weight-for-height of 90–94.9% and 95–99.9% of the standard. This overall preventive effect of supplementation was almost completely explained by the effect of supplementation on the high-level consumers: the low-level consumers showed no statistically significant attributable prevention (Table 3) for the same initial weight-for-height groups.

The sum of households in Table 1 and Table 3 is greater than the total number of households in Table 2 because some households were in a high- or low-participation category at one time interval and then shifted to another. Consequently, some households appear once in Table 1 and once in Table 3. However, every household appears only once in the analyses of the whole population (Table 2).

Discussion

In communities where malnutrition is endemic, very young children are vulnerable to stunting and wasting during the period of transition from reliance on breast milk to consumption of the family diet at 6–24 months of age (*10*). The results for the non-supplemented group in the present study illustrate the decline into wasting during this period. In the absence of supplementary feeding, 45% of the children whose status was marginal (90–94.9% weight-for-length) dropped below the cut-off point of mild wasting within three months. Among those who were in a somewhat better state (95–99.9% weight-for-length), an even greater proportion (62%) lost ground relative to the standard, dropping below 95%.

The mean weight-for-length in the population underwent a slow decline relative to the NCHS/WHO/CDC reference population as the children's ages increased from 6 months to 21 months. Subsequently a recovery occurred. For certain children the values became extremely low, i.e. wasting was observed. This was considered a short-term response to malnutrition; the results of this paper are concerned with such short-term effects. In contrast, mean length-for-age has been

Table 3. **Mean proportion of prevented wasting within households and attributable prevention in low-level participants**

Age category (months)	Duration of supplementation (months)	Initial weight-for-length category (%)	Treatment groups		Attributable prevention
			Atole (*n*)[a]	Fresco (*n*)	
6–24	3	90–94.9	113 (0.69)[b]	121 (0.66)	0.03 [–0.07–0.13][c]
	3	95–99.9	147 (0.57)	130 (0.49)	0.08 [–0.02–0.18]
	3	⩾100	181 (0.55)	144 (0.49)	0.05 [–0.03–0.13]
6–24	6	90–94.9	88 (0.60)	106 (0.55)	0.05 [-0.07–0.17]
	6	95–99.9	126 (0.50)	100 (0.39)	0.11 [–0.00–0.23]
	6	⩾100	166 (0.37)	135 (0.31)	0.06 [–0.03–0.14]
24–48	6	90–94.9	91 (0.85)	89 (0.83)	0.02 [–0.08–0.11]
	6	95–99.9	114 (0.84)	94 (0.73)	0.11 [0.02–0.21][d]
	6	⩾100	126 (0.75)	64 (0.64)	0.11 [–0.02–0.23]

[a] See footnote a, Table 1.
[b] See footnote b, Table 1.
[c] See footnote c, Table 1.
[d] See footnote d, Table 1.

reported as declining more markedly than weight-for-length up to the age of 21 months and as failing to recover thereafter (*6*). Stunting is therefore a better indicator of the longer-term effects. Previous reports have indicated that supplementation improved growth in stature during early childhood (*11*) and that this effect was retained in adolescence (*12*, *13*).

The results from the supplemented group indicated that improvements in energy intake (16–18% of the recommended daily intake) prevented deterioration among a substantial proportion of thin children (95–99.9% weight-for-length) and mildly wasted children (90–94.9% weight-for-length). The reductions in the proportions of children who would otherwise have become more wasted (both weight-for-length categories) were statistically significant for both the three-month and six-month intervals of supplementation. The attributable prevention values were almost identical for the three-month and six-month groups, indicating that the benefits from supplementation, once established at three months, were retained for the longer period.

The attributable prevention values of 0.21–0.26 produced by supplementation were impressive in absolute terms, but comprised only 57–58% of the mean proportion of non-prevented moderate wasting within households in non-supplemented groups in the 90–94.9% category and 34–37% of non-prevented mild wasting within households in non-supplemented groups in the 95–99.9 % category. In the best case, for instance, the proportion of non-prevented moderate wasting within households after three months in the 90–94.9% category of the supplemented group was 0.19 (1.00–0.81) compared to 0.45 (1.00–0.55) of the non-supplemented group. The attributable prevention value was 0.26, which accounts for 58% of the 0.45 mean wasting within households in the non-supplemented group.

We believe that most of the unprevented wasting among those in the 90–94.9% weight-for-length category was caused by random fluctuation in weight-for-length. We base this belief on the fact that the mean proportion of moderate wasted children who recover within households among non-supplemented groups (*6*) was about the same as the mean proportion of prevented moderate wasting within households in supplemented groups (Table 1). This steady-state calculation was less true for children in the higher weight-for-length categories, perhaps indicating that supplementation was more successful in preventing moderate wasting (<90% weight-for-length) than mild wasting (90–94.9% weight-for-length).

Children in this study benefited from better health care than is usual in such malnourished populations. We have shown elsewhere that there is synergy between illness and poor diet in the stunting of growth (*14*). It is therefore possible that, in the absence of health care, a greater effect might have occurred.

In contrast to the results in younger children, the effects of supplementary feeding on children aged 24–48 months were smaller and not statistically significant, possibly because of a lack of statistical power. This result was not surprising. We have shown elsewhere that, in the absence of supplementary feeding, weight-for-length declines in this population from birth to 21 months of age and improves slightly thereafter until 42–48 months of age. We have also shown that the recovery of moderately wasted children as a result of supplementary feeding was restricted to children aged under 24 months (*6*).

The preventive effects of supplementation in children above 100% weight-for-length were substantially smaller than those observed in lower weight-for-length categories and were not statistically significant. Children above the weight-for-length reference median do not seem to benefit from nutritional supplementation. The question arises as to whether supplementary feeding in this group promotes overweight. We compared the mean proportion within households of supplemented and non-supplemented groups between 100% and 110% weight-for-length who moved above 110%. Fewer than 3% crossed the 110% limit in each group and the differences were not statistically significant. Although obesity may take longer than six months to become obvious, the effect was so small as to suggest strongly that this kind of supplementation does not cause obesity in the settings concerned.

Appropriate comparison groups are necessary if the true effects of supplementation are to be revealed (*5*). In our analysis of the effect of supplementary feeding on the prevention of wasting we used comparison groups that were analogous to those used in our previous work on recovery from wasting (*5*, *6*). Participation in the supplementation programmes in this study was the result of self-selection. The potential confounding effect of self-selection was controlled for by comparing children in the Atole and Fresco villages with similar levels of participation in the supplementation programmes (Table 1). Tables 2 and 3 show that there was no differential self-selection in the ingestion of supplementation between the two groups. Table 2 shows effects similar to those indicated in Table 1, although, as expected, they are attenuated. The comparisons in Table 3 tend to show better results for the Atole group in the categories in question, which was to be expected because even the low-level Atole consumers received more supplementation than did the low-level Fresco consumers. Thus neither self-selection among the Atole children nor differential self-selection between Atole and Fresco children could explain the effects seen among the high-level participants. The findings reflect the effectiveness of supplementation in the prevention of wasting.

Depending on the age intervals and weight-for-length categories, supplemented children had intakes that were between 16% and 18% higher in respect of recommended daily intake for energy than non-supplemented children. No differences were found in dietary intake between groups, but it has been estimated that there was an extra energy intake from breast milk of about 4.3% of the recommended daily intake in the Fresco group (*5*). Even after considering the possible additional intake of breast milk in non-supplemented children, therefore, a true supplementation amounting to 11.7–13.7% of the recommended daily intake for energy was achieved in the supplemented group. The preventive effect of the diet was almost certainly not mediated by the energy content alone; the difference in protein content, and the associated nutrients, also probably played an important part.

A large proportion of children aged 6–24 months who are below 100% weight-for-length would evidently benefit from six months of supplementary feeding. The criteria for selecting children for programmes of supplementary feeding in order to prevent wasting in populations similar to those studied might therefore be: age under 24 months; and weight-for-length 100% or less of the standard. Different criteria may have to be applied for other populations, such as those in South Asia, with higher prevalences of wasting (*15*).

Depending on the resources available, the cost of screening, and other considerations, a feeding programme for all children aged 6–24 months might be introduced, rather than selecting a subgroup for supplementation. An argument against universal supplementation is that supplemented children in the upper range of the weight-for-length distribution may become obese. Our results indicated that this was not the case: children whose initial weight-for-length exceeded 100% of the standard did not become overweight or obese as a result of supplementation. ■

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Conflicts of interest: none declared

Résumé

Effet de la supplémentation alimentaire sur la prévention de l'insuffisance pondérale légère à modérée dans des conditions de malnutrition endémique au Guatemala

Objectif Estimer l'effet de la supplémentation alimentaire sur la prévention de l'insuffisance pondérale chez des enfants d'âge préscolaire dans une région rurale du Guatemala où la prévalence de la malnutrition est élevée.

Méthodes Des enfants de 6-48 mois ayant un rapport poids/taille supérieur à 90 % de la médiane de la population de référence NCHS/OMS/CDC ont reçu soit de l'Atole, une boisson hautement protéinée et moyennement énergétique, soit du Fresco, une boisson ne contenant pas de protéines et ayant une faible valeur énergétique. Les enfants consommant de l'Atole en quantité équivalente à plus de 10 % de l'apport énergétique quotidien recommandé (ajusté sur l'âge) ont été qualifiés de « supplémentés » et ceux d'un groupe comparable consommant du Fresco de « non supplémentés ». L'apport énergétique dans le groupe supplémenté était supérieur de 16-18 % de l'apport quotidien recommandé par rapport au groupe non supplémenté. La différence correspondante au niveau de l'apport protéique était de 45-80 % de l'apport quotidien recommandé. Les enfants ont été revus à intervalles de 3 ou 6 mois afin de suivre l'évolution de leur rapport poids/taille. La différence entre les groupes supplémenté et non supplémenté en ce qui concerne la proportion d'enfants restés dans la même catégorie de poids/taille à la fin des intervalles étudiés correspondait au niveau de prévention de l'insuffisance pondérale attribuable à la supplémentation alimentaire (prévention attribuable). Les ménages étaient utilisés comme unités d'analyse afin d'éviter des effets de regroupement de cas.

Résultats La prévention attribuable chez les enfants de 6-24 mois ayant un rapport poids/taille compris entre 90 % et 99,9 % des valeurs de la population de référence à l'entrée dans l'étude allait de 0,21 à 0,26 et était statistiquement significative après 3 et 6 mois de supplémentation. Elle n'était pas significative chez les enfants ayant un rapport poids/taille égal ou supérieur à 100 % de la norme ni chez les enfants de plus de 24 mois. Les enfants dépassant 100 % de la norme n'ont pas présenté d'excès pondéral à la suite de la supplémentation.

Conclusion La supplémentation alimentaire chez les enfants de 6-24 mois dans des populations où l'apport alimentaire est insuffisant peut prévenir l'apparition d'une insuffisance pondérale chez une grande proportion d'enfants.

Resumen

Efecto de la alimentación suplementaria en la prevención de la emaciación leve a moderada en condiciones de desnutrición endémica en Guatemala

Objetivo Estimar el efecto de la alimentación suplementaria en la prevención de la emaciación en niños en edad preescolar de una zona rural de Guatemala con alta prevalencia de desnutrición.

Métodos Niños de 6–48 meses de edad, con un peso para la talla superior al 90% de la mediana de la población de referencia NCHS/OMS/CDC, recibieron ya fuera Atole, una bebida con un alto contenido de proteínas y un contenido energético moderado, o bien Fresco, una bebida sin proteínas y de bajo contenido energético. Los niños que consumieron cantidades de Atole equivalentes a más del 10% de la ingesta alimentaria recomendada para la edad en términos de aporte energético fueron clasificados como ''suplementados'', y un grupo comparable de niños que consumieron Fresco fueron clasificados como ''no suplementados''. El consumo energético del grupo suplementado superó al del grupo no suplementado en un 16%–18% de la ingesta diaria recomendada. La diferencia correspondiente en la ingesta proteica fue del 45%–80% de la ingesta diaria recomendada. Se siguió la evolución de los niños a intervalos de tres o seis meses para evaluar su desarrollo en términos del peso para la talla. La diferencia entre los niños suplementados y los no suplementados en lo tocante al porcentaje que se mantuvieron en la misma categoría de peso para la talla al final de los intervalos de estudio reflejaba la prevención de emaciación atribuible a la alimentación suplementaria (prevención atribuible). Como unidad de análisis se utilizaron los hogares, a fin de evitar efectos de conglomerado.

Resultados La prevención atribuible en los niños de 6–24 meses con peso para la talla entre 90%–99,9% de la población de referencia al iniciar el estudio se situó en el margen de 0,21–0,26 y fue estadísticamente significativa a los tres y seis meses de iniciada la administración de suplementos. Sin embargo, no fue significativa en los niños con peso para la talla de 100% o más o en los niños de más edad. Los niños situados por encima del 100% del peso para la talla no desarrollaron sobrepeso como consecuencia de la administración de suplementos.

Conclusión La alimentación suplementaria de los niños de 6–24 meses en las poblaciones con ingestas alimentarias insuficientes puede prevenir la aparición de emaciación en una gran proporción de los casos.

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