Original Article

PERSISTENCE OF GOITER DESPITE ADEQUATE IODINE INTAKE

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ABSTRACT

Objective: To evaluate the state of iodine uptake and frequency of goiter in a previously endemic population after use of iodine salt for ten years.

Methodology: In an area in south of Iran following examination of randomly selected 1504, 8-10 year school children, 102 cases with grade 2 or larger goiter were found. One hundred normal cases regarding thyroid examination were also selected as controls. From all 202 children, random urine specimen was assayed for iodine as an indicator of iodide intake.

Results: Frequency of goiter grade 2 or larger was 6.8%. Median levels of urinary iodine in goiterous children and controls were 20.00µg/dL and 24.50µg/dL respectively. Values more than 10µg/dL indicate sufficient intake. Frequency of iodine deficiency in patients with goiter was 14.0% vs. 12.7% in control group. There was no statistically significant difference between the two groups (P value=0.748).

Conclusion: Iodized salt has been effective to provide acceptable iodide intake but other causes are supposed to be responsible as etiologic factors for persistence of endemic goiter.

KEY WORDS: Goiter, Iodine deficiency, Urine iodide.

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INTRODUCTION

Thyroid is the only easily available endocrine gland for examination and its diseases are also the commonest among the endocrine system. For the past centuries it has been known that plants containing iodide could prevent and even treat goiter.[1]

During the past few decades, on the basis of WHO recommendation, many countries have started iodide supplementation with fortification of salt or water. These supplementations are important especially in high altitude regions where soils are poor in iodide.

A report by WHO in 2003 denoted that globally two billions people including 284 million children were at risk of iodine deficiency and half of them had some degrees of goiter.[2] According to UNICEF description, when more than 5% of 6-12 year school age children have goiter in any region, the term of *endemic* could be applied to that area.

Iodine deficiency is the single most common cause of preventable mental retardation and brain damage in the world. Recommended daily allowances for iodide are as follow: for adults and adolescents 150µg/day, pregnancy and lactation 200µg/day, children 120µg/day and for infants less than a year 50µg/day.[3] Success of these measures, supplementation with iodized salt and effective monitoring of iodine nutrition are effective and could be a great event in preventive medicine.

The main aims of this study were two folds first: to prove that iodide supplementation has

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been sufficient and second, to update our information about the frequency of goiter despite the general impression that frequency was drastically decreasing. The population under study has been on iodide supplementation through iodized salt for more than 10 years.

SUBJECTS AND METHODS

In a case control study in an area of south of Iran which is known for high incidence of endemic goiter, 1504 randomly selected 8-10 year school children were examined. Out of this 102 cases(53 male, 49 female) of goiter grade 2 or larger were found. One hundred (47 male, 53 female) normal children; age and sex matched were also selected as control. Grading of goiter was done according to WHO method: 1A, just palpable; 1B, visible only with neck extension,[2] visible in normal position;[3] visible from as far as 3 meters. Because stool iodide excretion is very low and negligible, urine iodide were assessed as an indirect indicator of iodide intake; so a random urine sample was obtained from each child and assayed by spectrophotometry in reference laboratory.

RESULTS

Frequency of goiter grade 2 or larger was 6.8%. Medians of urinary iodine were 20.00µg/dL in goiterous children, and 24.50µg/dL in controls. Frequency of severe iodine deficiency on the basis of urinary iodine content less than 2µg/dL, were 2.2% in goiterous and 5.3% in controls. The difference was not statistically significant between two groups (P value=0.748).Because iodine excretion more than 10µg/dL in urine indicates sufficient and more than.[5] µg/dL denotes acceptable intake, it is concluded that: Although iodide supplementation was sufficient the incidence of goiter has remained as high as in endemic areas. Table-I and II.

DISCUSSION

It's accepted that urine iodide measurement in random specimens provides an adequate assessment of population's iodine nutrition. Some studies, for instance Bilabina[4] in Togo compared urine iodide with iodine content of water intake, and found direct significant relationship. Others such as Markou[5] in Azerbaijan compared a new rapid urine iodide assay method with older classic method. The new method was an acceptable alternative while it was rapid and inexpensive. Finally ICCIDD (The International Council for the Control of Iodine Deficiency Disorders) Chairman, Jack Ling believes that because the intake of iodized salt, meat, dairy products or seafood is not clearly known in different individuals it's better to monitor iodine intake using a random urine iodine assessment.[6]

ICCIDD was formed in 1985 with support of UNICEF, WHO, and the Australian government, to bridge the gap between available knowledge and its application to attain iodine sufficiency for the millions at risk Table-III.

Table-I: Comparison of mean, median and mode of urine iodide (µg/dL) between both groups: goiterous cases and control.

N.	*Valid*	*Goiter*	*Control*
		93	94
	Missing	9	6
Urinary Iodine excretion (mcg/dL)	Mean	22.6774	23.4043
	Median	20.0000	24.5000
	Mode	40.00	40.00

Table-II: Population distribution according to median of urine iodide excretion (µg/dL) in both groups.

		Frequency and valid percent			
Median urine iodine µg/dL		*Goiter*		*Control*	
Severe iodine def.	=or< 2	2	2.2%	5	5.3%
Moderate def.	2.1-4.9	4	4.3%	2	2.1%
Mild def.	5-9.9	7	7.5%	5	5.3%
Optimal	10-19.9	27	29.0%	24	25.5%
More than adequate	20-29.9	25	26.9%	27	28.7%
possible excess intake	=or> 30	28	30.1%	31	33.0%
	Total	93	100.0%	94	100.0%
Missing system		9		6	
Total		102		100	

Table-III: The following scale has been used by WHO/ICCIDD/UNICEF to relate iodine nutrition to urinary iodine concentration (6)

*Median Urinary Iodine Concentration (µg/dL) **	*Corresponding Approximate Iodine Intake (µg/day)*	*Iodine Nutrition*
<2	<30	Severe deficiency
2-4.9	30-74	Moderate deficiency
5-9.9	75-149	Mild deficiency
10-19.9	150-299	Optimal
20-29.9	300-449	More than adequate
>29.9	>449	Possible excess

A median urinary iodine concentration between 10 and 20µg/dL is ideal.

Potentially both iodine deficiency and iodine excess[3,7-8] can cause goiter. Both possibilities as the main cause of endemic goiter could be ruled out in our cases because of more frequent severe iodine deficiency and slightly higher urinary iodine excretion in controls. Comparing with previous studies[9-11] of Mostafavi[12] and Mozaffari[13] which have been done in areas similar to ours, frequency of goiter mentioned in our study seem to be more consistent due to the fact that physical examination has been done by a pediatric endocrinologist.

Reviewing the above scaling method and the result of the present population's urinary iodine content, it can be concluded that: We have been successful in iodide supplementation in the area under the study. Both groups had sufficient and almost equal iodine intake, therefore the role of iodine deficiency in persistence of goiter has to be questioned.

Iodine deficiency as the main cause of goiter and preventable mental retardation has been proved, but goiter has persisted as frequent as endemic rates despite sufficient iodide supplementation. Further studies are required for identification of possible cause or causes of persistence of goiter.

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