

The Nutrition Canada Survey: a review

STATEMENT BY THE NUTRITION COMMITTEE* OF THE CANADIAN PAEDIATRIC SOCIETY

The data obtained through the Nutrition Canada national nutrition survey must be interpreted cautiously because of limitations in both the design of the survey and our present knowledge of the implications of the findings. The data suggest that, at present, nutritional status is suboptimal among members of the general population. However, because there is no evidence of clinically apparent malnutrition it is difficult to judge the immediate health significance of this finding. Among the Inuit, however, the data suggest that intake of vitamin C may be sufficiently low to approach the level causing clinical problems. Government should make funds available to permit analysis of the data to be completed and investigative studies to be undertaken to assess the health significance of the findings.

Les données recueillies lors de l'enquête nationale sur la nutrition, Nutrition Canada, se doivent d'être interprétées avec circonspection à cause des limites de son dispositif d'enquête et de notre connaissance actuelle des implications des observations obtenues. Les données suggèrent qu'actuellement le statut nutritif de la population en général est suboptimal. Toutefois, comme il n'y a aucune manifestation cliniquement apparente de malnutrition, il est difficile de juger de la signification immédiate de ces observations sur la santé. Chez les Inuits, toutefois, les données suggèrent que leur apport en vitamine C peut être suffisamment bas pour approcher un niveau capable de causer des problèmes cliniques. Le gouvernement devrait libérer des fonds afin de permettre de compléter l'analyse de ces données et d'entreprendre des études poussées en vue d'évaluer la signification de ces observations sur la santé des gens.

The Nutrition Canada Survey was undertaken between September 1970 and December 1972. It was the first national nutrition survey conducted in Canada and was the most comprehensive survey of the nutritional status of the population of any country ever conducted.

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The objectives of the study were, first, to estimate the prevalence of nutritional diseases in the Canadian population and, second, to determine the type and quantity of food items consumed by Canadians.

Nutrition Canada was designed to survey population samples in each of the 10 provinces, with representation from metropolitan, urban and rural residents and from "low-income" and "other-income" groups. The survey included Indians living in the provinces and in the territories and Inuit living in four settlements in the Northwest Territories but these groups did not constitute probability samples. In addition, the survey examined 973 women in the 2nd or 3rd trimester of pregnancy referred by local health units. The number taking part in the survey was 12 795 in the general population (46% of those initially selected), 1806 Indians and 346 Inuit.

The survey procedure consisted of a physical examination, including dental assessment and anthropometric measurements, a dietary interview at which the participant was asked to recall all food and drink consumed the previous day, and analysis of blood and urine for some 19 chemical constituents. The clinical and biochemical findings were categorized into risk groups as determined by the degree of deviation from preset norms established by an expert committee. Dietary intake of the various nutrients was categorized as "inadequate", "less than adequate" or "adequate" on the basis of what was considered a desirable daily intake.

In Nutrition Canada's first report,¹ published in November 1973, the dietary data were presented as percentages of population groups with inadequate or less-than-adequate intakes. This inappropriate interpretation of 24-hour dietary data was corrected in the subsequent reports,² in which the median intake of the group was evaluated.

The first report was a general summary of the survey's most relevant findings.¹ In January 1975 more detailed information was published in 12 volumes,² one volume relating to each province, one to Indians and one to Inuit. We have reviewed these reports and examined some of the data pertaining to children. We will now comment on certain aspects of the data; additional statements can be expected later.

General comments

Nutrition Canada has accumulated a

wealth of information; much of it is still unpublished or not yet analysed. The data should be studied carefully so that the right conclusions are drawn and, therefore, wise action is taken to correct the diet of the Canadian child. Hasty conclusions and intervention that eventually turn out to be wrong would do our children a disservice.

Certain defects in the design and outcome of the study require comment:

1. The survey attempted to sample all age groups but relatively few children were studied. For example, fewer than 250 infants under 1 year of age in the general population were included in the survey, and laboratory investigations were conducted on a much smaller number. The total number of Inuit children under 9 years was only 77. Consequently it will not be possible to stratify children into narrow age, sex, socioeconomic, ethnic and other categories for analysis.

2. The small number of pregnant women surveyed was not a representative population sample since they were referred from local health units and the criteria for selection are not known. Perhaps they were good clinic attenders and therefore less likely to have nutritional problems. Regrettably the survey design did not call for follow-up of these women to obtain details about their infants. Thus an opportunity was lost to relate nutritional status in pregnancy to the health and size of the infant.

The findings of the survey must be a source of concern to pediatricians since they suggest an unfortunate degree of suboptimal nutrition among Canadian children. They are, at the same time, a source of satisfaction in that they suggest that clinically apparent malnutrition is not a problem in the general pediatric population.

The data presented in the Nutrition Canada reports suggest that the intakes of nutrients are moderately low in some individuals. There is biochemical evidence suggesting a depletion of tissue concentrations of many nutrients among individuals in the population. The national report suggested that low dietary intakes and evidence of tissue depletion were not restricted to particular segments of the population characterized by geographic region or socioeconomic classification. However, when some of the data were reanalysed in terms of the individual family income reported in the survey, an effect of income on nutritional status was

found. Low tissue concentrations or stores of certain nutrients (vitamin C, folic acid and iron) were significantly more prevalent in low-income groups.

The survey did not detect individuals with clinically apparent malnutrition. Certain clinical signs were recorded but these must be interpreted with great care. Many signs associated with clinical malnutrition are nonspecific; they assume diagnostic importance only when very advanced or when associated with other clinical signs suggesting the same nutritional disease. The clinical signs recorded by Nutrition Canada were usually not diagnostic; they were usually seen in isolation in a particular subject. It is justifiable to conclude that the degree of nutrient depletion suggested by the dietary and biochemical data was not sufficient to produce clinically apparent disease. We have chosen to describe this situation as being one of suboptimal nutrition rather than malnutrition.

Two areas of concern to the pediatrician and general medical community arise from these findings:

First, there must be concern about possible future trends — for improvement or for deterioration — from what may now be a borderline situation. Nutrition Canada provided no evidence of the direction of change, if any. Health workers have a responsibility to try to influence the direction of future change.

Second, physicians need to become more aware of the importance of nutrition in the general health of Canadians. If the nutritional status of the general "well" population is suboptimal, it is reasonable to predict that the nutritional status of individuals in "sick" populations, as seen in physicians' offices and in hospitals, will be less satisfactory. Many disease processes, as well as the anorexia that accompanies them, have detrimental secondary effects upon nutritional status. An assessment of dietary intake should form part of medical history-taking and, when necessary, techniques to detect subclinical malnutrition should be used. Dietary advice to correct nutritional problems should be offered to patients as part of their therapy.

Calcium, phosphorus and vitamin D

Statements have been made that vitamin D and calcium nutrition are severely compromised in some Canadian children, especially those living in the Arctic. We do not believe that the findings of the survey warrant such statements. While we agree that calcium intakes appear to be moderately low in comparison to currently recommended intakes, we find no clear evidence that this has caused impairment of health

to the degree implied by those statements.

Median dietary calcium intakes were generally near or above the "adequate" level in all subjects below the age of 9 and in males in the age group 10 to 19 years; girls aged 10 to 19 years had somewhat lower intakes. In the Inuit median intakes were generally lower than in the general population. Assumed intake of vitamin D, calculated from recorded intakes of milk, margarine and supplements, was below 400 IU/d, the recommended level, in the age groups 0 to 4, 5 to 9 and 10 to 19 years. Dietary intake of vitamin D in Inuit children was "inadequate" in all age groups, and in some individuals (31 males aged 10 to 19 years) no vitamin D intake was recorded. Of course, this took no account of the effect of sunlight in reducing vitamin D dietary requirements or of the contribution of vitamin D from native foods. Recommended intakes of vitamin D are set on the assumption of the highest possible requirement; they exceed the probable requirement of most individuals.

Serum values of calcium, phosphorus and alkaline phosphatase did not show aberrations suggesting rickets or early rickets. No clinical evidence of rickets was seen in the children studied.

Thus an apparent deficiency in dietary intake of calcium and vitamin D in some groups of children was not reflected in abnormal serum values of calcium, phosphorus and alkaline phosphatase, which suggests that calcium intake, phosphorus handling and bone response were adequate. It follows, therefore, that there may be a discrepancy in the national standard for adequate nutrition or in the validity of the 24-hour recall data. Further analysis of the data that have been collected, to show age-dependent relationships and seasonal variation, and analysis of more extensive dietary data are required before valid conclusions can be drawn. We recommend that this be done as soon as possible.

Caution should be exerted in describing the results of the Nutrition Canada Survey. We are concerned about apparent overinterpretations that have been applied in some presentations to the public. At the same time we endorse our previous recommendation that continued effort be made to ensure that all sources of milk are fortified with vitamin D.

Vitamin C

While evidence of health problems associated with vitamin C deficiency was not seen in the general population, there was suggestive evidence of a problem among the Inuit, whose ob-

served intakes were very low. Only in the group under 5 years old did the median intake achieve the level suggested as "adequate". Serum vitamin C values were in the "high risk" category in over 10% of children and teenagers.

Although no overt scurvy was noted, there was a high prevalence of nonspecific clinical signs that might suggest vitamin C deficiency. Clow, Laberge and Scriver³ recently presented a hypothesis that chronic deficiency of vitamin C in pregnant and lactating Inuit may be a major contributing factor in the high prevalence of neonatal tyrosinemia among the Inuit. We believe that further investigation of this hypothesis and of the vitamin C status of the Inuit is warranted.

Unavailable data and data analyses

Of particular interest to the pediatrician is the growth pattern of the Canadian child and deviations of this pattern in sectors of the population in which particular problems may exist. Measurements of height, weight, fat-fold thickness and a variety of anthropometric parameters were included in the survey. When considered in relation to age and norms from other populations, these measurements can provide good indications of the overall nutritional status of a population.

Unfortunately, the anthropometric data have not yet been analysed. We believe such analysis should be given a high priority and we urge government to make adequate resources available for this purpose before the data are out of date.

In analysing the anthropometric data we recommend that the following questions be addressed:

1. How does the growth pattern of the Canadian child compare with standards developed for other populations?
2. Are there regional, socioeconomic or ethnic differences in growth patterns?
3. What proportions of children are above and below standard normal ranges? What proportions might be considered overweight and underweight? Are there characteristic distributions of these children in the population?
4. Can aberrations in total energy intake or in the intake of individual nutrients be related to observed abnormalities in growth?

We have noted also that certain aspects of the data provided by Nutrition Canada are extremely difficult to interpret on the basis of existing knowledge. An example is the observation of a widespread prevalence of low serum folate values. By conventional standards

developed through observation of values associated with clinically diagnosed folate deficiency, the values observed in the Canadian population are indeed low. However, there was no evidence of megaloblastic anemia or other recognized clinical signs of folate deficiency. We believe that this anomaly warrants further investigation, both through careful analysis of the data and through clinical and experimental studies of folic acid and its metabolism. Until additional information is available the health significance of the observation cannot be assessed. Other anomalies in the observations (for example, the mild but prevalent thyroid enlargement noted in Western Canada without indication of iodine inadequacy) also warrant further study.

Conclusion

While advocating that steps be taken

to improve the general nutritional status of the population, or at least to ensure that no deterioration of the present situation occurs, we caution against specific intervention measures aimed at the correction of problems that may not exist. Unless clearly indicated by the data of Nutrition Canada and other knowledge of existing conditions or trends, such activities may be premature and potentially harmful; this caution applies especially to calcium, phosphorus and vitamin D nutrition.

We urge clinicians, investigators and government to give careful consideration to the existing data and consider ways and means of clarifying the apparent anomalies and ambiguities of interpretation within the results of the Nutrition Canada Survey. Specifically, we recommend to government that funds be made available to permit anal-

ysis of the Nutrition Canada data to be completed and investigative studies to be undertaken to assess the health significance of the findings of the Nutrition Canada Survey and similar studies. This should be done before any new nationwide surveys are undertaken.

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References

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Mebendazole in the treatment of helminthiasis

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Mebendazole, a new broad-spectrum anthelmintic, was used to treat patients with nematode infections — ascariasis, trichuriasis and hookworm. The dosage for adults was 100 mg twice daily for 3 days and for children, 50 mg twice daily for 3 days. Pretreatment and post-treatment egg counts on stool specimens showed that after mebendazole there was a reduction of over 99% in egg count per gram of stool in all three types of infection. The overall cure rates for the infections were as follows: *Ascaris lumbricoides*, 86.8% (59/68); *Trichuris trichiura*, 86.0% (37/43); and hookworm, 85.7% (24/28). The drug was equally effective in light and heavy infections. No important side effect was noted with this drug. It is suggested that mebendazole is the drug of choice for trichuriasis and mixed nematode infection.

Le mébendazole, nouvel anthelminthique à large spectre d'action, a été utilisé dans le traitement de sujets souffrant de maladies parasitaires à nématodes — ascaridiase, trichocéphalose et ankylostomiase. La posologie pour adultes a été de 100 mg deux fois par jour pendant 3 jours et pour enfants, de 50 mg deux fois par jour pendant 3 jours.

La numération des oeufs dans les fèces, effectuée avant et après le traitement, a montré que l'administration du mébendazole a été suivie d'une réduction de plus de 99% du nombre des oeufs par gramme de matière fécales dans chacun des trois types d'infections. Les taux de guérison globaux pour ces infestations ont été les suivants: *Ascaris lumbricoides*, 86,8% (59/68); *Trichuris trichiura*, 86,0% (37/43); et ankylostomiase, 85,7% (24/28). Le médicament s'est révélé d'une égale efficacité dans les infestations légères ou à caractère aigu. On n'a constaté aucun effet secondaire d'importance. Tout porte à croire que le mébendazole est le médicament d'élection dans les cas de trichocéphalose ou d'infection mixte par des nématodes.

Mebendazole is a relatively new broad-spectrum anthelmintic that has been reported to have excellent therapeutic effects on nematode infections.¹⁻¹¹ Unlike all anthelmintics in current use mebendazole is effective against *Trichuris trichiura*. This drug has been found to be free from significant side effects.¹⁻¹²

Mebendazole is methyl 5-benzoyl-2-benzimidazolecarbamate (Fig. 1). It is insoluble in water. Its pharmacologic action is to cause irreversible blockade of glucose uptake by nematodes; in mammals, including man, however, it does not cause changes in blood glucose concentration.^{1,12,13}

This paper reports the results of the

use of mebendazole in infections with *Ascaris lumbricoides*, *T. trichiura* and hookworms.

Patients and methods

Patients

A total of 120 patients with intestinal nematodes were studied. No pregnant women and no children under 2 years of age were included. All were outpatients of the tropical disease clinic of Queen Mary Veterans Hospital. More than half were immigrants from tropical countries. The rest were mostly Canadians who had returned from overseas, but five persons had acquired *A. lumbricoides* infection in Quebec.

Each patient was interviewed and underwent a complete physical examination on the initial visit. In addition to stool examination a complete blood count, SMA 12/60 biochemical profile and urinalysis were done for most patients. When seen again 10 to 14 days after completion of treatment all patients were questioned carefully about side effects of the medication. For about 20% of the patients (those in the initial phase of the study) blood count and SMA 12/60 biochemical profile were repeated at this return visit.

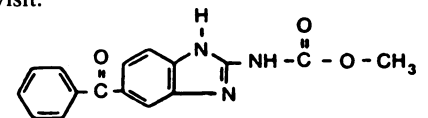


FIG. 1—Chemical structure of mebendazole.

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