Weekly iodine supplements work

The feasibility of several approaches to improving iodine intakes of deficient populations, including the iodization of common salt, was shown in the first quarter of this century. In their paper in this issue, Dunn and Todd (1) remind us that during those pioneering years, studies of the effectiveness of intermittent oral doses of iodide in combating goiter were also made. Although several countries, notably the United States and Switzerland, rapidly translated into effective large-scale public health interventions the early knowledge that iodine deficiency could be simply prevented by supplementation, it is tragic that in many countries none of these interventions were widely applied during the subsequent 65 years.

Iodine deficiency continued to impair the development of children in much of the developing world at the start of this decade. In the 1990 Declaration and Plan of Action of the World Summit for Children, world leaders agreed to take action to tackle priority health and nutrition problems affecting children and women, and the goal of the virtual elimination of iodine deficiency disorders (IDDs) by the year 2000 was established.

Until 1993, many countries used large quantities of injectable or oral supplements of iodized oil. Because these supplements were expensive and required trained health staff to administer them, the effectiveness and sustainability of this approach was questionable. The study by Dunn and Todd was designed in 1991 when there was less experience with introducing salt iodization into developing countries and an urgent need to test additional ways to combat IDDs (CH Todd, personal communication, 1998).

On the basis of experiences from several developing countries, it had become clear to UNICEF by late 1992 that salt iodization would be the single most effective, affordable, and sustainable intervention to achieve the IDD goal in almost all developing countries. UNICEF’s decision to concentrate its efforts on this intervention has been effective. By 1996 the proportion of salt consumed in developing countries that was iodized had increased to >60% from <10% in 1990 (2). Reports from UNICEF offices in many countries indicate that this proportion continues to increase. If present trends continue, >90% of all salt consumed by populations at risk of IDDs will be iodized by December 2000. Even in Nepal, where in 1992 skeptics doubted that iodized salt would reach remote families who had previously been a target group for iodized oil supplements, a 1997 population survey showed that >90% of such families were already using iodized salt (3). About 80% of the salt consumed in Zimbabwe is now iodized (4).

Although salt iodization is the intervention of choice to eliminate IDDs, population groups exist for whom this approach is not immediately effective. In the far west of China, for example, the abundance of numerous local salt deposits results in little demand for packed iodized salt (5). After the feasibility and effectiveness of iodizing irrigation water in this area was shown, UNICEF is supporting the expansion of this approach to other areas in western China where the use of iodized salt is not currently feasible.

The results of the study by Dunn and Todd are relevant to the international effort to eliminate IDDs in four ways. First, they show the efficacy of another potentially practical, low-cost approach to combating IDDs in high-risk population groups who do not consume iodized salt. A year’s supply of biweekly supplements of the kind used by Dunn and Todd would cost just a few cents, excluding packaging and costs of administering the supplement, making the cost of this intervention similar to that of salt iodization, which has been estimated to cost ≈US$0.05 per person protected against iodine deficiency per year, but much cheaper than the use of iodized oil capsules. However, the most devastating consequence of iodine deficiency is the irreversible damage to the development of the fetal nervous system that occurs in the first trimester of pregnancy (6). To prevent this, reproductive-age women would need supplements, and this group might be more difficult to reach than children in school. It is partly because of the difficulty of reliably providing nutrient supplements to this population group that the folic acid fortification of cereal products was introduced in the United States at the start of this year.

Second, because the results show that a constant daily intake of iodine is not necessary to maintain adequate thyroid function, they suggest that the consumption of salt with an iodine content that varies considerably from batch to batch and from day to day will still be effective in preventing IDDs. Many small salt refiners and packers in developing countries now use simple equipment to spray an aqueous solution of potassium iodate over salt before it is sold. Under these conditions, it is difficult to maintain a precisely fixed concentration of iodine in salt. The desirable concentration at the point of production is between 20 and 40 mg I/kg salt (7). In practice, salt often reaches the consumer with concentrations of iodine ranging from zero (occasionally, when iodate supplies temporarily run out) to double the recommended amount (when the flow of salt under the iodate spray slows down).

Third, the observation that the thyroid volumes of previously iodine-deficient children decreased to normal values in groups receiving the biweekly or monthly supplements, although urinary iodine excretion did not increase, suggests that urinary iodine excretion might be a less reliable proxy for adequate thyroid function in populations than previously supposed. Population surveys that rely on urinary iodine excretion to evaluate the biological effect of salt iodization programs may underestimate their effectiveness.

Finally, in showing that biweekly, and presumably weekly, iodine supplements are effective in maintaining thyroid function,
the results of this study bring the potential use of a weekly supplement containing several important micronutrients closer. Weekly or biweekly doses of vitamin A, vitamin D, and riboflavin are known to be effective and there is growing evidence that weekly doses of iron salts improve iron status in some population groups. There is an urgent need for population-based studies on the effect of intermittent doses of other micronutrients now recognized to be critical for fetal development and child health and development, such as folic acid and zinc, and for large-scale demonstrations and evaluations of the effectiveness of weekly multiple micronutrient supplements on critical health outcomes of population groups in developing countries at risk from multiple micronutrient deficiencies.

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There needs to be more than one way to skin the iodine deficiency disorders cat: novel insights from the field in Zimbabwe

Iodine deficiency disorders (IDDs), considered to rob the performance and even threaten the lives of the estimated one billion persons at risk worldwide, are but one of the public health menaces of a nutritional nature that merit concerted public health attention. The extent to which scarce funds for nutrition in developing countries still should be invested in research has been questioned (1). This school of thought suggests that there is no longer any need for nutrition research because the solutions are in hand and all that is needed is the application of interventions (2, 3). A less sweeping corollary of that position asserts that specific health problems are beyond the investigational stage and ready for the operational (eradication) phase; for IDDs, universal iodization of table salt has been advanced as the panacea (4). If these propositions were true, we would have to condemn—rather than laud—the paper by Todd and Dunn (5) that appears in this issue as creating a distraction and division of efforts and as a heretical position.

So predominant has been the discussion about salt iodination that it is not so widely appreciated that various alternative intervention approaches to IDDs also exist. As reviewed by Elnagar et al (6), these include high-dose supplementation with iodine in oil (by injection or oral administration), iodine fortification of flour, incorporation of iodine into school snacks and beverages, addition of iodine to fertilizers, restoration of iodine to the water supply, and periodic distribution of soluble iodine (as Lugol’s solution or potassium iodide). The latter option is the one explored in Zimbabwe (5), with the authors showing the efficacy of periodic oral potassium iodide solutions in correcting the iodine-deficiency indicators of schoolchildren and setting guidelines for the periodicity of dosing. They also provide important insights into the sequential pattern of changes that occur in the iodine-status indicators during the dynamic phase after the status quo is perturbed.

Adherents of the “no more research” schools may condemn these efforts as distractions that detract from the central campaign to iodize salt. Obviously, the answer in public health research is clearly not to let every flower bloom. Our academic training forces us, however, to question any one-size-fits-all approach to public health strategy because it may be as sterile as the turn-of-the-century military debates about whether wars were to be fought only by infantry, cavalry, or artillery. For IDDs, the approach must be questioned on both theoretical and practical bases.

The approach of Todd and Dunn (5) responds to a realistic appreciation of the meaning of population diversity. Factors intrinsic to developing countries, such as vast disparities in income, ethnic heterogeneity, recurrent infections, parasitoses, varied culinary practices, migration, and urbanization, among others, create conditions for an even broader-based, prevailing distribution of nutrient status than those found in affluent nations. A so-called uniform public health intervention such as universal salt iodization, which is not really uniform because salt intakes by individuals vary greatly, would only tend to shift these broad distributions to the right. Logically, the egalitarian goal of true equity and equality will be gained not by giving everyone the same amount, but rather by seeing that everyone achieves an equivalent status. An articulated strategy would aim to narrow the distribution while centering it within the optimal range of human iodine status.

Beyond theory, however, we have the practical contemporary reality. It is almost ironic that the more a population might need iodine, the less universal is salt iodization. At least it has been our experience in Guatemala (7, 8) and elsewhere in the developing world (9, 10) that the table salt in the marketplace has nonuniform iodine content, with most samples falling below the legislated norms of the fortification statutes. Whether a high degree of underfortification is due to technical barriers, lack of political will, or both in a given situation, the existence of salt fortification laws is little guarantee of adherence by the salt manufacturers. The proponents of the monolith assure us that such barriers can be overcome. Some wait patiently, clinging to their salt shakers; others (eg, Todd and Dunn) learn more about alternative approaches.

Todd and Dunn (5) preface their conclusions with the disclaimer “Although it is no substitute for the universal iodization of salt, regular potassium iodide administration is a practical method of iodine supplementation in selected areas.” Let me make the heretical proposition that even if universal iodization
were indeed to be universal, the ingenious approaches tested in the Zimbabwe highlands may still be recommendable as complementary. A silent and imperceptible centralized action can solve a problem of nutrient reserves but it may not educate the populace about its own health situation. Salt iodization does not produce any conscious linkage of the source of iodine with the resolution of goiter. By contrast, in the context of a school-based intervention, both the pupils (future parents) and their parents can actually observe and appreciate the cause-effect relation between the periodic potassium iodide drinks and the involution of their own neck swellings. This informs the population and builds a constituency of the citizenry for access to iodine in a way that a top-down, imperceptible iodine-addition-at-a-distance approach can never muster. Even in places where salt iodization is being implemented, local school potassium iodide projects should still be considered as a complementary action.

Natural science has a fascination with complexity and diversity; public health policy, on the other hand, finds diversity both troublesome and problematic and opts for one-size-fits-all solutions. Nature, however, has the last word in this debate. In ways of diet and nutrition, especially for low-income human populations, the myths of the monotonous diet and the generalized deficiency have been overvalued. The intrinsic complexities and uncertainties in nutritional problems call for creativity and diversity in their solutions.

I am left admiring the initiative of Todd and Dunn (5), who rightly show us that the rumors about the death of any need for further research into solving IDDs have been greatly exaggerated. With intervention strategies that use only a single, monolithic, broad-brush approach in public health we run the risk of painting ourselves into a corner, but the addition of other tools, such as rollers, multinozzle sprayers, and fine-tipped brushes allow us to cover every ragged nook and cranny of complex health problems. The work from Zimbabwe (5) leaves us with a more diverse armamentarium with which to confront and combat IDDs. Understanding and respecting the complexity and diversity of human populations may provide us with the wisdom to select among the various tools at hand.

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