Publishing and Citing Papers Concerning Nutrient Data

Perspectives of a User, Author, and Reader

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As a nutritionist in an epidemiologic research group, I am concerned about the comparability of dietary data reported in cohort and case-control studies. Epidemiologists seek confirmation of their findings on diet and disease. If the results differ from other investigations concerning the same dietary component and the same disease, nutritionists and epidemiologists look for possible explanations in the methodologies of the studies. One of the first issues to investigate are the similarities and differences in the dietary methodology and the food composition data.

I concur with Grace Petot, the chairperson of this session, about the frequent absence of information on the sources of food composition data in published papers. Recently, Audrey Maretzki, Editor of the Journal of Nutrition Education, sent me copies of eight papers with dietary intake data that were published in this Journal. In my opinion, only three of these were satisfactorily documented. The authors of one article stated that "computerized nutritional analysis of menu items provided information about nutrient content" (1). The reference was to a paper concerning a computerized analysis system. There was no information about the source of the nutrient data. The text of a second paper indicated that the 24-hour recalls were analyzed by Food Processor II (ESHA Research, Salem, OR) (2). There was no further information, no citation in the references, and no date. In a third article, the authors stated that the "unique data-based design and computer software packet are described elsewhere" (3). The references were to a paper by Block and to a computer system packet from the National Cancer Institute. Again, no information concerning the source of the nutrient data was included. Finally, another paper used a Home and Garden Bulletin from 1981 to analyze 1990 data (4). Although these papers did not pertain to diet and disease associations, they indicate that better documentation is needed.

Because of my interest in the association of carotenoids and cancer risk, I'm always interested in the methods used for assessing their intakes. As you know, until recently, data on the carotenoid contents of food items were sparse. Yet, in a paper on vitamin A, beta-carotene, and cancer risk, published in the Journal of the National Cancer Institute in 1987 (5), I found this statement, "Using the U.S. Department of Agriculture tables of food values for standard portion size of each food item, we estimated the average daily dietary intake of vitamin A and beta-carotene for each individual...." Interestingly, none of the nutrient data were published. Rather, the population was divided into thirds, according to low, medium, or high intakes of vitamin A and beta-carotene; these distributions were compared to the incidence rates of selected cancer sites. I suspect that the investigators utilized the vitamin A values of fruits and vegetables and assumed that the vitamin A in these foods could be considered the beta-carotene content of the diet. This, we know, is questionable.

Another paper dealing with the epidemiologic evidence on the role of carotenoids in reducing cancer risk (6) included two statements that I found misleading and inaccurate. The first stated that "present food composition tables reflect the content of beta-carotene, alpha-carotene, beta-cryptoxanthin, lycopene, and possibly several other carotenoids." This is only partially true since some of these carotenoids do not possess vitamin A activity. A footnote indicated that the

AOAC method does not resolve beta-carotene from the other hydrocarbon carotenoids, but that the xanthophylls are separated. This statement suggests that data on the xanthophyll contents of food items are available. However, it is only very recently that data on selected carotenoids have been published. A second misleading comment stated that "current food composition tables list for carotenoid content a composite value which measures a number of hydrocarbon carotenoid species including beta-carotene." Again, there was a footnote, "food composition tables actually list the vitamin A content of food in International Units and Retinol Equivalents, and the carotenoid content must be calculated from these values." There was no information concerning the methods for calculating these values.

In my opinion, there are indeed some acceptable ways to estimate and report carotene intakes. A few examples from the literature are shown below:

1. Report total vitamin A, and separately, vitamin A from fruits and vegetables (Byers et al, 1987) (7).

2. Compute vitamin A activity consumed in form of retinol precursors (Hinds et al, 1984) (8).

3. Use FAO/WHO percentage distribution of vitamin A into retinol, beta-carotene, and other carotenoids for different food groups, and convert to micrograms of each component (LeMarchandetal, 1989)(9).

4. Use McCance and Widdowson's food composition data for estimating total retinol and carotenes (Paul and Southgate, 1978) (10).

5. Report intakes of foods which are sources of particular carotenoids (Le Marchand et al, 1989) (9).

6. Use the provisional data on carotenoids, and impute values for similar foods (Beecheretal, 1990) (Unpub.data).

Unfortunately, editors do not always send manuscripts for review to researchers who are knowledgeable about food composition data and sources. Perhaps we should be communicating with them! We could suggest that authors presenting dietary intake data follow a prescribed set of rules, similar to the following suggested practices:

1. Identify all primary sources in the text and references.

2. Indicate the source of nutrient data of the selected software package.

3. Describe briefly the methods used for the analysis of particular nutrients.

4. Summarize the procedures used to impute any nutrient values.

I found several papers that satisfied these criteria. For example, Murphy et al. (11) stated that intakes "were calculated using the USDA Survey Nutrient Data Base, which was developed specifically for the NFCS 1977-78 data. The nutrient data were obtained from Agriculture Handbook No. 8, its first three revisions, and additional data. When analytic data were unavailable, nutrient values were derived from similar foods or calculated from recipes; there were no missing values in the nutrient data base." References were provided for all of these sources. This description indicates that others who might wish to repeat this study in another population could essentially repeat the same methods to achieve comparability.

Le Marchand et al. (9) also noted the authors and source of all major references and indicated precisely how the carotenoid content of foods was calculated. Similarly, Byers et al. (8) identified all sources used for analysis of dietary data in their paper.

It is not difficult to identify the source of nutrient values in a database. To illustrate, we are conducting dietary studies among populations living in several diverse geographic areas, and our food composition database needs to include items consumed by multiple ethnic groups in Hawaii, the U.S. Mainland, several Pacific Islands, and Asian countries. Consequently, various published tables and research papers, as well as particular laboratory analyses, are utilized for the database. The sources are identified with a particular code for each nutrient in all food items. Similarly, each diet history questionnaire utilized in a study requires modification of our database so that the values of each food group are representative of the usual diets of the study population. Such alterations should be described in the methodology of the published paper.

As the number of diet-disease studies, databases, and software packages increase, there needs to be better documentation of the source of the food composition data, along with adequate descriptions of the dietary methodology. This is essential for proper interpretation of the study findings and comparability with other published studies.

REFERENCES

1. Roberts-Gray C, Sparkman AF, Simmons LF, et al. Evaluation of Texas' child-care oriented nutrition education and training program. J Nutr Educ 21:16-25, 1989.

2. Hermann JR, Kopel BH, McCrory ML, et al. Effect of a cooperative extension nutrition and exercise program for older adults on nutrition knowledge, dietary intake, anthropometric measurements, and serum lipids. J Nutr Educ 22:271-274, 1990.

3. Smith-Porter E and Cook RA. Comparison of nutrient intake levels in older adults as estimated by self-administered versus interview-assisted food frequency questionnaires. J Nutr Educ 22:298-302, 1990.

4. Skinner JD. Changes in students' dietary behavior during a college nutrition course. J Nutr Educ 23:72-75, 1991.

5. Paganini-Hill A, Chao A, Ross RK, et al. Vitamin A, beta-carotene, and the risk of cancer: a prospective study. JNCI 79:443-448, 1987.

6. Ziegler RG. A review of epidemiologic evidence that carotenoids reduce the risk of cancer. J Nutr 119:116-122, 1989.

7. Byers TE, Graham S, Haughey BP, et al. Diet and lung cancer risk: findings from the Western New York diet study. Am J Epidemiol 125:351-363, 1987.

8. Hinds MW, Kolonel LN, Hankin JH, et al. Dietary vitamin A, carotene, vitamin C and risk of lung cancer in Hawaii. Am J Epidemiol 119:227-237, 1984.

9. Le Marchand L, Yoshizawa CN, Kolonel LN, et al. Vegetable consumption and lung cancer risk: a population-based case-control study in Hawaii. JNCI 81:1158-1164, 1989.

10. Paul AA and Southgate DAT. McCance and Widdowson's The Composition of Foods, 4th ed. New York: Elsevier/North-Holland, 1978.

11. Murphy SP, Davis MA, Neuhaus JM, et al. Factors influencing the dietary adequacy and energy intake of older Americans. J Nutr Educ 22:284-291, 1990.