



**ENDEMIC GOITER IN BRAZIL**

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**PUBLICAÇÃO IEA N.º 215**  
Junho — 1970

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CIDADE UNIVERSITÁRIA "ARMANDO DE SALLES OLIVEIRA"  
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\*Report of the Meeting of the PAHO Scientific Group on Research in Endemic Goiter held in Puebla, México, 27 to 29 June 1968, Chapter 15 - pg.179-182, 1969.

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## ENDEMIC GOITER IN BRAZIL

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### SUMMARY

The authors have briefly reviewed the history of endemic goiter in Brazil, with several references to early reports in colonial times. The present public health significance of endemic goiter is emphasized and reference is made to a suggestion that the prophylactic program should be reviewed mainly to the lack of control of the concentration of iodine in common salt in São Paulo. It is assumed that within the present prophylactic conditions less than 300 µg of iodine per day is actually ingested per person. It may be hoped that these deficiencies will be rectified in the near future.

### HISTORY

References to endemic goiter in Brazil go back to colonial times when the French scientist, Saint-Hillaire (1819), reported in his "Description of People and the Land of Brazil" that more than 80 per cent of the inhabitants of the State of Goiás presented an enlarged thyroid gland (13). In 1820 another traveler, Martius (17), noted the same in the State of Minas Gerais and observed that women were more affected than men. In the same year D'Orbigny gained the impression that four-fifths of all the men and women in a small valley in São Paulo had visible tumours of the neck (15).

Early in the present century Neiva and Pena (10) reported a high incidence of goiter in the upper São Francisco river. The number of person affected seemed to be lower as they traveled down the river toward the sea. They also mentioned a significant incidence of enlarged thyroids in areas where there was no Chagas' disease. This seems to be the first observation that there is no di-

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rect relationship between the two endemic disorders. Twenty years later Lobo-Leite (5) confirmed this impression, reporting negative complement fixation tests for Chagas' disease in most goitrous patients of Minas Gerais.

Iodine-want as an etiologic possibility for the Brazilian endemic was first seriously suggested by Viana (18) in 1938. He presented evidence for lack of environmental iodine (in food and water) in a number of towns in Minas Gerais State. In 1944 Lobo-Leite (6) was able to demonstrate the effectiveness of potassium iodine in preventing endemic goiter. He reported a decrease in the incidence of thyroid enlargement in schoolchildren from 44 per cent to 27 per cent after two years of continuous administration of the iodized salt. During the decade that followed many investigators reported the incidence of goiter among schoolchildren in São Paulo, Paraná, and Rio Grande do Sul (1, 3, 11, 14).

Official attention was first paid to the problem in 1953 when the Ministry of Health published a report on the incidence of endemic goiter in Brazil (16). It was only in 1956 that Pellon et al. (12) issued a complete study on the problem of endemic goiter. For this extraordinarily thorough study 1,129 towns were visited in 19 states and 886, 217 individuals were examined. More recently Aragão (2) established the geographic distribution of endemic goiter in Brazil, and Memoria (9) reported the incidence of non-tasters to phenylthiocarbamide (PTC) among normal and goitrous children in Minas Gerais State.

In 1964 Gandra (4) described this findings in 56,230 schoolchildren between the ages of 6 and 16 in 154 towns in São Paulo State. For this study radioiodine was used and the stable iodine concentration in water and common salt were measured.

Lobo et al. (7, 8) in 1966 studied the relationship between endemic goiter and Chagas' disease and observed a number of abnormalities in thyroidal iodoproteins in endemic cretins.

PRESENT PUBLIC HEALTH SIGNIFICANCE OF ENDEMIC GOITER

On the basis of the official report of Pellon et al. (12) it appears that nearly 11 million Brazilians are affected with endemic goiter. The survey revealed also three distinct areas of endemicity:

- 1) East meridional, south and west regions:  
high incidence.
- 2) North and northeast occidental regions:  
moderate endemicity.
- 3) Northeast oriental and east setentrional:  
free of endemic goiter.

No correlation was found between the frequency of endemic goiter and altitude, but goitrous females outnumbered effected males by more than two to one. The differences between sexes was reduced with increasing degree of endemicity up to 40 per cent.

The present problem of endemic goiter in the various states of Brazil is presented in Table 1. Gandra (4) was unable to find a decrease in the incidence of goiter among school-children in São Paulo State two years after the first survey. He concluded that the prophylactic program of endemic goiter must be revised and an increased iodine content of the diet must be put in practice by the public health system.

Table 1. Incidence of endemic goiter in various states of Brazil (12)

State	Incidence (per cent)
Mato Grosso	58.9
Minas Gerais	34.6
Goiás	34.0
São Paulo	30.0
Rio de Janeiro	28.8
Santa Catarina	28.4
Paraná	24.0
Espírito Santo	21.5
Rio Grande do Sul	19.5

#### PRESENT PRACTICE REGARDING PROPHYLAXIS

By a law of (14) August 1953, it became mandatory that iodine be added to salt in the proportion of 10 mg per kilogram of refined sodium chloride, either as sodium or potassium iodide. The law, however, reserved the use of iodized salt to Brazilian regions where endemic goiter among schoolchildren is more than 15 per cent for boys and 25 per cent for girls. This was criticized, for it deprived many regions from the benefits of the law. The law made no reference to the use of iodate, which technically and economically has many advantages over iodide salts.

Gandra (4) first called the attention of public health officials to the lack of control of the concentration of iodine in common salt in São Paulo. Analyses were made of 869 samples of table salt (under different names) in 153 towns. The mean concentration of iodine was  $4.57 \pm 3.56$  mg of iodine per kilogram of salt. In 57 samples more than 10 mg per kg were found, and in 163 the value of iodine was between 5 and 9.9 mg per kg. Of 16 brand names, more than 15 samples were collected at different places and towns. Only one brand name sample had a confidence interval that included 10 mg per kg. Accordingly, it was suggested that the current industrial mixture of iodine and sodium chloride was not homogeneous and that the entire system should be revised.

Nevertheless, it should be mentioned that the use of iodized salt in São Paulo since 1953 decreased the incidence of endemic goiter among schoolchildren from 27.08 per cent (4) to 19.29 per cent. This result is far from satisfactory. One of the reasons could be the heterogeneous concentration of iodine in common salt. If one assumes that the daily use of salt per person is 10 to 15 g (mean: 12.5 g) with a mean concentration of 4.5 mg of iodine per kg, then the population in São Paulo State receives 57.6  $\mu$ g of iodine per day. Even when this figure is added to the iodine content of food and water it is still below the 300  $\mu$ g per

day recommended as an effective prophylaxis program. It may be hoped that these deficiencies will be rectified in the near future.

#### RESUMO

Os autores reviram, de maneira sumária, a história da endemia de bócio no Brasil, com várias referências aos relatórios iniciais de viajantes como Saint-Hillaire e Martins, em tempos coloniais. A significação atual do programa profilático de bócio endêmico é particularmente focalizada e faz-se referência a sugestões de que este programa deva ser revisto principalmente pelo fato de haver pouco controle sobre a concentração de iodo no sal de cozinha comumente empregado em São Paulo. É aceito que menos de 300 microgramos de iodo por dia são ingeridos habitualmente por pessoa nas presentes condições, o que estaria abaixo do mínimo recomendado. Espera-se que estas deficiências sejam corrigidas em futuro próximo.

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