LATIN AMERICAN THYROID SOCIETY (LATS) SUPPORTS MONITORING THE OPTIMAL SALT IODIZATION

Gabriela Brenta, Lorena Montserrat Mosso Gomez, Maria del Carmen Silva Croome and Helton Estrela Ramos

As a result of the recognition of iodine deficiency as the principal etiology for goiter worldwide, in the 1940s, several countries in Latin America started introducing the use of iodized salt in order to eliminate the goiter belts. In Argentina, Dr. Hector Perinetti together with the Health Minister Dr. Arturo Oñativia committed to the study of endemic goiter and received the visit of Dr. John Stanbury in 1950 to this aim. Later on, Dr. Mario Pisarev, Dr. Juan Pablo Salvaneschi and Dr. Gerardo Sartorio carried on with this project with the determination of blood thyroid tests, urinary iodine concentration (UIC) and thyroid palpation in school-age children (SAC). Having recognized this disease as a public health problem, the World Health Organization (WHO) created a study group on endemic goiter, with the collaboration of John Stanbury and other prestigious Latin American experts. In 1961, the Scientific Advisory Committee of the Pan American Health Organization (PAHO) (1) designed a panel of distinguished scientists that included Dr. Jorge Maisterrena from the Institute of Nutritional Diseases in Mexico City; Dr. Rodrigo Fierro from the University of Quito and the Technicologic Institute of Quito, Ecuador; Dr. José Barzelatto of the Salvador Hospital and the University of Chile; Dr. Yaro Gandra of the University of Sao Paulo, Brazil; Dr. Luis Carlos Lobo of the University of Rio de Janeiro and University of Brasilia; and Drs. Marcel Roche and Karl Gaede of the Venezuelan Institute of Scientific Research in Caracas. Later on, the research focused on endemic goiter was followed by several investigators in universities of Central and South America who were already experts in thyroidology and who worked in proximity to foci of endemic goiter, among them were Dr. O. J. Degrossi, Dr. N. Altschuler, Dr. H. Forcher, Dr. A. A. Zaninovich, Dr. O. M. Mutchinick, Dr. C. L. Enriori, Dr. H. Soto and Dr. H. Niepomniszcze from Argentina and Paraguay, Dr. J. Barzelatto and Dr. E. Covarrubias from Chile, Dr. E. Gaitán and Dr. H. W. Wahner from Colombia, Dr. A. Medeiros-Neto, Dr. L. C. G. Lobo, Dr. W. Nicolau, Dr. D. Rosenthal, Dr. J. Fridman from Brazil, Dr. R. Fierro-Benítez, Dr. I. Ramirez, Dr. E. Estrella, Dr. C. Jaramillo, Dr. C Díaz, and Dr. J. Urresta from Ecuador, Dr. E. A. Pretell, Dr. F. Moncloa, Dr. R. Salinas, Dr. R. Guerra-García, Dr. A. Kawano,

Dr. L. Gutiérrez, Dr. J. Pretell, and Dr. M. Wan from Peru and Dr J. A. Maisterrena, Dr. E. Tovar, and Dr A. Chávez from México, to assure a permanent surveillance on iodine nutrition and thyroid function. This decision resulted in positive steps taken to prevent the development of goiter, such as in Argentina, where the national law on salt iodization was finally passed in 1967 (2). In 1980, all the consequences of the lack of iodine, ranging from goiter to mental retardation, were gathered under the term "iodine deficiency disorders" (IDDs) and the measurement of UIC levels became the best tool to monitor population iodine deficiency status (3). In 1994, in an attempt to reduce the prevalence of iodine deficiency worldwide, the WHO recommended eliminating IDDs by iodizing all salt for human consumption (3). The prevalence of goiter as it relates to iodine nutrition has been studied in SAC from 13 Latin American countries with the use of the ThyroMobil model. In some of the regions, the prevalence was very low (3.1%), while in others it reached 25%, with median UIC correlating well with the iodine in the salt. The median iodine content in the salt varied outside the recommended range of 20-40 parts per million (ppm), and was greater than 78 ppm in 83.1% of all samples, demonstrating a great achievement in the elimination of iodine deficiency in most of the studied countries (4). From 2005 on, the WHO determined that each country should make its own reports on the iodine deficiency situation every 3 years. By 2007, the number of countries with iodine deficiency (median UIC < 100 μg/l) had reduced from 54 in 2003 to 47.

Born as the International Council for Control of Iodine Deficiency Disorders (ICCIDD) in 1986, the Iodine Global Network (IGN) is now the authoritative voice for iodine nutrition. With a focus on universal salt iodization (USI) as the most cost-effective and sustainable solution for prevention of iodine deficiency disorders.

Several partners cooperate in the global effort to eliminate IDD and Health agencies must provide the sustaining leadership to create and maintain long-term solutions to problems of iodine deficiency by fortifying salt with iodine. It is mandatory to ensure Government commitment to USI and enforcement of mandatory legislation, to get the salt industry support to ensure/achieve sustained household access to high-quality, adequately iodized salt, and to have regular surveillance and monitoring to identify programmes that are not working and require remedial action. Awareness of the consequences of iodine deficiency among government, salt producers, and the general public is critical. Optimal iodine nutrition needs to be accepted as a fundamental right

and USI as the most cost-effective tool to achieve it. There is also a need to accept that salt iodization and salt reduction (to avoid Arterial Hypertension) are compatible and synergistic health policies.

WHO defines adequate iodine intake in adults as a median UIC value ≥ 100 µg/L (5). However, the scientific basis for this threshold is weak, and estimates based on populations other than SAC should be interpreted with caution. Adequate iodine intake in SAC corresponds to median UIC values in the range 100-299 µg/L, and includes categories previously referred to as "Adequate" (100-199 µg/L) and "More than adequate" (200-299 µg/L) (5).

Adequate iodine intake in pregnant women corresponds to median UIC values in the range 150-249 µg/L (5). Because of altered physiology during pregnancy, iodine intake in this population group should not be used as a proxy for the general population.

IDD Elimination Program in Latin America demonstrates the effectiveness of mandatory salt iodization in eliminating IDD in SAC. It also reinforces the importance of achieving equity in high coverage with adequately iodized salt. However, we still have questions about whether currently proposed criteria for indicating optimal iodine status in SAC and pregnant women are correct and whether median UIC levels between 100 and 150 g/L are of concern in pregnant women when they are likely to have entered pregnancy with adequate iodine stores. It is also crucial for public health interest if iodine supplementation will improve maternal and child health outcomes in areas with mild to-moderate iodine deficiency. Actually, it is unclear whether the available data on maternal thyroid indices from controlled intervention trials can serve as a surrogate for future children intellectual development. A recent controlled antenatal trial, the CATS study (6), failed to show any benefits of treating maternal hypothyroidism on children IQ at 9.5 years of age. The women in this study had milder degrees of hypothyroidism than in earlier studies and in addition L-T4 treatment in the CATS study was initiated relatively late in gestation. A further consideration is that maternal hypothyroidism carries an increased risk of miscarriages and pre-term deliveries, complications largely preventable by L-T4 therapy. Thus, taken together it is plausible that optimization of maternal thyroid status through iodine supplementation in marginally iodine-deficient areas might have benefits.

A major concern with iodine supplementation in pregnant women has been the risk of iodine-induced thyroid dysfunction. Recently published data in Brazil are contradictory. Mioto et al (7), in Sao Paulo, analyzed 273 pregnant women, with median UIC of 146 μg/L, being 52% iodine deficient and only 4% in excess. They concluded that the Brazilian salt iodization program prevents deficiency but does not maintain iodine status within adequate and recommended ranges for pregnant women. In Rio de Janeiro, Saraiva et al. (8), have shown, after analyzing 629 samples of 244 first trimester pregnant women, using a very high quality methodology to assess UIC (inductively coupled plasma mass spectrometry), a median UIC considered adequate (221.0 μg/L), with 48.7% of women also presenting low UIC (<150 μg/L). An important issue was that, in this study, excessive UIC was associated negatively with subclinical hypothyroidism (OR = 5.6; 95% CI, 1.0-30.2). The studied population was considered iodine sufficient, and the recommendation was that supplementation should not be generally considered, based on the risk association between excessive UIC and subclinical hypothyroidism.

Concern about iodine overexposure and eventual increase of thyroiditis and subclinical hypothyroidism has also risen for the general population. Special attention and intense scientific research has been motivated in Chile (9-11).

Overall, there is evidence suggesting that iodine supplementation during pregnancy in Latin American countries must be further analyzed in order to avoid risks. We still need to update data on salt consumption in the Latin American population and be sure about the iodine content adequacy of salt for food processing, as well the household salt, in order to ensure adequate intakes. Governments must keep on monitoring the local optimal salt iodination amounts because they change dynamically as countries face their epidemiologic transitions. Population-wide mandatory iodination must be supported, but caution must be introduced so to include the lowest amount of iodine necessary to achieve IDDs minimization but at the same time, prevent overexposure. Iodine deficiency and overexposure will always coexist, Gauss curves assure this. To prevent overexposure, complementary “high risk strategies” directed to subgroups with higher risk of deficiency may have to be introduced. Mathematical models and cost effectiveness studies may help calculations on the precise amount of iodine needed in salt for each country. Local monitoring of population UIC is essential, as well as population salt consumption surveillance. Finally, calculation of the amount of iodine

content in salt has to be compatible with healthy lifestyle population messages: “lower your salt consumption, but always USE iodinated salt. Breast feed under 6 months children and eat dairy products regularly (including marine products, eggs, milk, fruit and vegetables)”. Well-designed combined policies will be compatible and synergistic. Since 2016, Latin America is celebrating the virtual elimination of iodine deficiency (12). Nevertheless, underexposure to iodine is still an issue (also is overexposure) (13) and governments must keep on monitoring the optimal salt iodination and the impact on the population, since sustainability is essential. With increasing campaigns recommending salt consumption reduction, efforts must be done to combine both policies so that they can be compatible and synergistic.

In conclusion, LATS strongly supports universal salt iodization and any effort necessary to assure an adequate iodine supply to the population.

References

1- Stanbury, John B; ed. (1969). Endemic goiter ; report of the meeting of the PAHO Scientific Group on Research in Endemic Goiter held in Puebla, Mexico, 27 to 29 June 1968. Pan American HealthOrganization. http://www.who.int/iris/handle/10665/170114

2. Feld A, Busala AE. Research and cure: knowledge and prophylaxis of endemic goiter in Argentina (1916-1958). Asclepio. 2010;62:375-404.

3. Li M, Eastman CJ. The changing epidemiology of iodine deficiency. Nat Rev Endocrinol. 2012;8:434-40.

4. Pretell EA, Delange F, Hostalek U, Corigliano S, Barreda L, Higa AM, et al. Iodine nutrition improves in Latin America. Thyroid. 2004;14:590-9.

5. http://www.ign.org/

6. Hales C ET AL Controlled Antenatal Thyroid Screening II: effect of treating maternal sub-optimal thyroid function on child cognition. J Clin Endocrinol Metab 2018 Jan 15. doi: 10.1210/jc.2017-02378.

7. Miotto et al. High prevalence of iodine deficiency in pregnant women living in adequate iodine area. Endocr Connect. 2018 Apr 26. pii: EC-18-0131.

8. Saraiva et al. Iodine status of pregnant women from a coastal Brazilian state after the reduction in recommended iodine concentration in table salt according to governmental requirements.Nutrition. 2018 Feb 14;53:109-114.

9.Mosso L, Martínez A, Rojas MP, Latorre G, Margozzini P, Lyng T, Carvajal J, Campusano C, Arteaga E, Boucai L. Early pregnancy thyroid hormone reference ranges

in Chilean women: the influence of body mass index. Clin Endocrinol (Oxf). 2016 Dec;85(6):942-948.

10.Mosso L, Margozzini P, Trejo P, Domínguez A, Solari S, Valdivia G, Arteaga E. Thyroid stimulating hormone reference values derived from the 2009-2010 Chilean National Health Survey. Rev Med Chil. 2013 Jan;141(1):95-103.

11. Mosso L, Martínez A, Rojas MP, Margozzini P, Solari S, Lyng T, Ortíz JA,Carvajal J. Frequency of subclinical thyroid problems among women during the first trimester of pregnancy. Rev Med Chil. 2012 Nov;140(11):1401-8.

12. Pretell E. at Micronutrient Forum, Cancun Mexico, 24 October 2016.

13. Camargo RY, Tomimori EK, Neves SC, I GSR, Galrao AL, Knobel M, et al. Thyroid and the environment: exposure to excessive nutritional iodine increases the prevalence of thyroid disorders in Sao Paulo, Brazil. Eur J Endocrinol. 2008;159:293-9.