

Summary of the first report on the iodine nutritional status in Italy

Antonella Olivieri¹, Massimo Tonacchera², Paolo Vitti², and The Regional Observatories for Goiter Prevention*

¹Istituto Superiore di Sanità, Roma; ²Università di Pisa, Italy

Introduction

In Italy a nationwide salt iodization program on a voluntary basis was implemented in 2005 after approval of the Law n.55/2005 aimed at preventing endemic goiter and other iodine deficiency disorders. According to the law iodine is added to course and table salt at 30 mg/kg in the form of potassium iodate and the use of iodized salt is permitted in the food industry and in communal eating areas. A nationwide monitoring program of universal salt iodization is carried out by the Italian National Observatory for Monitoring Iodine Prophylaxis (OSNAMI), which was established in 2009 at the Italian National Institute of Health (www.iss.it/osnami). The aims of OSNAMI are to evaluate the efficiency and effectiveness of the nationwide program of iodine prophylaxis in Italy and the activities of OSNAMI are annually reported to the Ministry of Health. Here we are presenting a short summary of the first report on the iodine nutritional status in the Italian population recently published by OSNAMI [1].

1. Indicators of the efficiency and effectiveness of iodine prophylaxis

In agreement with the guidelines of WHO, UNICEF, and ICCIDD [2], monitoring is based on the indicators showed in Table 1.

Table 1. Indicators used to monitor iodine prophylaxis

Indicators	Description
efficiency	Iodine content in salt Sales trend of iodized salt Median value of urinary iodine concentration (UIC) in schoolchildren Median value of urinary iodine concentration (UIC) in pregnant women
effectiveness	Percentage of goiter in schoolchildren Percentage of neonatal TSH>5.0 mU/L Incidence of congenital hypothyroidism
adverse effects	Methimazole prescription trend (as an indirect evaluation of new cases of hyperthyroidism)

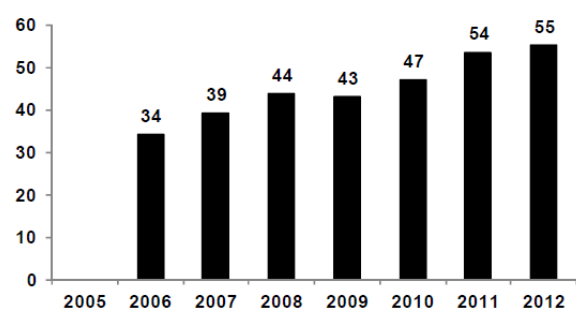
2. Iodine content in salt packages on the market

Assessment of the iodine content in salt on the market is carried out by the local health units in each Italian region. Further analyses are performed at the Italian National Institute of Health. Samples of the salt are taken both at the production sites and the points-of-sale. Up to now all the analysed samples have shown an iodine content within the limits permitted by the law (permitted range: 24-42 mg/Kg).

3. Sale trend of iodized salt

Sale trend of iodized salt is evaluated by collecting national sale data submitted to the Italian National Institute of Health by the salt producers. Over the years following the approval of the law an increasing trend of sale of iodized salt has been observed. In fact the percentage of iodized salt sold in 2006 was 34% and 55% in 2012 (Fig. 1). As the iodine prophylaxis program is not mandatory, further efforts should be made to better inform the population about the importance of using iodized salt. In fact, for an optimal iodine prophylaxis the consumption of iodized salt should be about 90% of the total salt consumption.

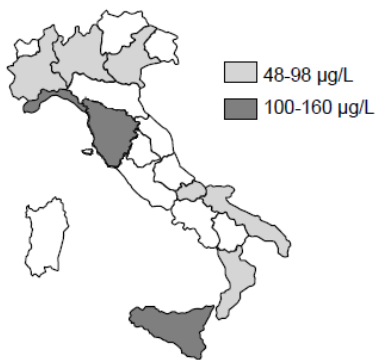
Fig.1 Sale percentage trend of iodized salt



4. Urinary iodine concentration (UIC) in schoolchildren

The surveys in the schools, aimed at evaluating UIC in schoolchildren, were conducted in collaboration with the Regional Observatories for Goiter Prevention. Between 2010 and 2012, 4,000 schoolchildren residing in nine regions were recruited. Each child attending the selected school provided a morning spot-urine sample to determine the UIC. The criterion to define an adequate iodine intake was a median UIC of at least 100 µg/L. In six out of the nine regions the median UIC ranged between 48 and 98 µg/L, whereas in the remaining three regions (Liguria, Tuscany, Sicily) median UIC values (range: 100-160 µg/L) indicated an adequate iodine intake (Fig. 2). A further survey to verify a lasting iodine sufficiency is being carried out in these three regions.

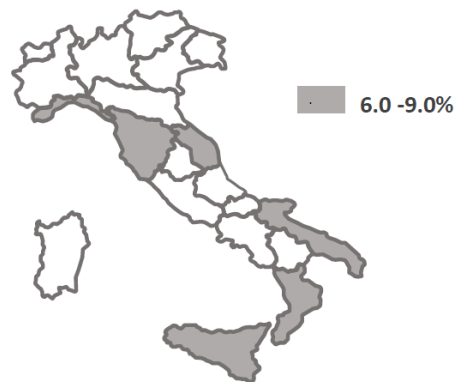
Fig.2 Median values of UIC in 9 Italian regions



5. Prevalence of goiter in schoolchildren

Data on prevalence of goiter in schoolchildren (n=3000) were available in six regions. Thyroid ultrasonography was performed in all children by trained observers. In all the regions the prevalence of goiter resulted to be higher than 5% ranging between 6% and 9% (Fig.3).

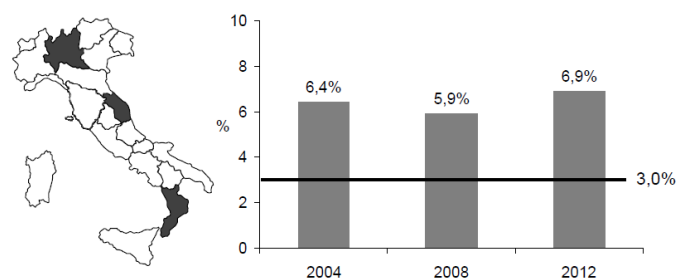
Fig.3 Prevalence of goiter in schoolchildren residing in 6 Italian regions



6. TSH concentration in newborns

A program of neonatal screening for congenital hypothyroidism has been active in Italy since the 1970s. Data on neonatal TSH are collected through the network of the regional laboratories performing the newborn screening for the disease. According to WHO indications effectiveness of a prophylaxis program in the neonatal population is demonstrated by a frequency less than 3% of newborns with TSH values >5.0 mU/L. Between 2004 and 2012 data collected in three regions (Lombardia, Marche, Calabria), representative of Northern, Central, and Southern Italy, (Fig. 4) were used to monitor the iodine nutritional status in newborns. Pooling the data from these three regions the frequency of TSH >5.0 mU/L resulted to be higher than 3.0% throughout the observation period (6.4% in 2004; 5.9% in 2008; 6.9% in 2012).

Fig.4 Frequency of TSH > 5.0 mU/L in newborns



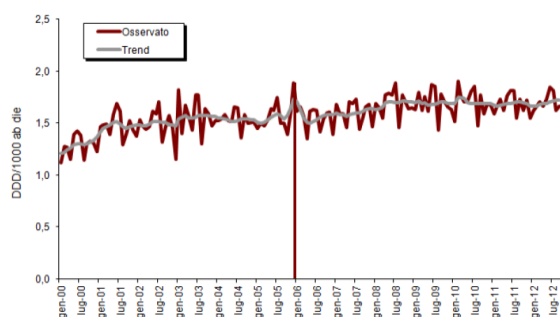
7. Incidence of congenital hypothyroidism

In Italy the surveillance of congenital hypothyroidism (CH) is performed by the Italian National Register of Infants with Congenital Hypothyroidism (INRICH), which is coordinated by the Italian National Institute of Health (Istituto Superiore di Sanità). The analysis of the INRICH data has shown that, similarly to what has happened in other countries, the incidence of CH has increased over the years. This is mostly due to the reduction of the cutoff levels which results in a greater identification of milder forms of the disease. In our country between 1999 and 2008 the incidence of babies with CH confirmed at birth (permanent + transient forms) was 1:1940 live births, whereas the incidence of babies with permanent CH (ascertained after re-evaluation of the diagnosis at the age of 3 years) was 1:2320 live births [3]. New analyses are ongoing to estimate the trend of the CH incidence after the introduction of the nationwide program of iodine prophylaxis.

8. Surveillance of adverse events

The surveillance of adverse events focuses on new cases of hyperthyroidism. The sale trend of anti-thyroid drugs, as an indirect indicator of new cases of hyperthyroidism, is analysed in collaboration with organizations appointed for drug control by the Italian Agency of Drugs (AIFA). (Fig.5). No increase of such drugs has been observed after the introduction of the iodine prophylaxis program in our country (year 2005).

Fig.5 Sale trend of anti-thyroid drugs



9. Circulation of information

Activities of OSNAMI are presented annually to the Ministry of Health. Participants of the monitoring program regularly meet to discuss potential interventions to improve the iodine prophylaxis program. Furthermore the OSNAMI web site (www.iss.it/osnami) is regularly updated.

10. Conclusions

Although an improvement in the iodine intake has been ascertained over the years following the approval of the law which introduced iodine prophylaxis, many areas in our country are still characterized by mild iodine deficiency. Therefore a high frequency of goiter and other iodine deficiency disorders is still observed in Italy.

11. References

1. Olivieri A and Vitti P. Attività di monitoraggio del programma nazionale per la prevenzione dei disordini da carenza iodica. *Rapporti ISTISAN 14/6, 2014*. Available at site http://www.iss.it/binary/osna/cont/Rapporto_Istisan_2014.pdf
2. World Health Organization. Assessment of iodine deficiency disorders and monitoring their elimination: a guide for programme managers. 3rd ed. Geneva: WHO, 2007.
3. Olivieri A, Fazzini C, Medda E et al. Multiple factors influencing the incidence of congenital hypothyroidism detected by neonatal screening. *Horm Res Paediatr 2015, 83:86–93*.

*The Regional Observatories for Goiter Prevention:

S. Andò (Calabria), M. Bagnasco (Liguria), P. Bellitti (Basilicata), M. Cignarelli (Puglia), E. Consiglio (Campania), M. D'Armiendo (Lazio), E. Degli Uberti (Emilia Romagna), G. Doveri (Valle D'Aosta), M. Gasperi (Molise), S. Mariotti (Sardegna), C. Mian (Veneto e Friuli-Venezia Giulia), G. Napolitano (Abruzzo), F. Orlandi (Piemonte), G. Radetti (Trentino-Alto Adige), C. Regalbuto (Sicilia), E. Puxeddu (Umbria), A. Tacaliti (Marche), M.L. Tanda (Lombardia), M. Tonacchera (Toscana).