Commentary: Dietary patterns in transition can inform health risk, but detailed assessments are needed to guide recommendations

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Most research on diet and health has historically focused on single nutrients or foods and their effect on disease outcomes. In recent years, this focus has shifted to include the total dietary pattern as a risk factor in epidemiologic studies. This change has occurred for several reasons. First, as we have moved from a focus on deficiency conditions to one of risk of chronic disease, the aetiology has become more complex. Methodologically, as well, it has been recognized that diets contain components that are highly collinear—so that observations of a single nutrient with a disease outcome could often be explained by other dietary factors. More than that, however, there has been the realization that it may not be enough to simply adjust for other dietary components as they are likely to interact in complex ways. The importance of this point has reached a larger audience since the limitations of several large nutrient specific clinical trials have become evident. For example, despite strong epidemiologic evidence of protective effects of beta-carotene against lung cancer in observational studies, the alpha-tocopherol beta-carotene (ATBC) trial in Finland, where beta-carotene was provided as a supplement, showed increased risk rather than protection. In the Women’s Health Initiative, modification of total fat intake did not have the expected or desired result, and it has since been acknowledged that other aspects of the diet needed consideration as well. At the same time, a more complex total diet intervention, the DASH study showed multiple improvements in health and the benefits of the Mediterranean diet were being confirmed. These and other such large studies have taught an important lesson—nutritional exposures are complex and dietary research needs a broader paradigm than the ‘pharmaceutical’ model that most studies have followed.

As dietary patterns research has become popular, numerous studies have documented the health advantages of variations of diets high in fruit and vegetables and relatively low in red meat and processed foods. Closer explorations of these patterns have lead to the generation of new hypotheses and to better understanding of nutrient interactions. However, most such studies have been conducted in the United States or Europe. Few have examined the diversity of dietary patterns worldwide and their relationship to health outcomes. This is of tremendous importance as diets in many countries are changing rapidly from traditional to more westernized patterns, with accompanying increases in obesity and diabetes. One such study, in this issue of the journal, examines dietary patterns in a large Japanese population and their relationship with cardiovascular mortality over a 7-year follow-up of adults without a history of cancer, diabetes or history of myocardial infarction at baseline. Using factor analysis, with a sample size of more than 40,000 men and women, they identified three major dimensions of the diet: a ‘Japanese pattern’, high in fish, vegetables, seaweed, soy and fruit; an ‘animal food’ pattern high in red and processed meats and butter; and a pattern they called ‘dairy, fruit and vegetable, and low alcohol’. It is important to note, that the latter pattern was actually less correlated with fruit and vegetable intake than the traditional Japanese pattern and appeared to be most distinguished by negative loadings for traditional Japanese foods like rice and miso soup in addition to alcohol intake.

Importantly, the Japanese diet has long been associated with relatively low cardiovascular disease despite high salt content and resulting hypertension. As expected, the pattern identified as the most traditional Japanese in this study was significantly associated with lower CVD mortality—those in the highest quartile of this factor were 26% less likely to die of cardiovascular disease than those in the lowest quartile (P for trend <0.01); while the ‘animal food’ factor showed the reverse—those in the highest quartile were 24% more likely to die of cardiovascular disease than those in the lowest (P for trend <0.05). These results held after adjusting for age, sex, smoking, walking (as a proxy for physical activity), education and total energy intake, and remained significant after further adjustment for BMI and history of hypertension. Numerous sensitivity analyses showed stability of patterns and of associations with outcomes. Interestingly, results for the subsets of deaths from stroke, cerebral infarction and intracerebral haemorrhage also showed significant protective effects of the Japanese diet, while coronary heart disease deaths remained significantly more likely with higher intakes of the ‘animal foods’ pattern. These results held despite the expected observation that the Japanese factor was positively associated with sodium intake, suggesting that other components of the overall diet may offer protection, despite this, both with and without the presence of hypertension.

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In some ways, the strength and robustness of the findings are surprising, as there were several methodological limitations to the dietary data. The food frequency questionnaire used included only 40 items, and did not include many processed foods that are currently popular in Japan—such as snack foods and drinks. Few prepared foods or recipes were included, likely leading to underestimation of ingredients, such as fats or oils used in cooking. In fact, total fat intakes did not appear to differ greatly across patterns, and were improbably low for the upper quartile of the ‘animal foods’ pattern, at ~21% of energy. One wonders if a more complete questionnaire would have identified additional important dimensions to the diet. Another effect this lack of detail could have is an underestimation of sodium intake in those not following the traditional pattern, thereby masking a potentially different relationship of sodium intake as a factor in these patterns. Because the distribution of gram weights can be extreme in some foods and/or distorted by water weight, the use of this variable input form (as opposed to percent of energy intake or number of servings) may lead to misclassification in categorization. Finally, the combination of incomplete data on intake and the use of quartile categories limit the ability to adjust for total energy intake, thereby adding distortion to the relative nature of the foods consumed as patterns.

The fact that clear associations with mortality were seen despite these limitations, suggests that the foods identified were sufficiently important to rank and separate major dietary choices in such a way that risk could be identified. This is an important first step in understanding these relationships. However, the patterns as described are limited in examining other aspects that may contribute to the effect of the total dietary pattern they represent. Future work should improve the detail of dietary assessment to be able to more fully describe the food and nutritional content of these patterns, to better understand potential interactions among components and to better guide dietary recommendations beyond these major food groups.

References