PREVALENCE OF IODINE DEFICIENCY AMONG GOITEROUS SCHOOL CHILDREN

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ABSTRACT

Objective: To evaluate the frequency of goiter and iodine deficiency in a group of school children aged between eight to ten years in Tafilah Governorate.

Methods: A total of 210 school children aged between eight to ten years (110 females and 100 males) were clinically evaluated for thyroid enlargement. Urinary iodine excretion level were estimated for the (76) subjects found to have thyroid enlargement (48 females and 28 males) during the period between 1st January to 30th July 2000. Thyroid gland size was assessed and classified using the palpation method as recommended by the WHO.

Results: The total goiter frequency rate was 36.2%. It was more common in females than in males (p=0.03). About 23.6 % of these children had iodine deficiency; Children 10 years of age had the highest frequency of iodine deficiency (p=0.03), whereas children aged 8 years had the lowest frequency. Severe iodine deficiency was not detected in this study sample while moderate iodine deficiency was found in 7.8%, and mild deficiency was found in 15.7%.

Conclusion: Goiter is still high among Tafilah school children with iodine deficiency accounting for less than one fourth of cases. The vast majority of cases however are due to other unidentified causes. Identification of these causes would be essential for efforts to combat this health problem in Jordan.

Key words: Iodine, Goiter, Children, Salt iodization.

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Introduction

Iodine deficiency disorders (IDD) were documented as a public health problem almost all over the world [(1)]. About 3-4 billion people in the world are covered by iodine supplements to prevent iodine deficiency disorders (IDD) [(2)]. Iodine deficiency can lead to a spectrum of disorders ranging from severe mental retardation to milder forms of motor and cognitive deficits [(3,4)]. It is well established that an adequate iodine intake prevents iodine deficiency disorders [(5)]. The aim of the present work is to identify the frequency of goiter and iodine deficiency in a group of school children aged 8-10 years in Tafilah Governorate.

Methods

The study was carried out during the period between 1st January to 30th July 2000 in Tafilah governorate, which is located in the southern part of Jordan. A total of 210 school children aged 8-10 years (110 females and 100 males) attending one elementary school (Balat Al-Shouhada Mixed Primary School) in the city were included in the study. Each child was examined by a physician who assessed his thyroid gland size by palpation and inspection of the neck and classified it as recommended by the WHO [(6)].

- Grade 0 = No goiter (normal).
- Grade 1A= Thyroid lobes larger than the ends of the thumbs.
- Grade 1B= Goiter palpable and visible only when the head tilted back.
- Grade 2 = Goiter visible when the neck is in normal position.
- Grade 3 = Very large goiter that can be visible from about 10 meters.

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Urinary iodine excretion level was estimated for (76) children with thyroid enlargement (48 females and 28 males). Urine samples were collected from these children during the school visit in clean bottles, which were sealed and identified with labels containing the identification code of the subject (name, class, serial number in the study). All samples were kept in ice while being transported to the laboratory of Faculty of Agriculture, University of Jordan**,** and stored at -20c until analysis. Concentration of iodine in urine is considered as the most appropriate indicator of iodine status and determined by the method of Sandell and Kolthoff after digestion of the urine with hyanchloric acid [7-9]. Using the WHO/ /ICC IDD (International Council for Control of Iodine Deficiency Disorders) criteria, the levels of less than 10 µg /dl were considered as iodine deficiency [10]. The classification of the severity of iodine deficiency is shown in Table I.

Ten Children with previous significant diseases were excluded from the study and only apparently healthy subjects were considered suitable for entry.

Results

The frequency of goiter in this study was 36.2 %; grade 1A was present in 19 % while grade 3 was identified in 2.8 %. Goiter frequency was more common in females than in males (p= 0.03) as shown in Table II.

About 23.6 % of these children had iodine deficiency. Children of 10 years of age had the highest frequency of iodine deficiency {10 children (8 females 2 males)} (p= 0.03) whereas children aged 8 years had the lowest frequency. However, severe iodine deficiency was not detected in this study sample (urinary iodine level <2 µg /dl), while moderate iodine deficiency was found in 7.8%, and mild was found in 15.7% as shown in Table III.

Discussion

The frequency of goiter (36.2%) found in this study is lower than that identified in the same region in 1993 which was 76.1% [11] but is still higher than that reported in other areas like Egypt which was 34.6% [12], Tasmania Australia it was 24.6% for boys and 20.7% for girls [13]. Urinary iodine excretion was low in a quarter of the sample, while in a similar study in the West Bank; only 10% of school children aged 8-10 years had low levels of urinary iodine excretion [14]. This difference may be due to geographic location as the West Bank is close to the Mediterranean Sea. The high frequency of goiter with normal urinary iodine excretion in this study may be due to other causes such as endemic simple goiter [15] or other associated diseases such as selenium deficiency [16], and iron deficiency anemia [17] which should be treated with selenium or iron according to the deficiency at the same time of iodine supplementation to have an effective iodine supplementation [18].

Although iodine deficiency may still be responsible for one fourth of cases in this population, other unidentified causes are responsible for the remainder.

Conclusion

Goiter is still high among Tafila school children with iodine deficiency accounting less than one fourth of cases. The vast majority of cases however are due to other unidentified causes. Identification of these causes would be essential for efforts to combat this health problem in Jordan.

Recommendations

Intensive education of the people about the importance of iodine for health and nutrition, and encourage went to increase the consumption of seafood (fish), which is good source of Iodine, are required.

Stressing the need for periodic assessment of the iodized salt regarding its iodine content and availability in the market, through a regular monitoring system is also recommended.

Further studies should be conducted to investigate different causes of goiter other than iodine deficiency in Tafilah Governorate and its association with other diseases such as iron deficiency anemia and selenium deficiency.

Table I. Criteria for assessing severity of IDD based on urinary iodine levels [10]

Urinary iodine levels (µg /dl)	**Severity of IDD***
< 2	Severe
2 - 4.9	Moderate
5 - 9.9	Mild
> 10	No deficiency

***** Iodine Deficiency Disorders

Table II. Grades of goiter by gender

Goiter	Male	Female	Total (210)	
	N	N	N	%
0 *	72	62	134	63.8
1A*	16	24	40	19.0
1B *	6	12	18	8.6
2 *	4	8	12	5.7
3 *	2	4	6	2.9

* Abbreviation as in text

Table III. Iodine status by age and sex among children with goiter.

		Male (28)				Female (48)			
Age/year	Number of children	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate	Severe
8	15	3	1	0	0	10	1	0	0
9	25	7	2	0	0	12	2	2	0
10	36	10	1	1	0	16	5	3	0
Total	76	20	5			38	13		
			18 (23.6%)						

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