Pak J Med Res
Vol. 51, No. 4, 2012

Original Article

Thyroid Status and Urinary Iodine Levels in Women of Endemic Goiter Area

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Abstract

Background: To determine the thyroid function tests and urinary iodine levels in women belonging to goiter endemic area.
Study type and settings: Descriptive study conducted in women of goiter endemic area in Saggian Lahore.
Subjects and Methods: Saggian Lahore is a goiter endemic area. A total of 293 women between the ages of 18-45 years residing in the area were clinically screened for goiter. Of them 73 women having goiter were recruited for the study. Information regarding demographic profile clinical presentation and physical examination of the goiter was recorded on a questionnaire. The goiter size was graded according to WHO, UNICEF and the International Council for the Control of Iodine Deficiency Disorder. About 5ml of blood sample was drawn from each women and run for thyroid function tests i.e. T3 T4 and TSH using Elisa kits (Human scientific Co. Germany). Urinary iodine was checked by chemical method.
Results: Mean age of 73 women was 28.5 years. Marital status showed that 48(65.7%) were married and 25(34.3%) were unmarried. Visible diffuse goiter was seen in 56(77%) cases. Pressure symptoms as cough and shortness of breath was seen in 30(41%) and 31(42.5%) women respectively. Among the 73 women 24.6% (18 cases) took treatment for goiter. Adverse pregnancy outcome secondary to goiter was seen in 58% (28 cases) out of 48 married women. Thyroid function tests result showed that 72% (53 cases) were euthyroid, 18% (13 cases) were hypothyroid, and 10% (7 cases) were hyperthyroid. Urinary iodine levels showed that 99% women were iodine deficient.
Conclusions: Thyroid functions do not indicate iodine deficiency in all cases of goiter, therefore, Urinary iodine levels need be estimated while investigating goiter cases.
Policy message: Iodine deficiency should be diagnosed and treated on priority basis.
Key words: Goiter, thyroid status, iodine deficiency, urinary iodine levels.

Introduction

Endemic goiter due to iodine deficiency is a major problem world wide and is a threat to social and economic development of the countries[1]. Lack of adequate iodine uptake causes low level of the thyroid hormones[2]. The early and most obvious consequence of iodine deficiency is the goiter whose, growing size not only poses a cosmetic problem, but may also cause pressure symptoms with tracheal deviation and compression[3]. The most devastating outcomes of endemic goiter are increased perinatal mortality and mental retardation depending upon severity of iodine defiency[2]. A study in Ethiopian goiters women showed significantly high reproductive failure, such as miscarriages and abortions as compared to non goiters women[4].

WHO estimates that two billion people globally have insufficient iodine intake[1]. Urinary iodine excretion (UIE) is a best indicator to detect the degree of iodine deficiency. A cut off value of 100ug/L indicates adequate iodine in a population[5]. A study carried out in Ethiopia showed that 83% of the population had UIE less than 100ug/l and out of them 45% had UIE less than 20 ug/l[6].

Pakistan is considered one of the severely iodine deficient country in the region[7]. The results of surveys conducted by WHO and UNICEF during the last few years presented an alarming picture of the iodine deficiency disorders in the country[8,9]. This study was conducted in an goiter endemic area of Lahore where, enlarged necks and its swelling was taken as an omen by the local population who requested for a formal checkup of the whole population to determine the cause and its management.

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Subjects and Methods

This was a descriptive study carried out in a goiter endemic area of Lahore, at Saggian village located near river Ravi bank. A total of 293 women between the ages of 18-45 years were clinically screened for goiter. Of them 73 women had visible goiter and they were recruited for the study. Pregnant women, lactating mothers and patients who underwent thyroidectomy were excluded from the study.

All women having visible goiter were interviewed and examined. Information of all these patients regarding age, marital status, duration of goiter, clinical symptoms, obstetrical history for pregnancy outcome and history of treatment was recorded on a pre-designed questionnaire. Obstetrical history was recorded to see the adverse pregnancy outcome as abortion, still births and history of cretinism in these women.

Physical examination of the goiter was done for grading type and consistency. The goiter size was graded according to the criteria recommended by WHO, UNICEF and the international Council for the Control of Iodine Deficiency Disorders (as grade-0 no goiter, grade-1 goiter palpable but not visible, grade-2 goiters visible when neck is in normal position[10]. Goiter type is classified as diffuse or nodular and consistency as soft, firm, hard. In diffuse goiter all the thyroid gland is uniformly enlarged while in nodular goiter, distinct nodules are formed. While, in cases of solitary nodules the thyroid gland presents in the form of lump[11].

Five ml of blood was drawn from each women and serum separated. Thyroid function tests i.e. T3 and T4 were done by competitive Enzyme Linked Immunoassay and TSH by sandwich Enzyme Linked Immunoassay using reagent kits (Human scientific Co. Germany). The reference ranges of T3 and T4 in females that were taken as standard were 0.6 -2.02 ng/ml and 4.4-11.6 ug/dl and TSH as 0.3-6.2 mlu/l respectively. Spot urine samples of all patients were collected for urinary iodine estimation. Urine was digested with ammonium persulfate, the reduction of ceric ammonium sulfate (yellow) to cerous form (colourless) by iodide, and its detection was done by rate of colour disappearance (Sandell-Kolthoff reaction)[12]. According to WHO criteria normal reference range of urinary iodine is 100ug/l and above, mild deficiency when it is between 50-99ug/l. moderate 20-40ug/l and severe, when less than 20ug/l[6].

Results

A total of 73 women having goiter were seen. Their mean age was 28.5 years and 48(66%) were married and 25(34%) were unmarried.

Table 1: Clinical history of 73 women with endemic goiter.

	Mean	*n*	*%*
Time since goiter	7.6 years	-	-
Grading of goiter	Grade 1 (palpable goiter)	17	23.0
	Grade 2(visible goiter)	56	77.0
Physical examination of goiter	Diffuse	56	77.0
	Multinodular	8	11
	Solitary nodule	9	12
Pressure Symptoms	Cough	30	41
	Hoarseness	24	32.8
	Shortness of breath	31	42.5
	Difficulty in swallowing	26	35.6
History of goiter treatment used		18	24.6

Table-1 shows that visible diffuse goiter was seen more commonly (77%). Pressure symptoms were also seen in few women. Out of the total only 25% women took treatment for goiter.

Adverse pregnancy outcome was seen in 28(58%) women (Table-2).

Table 2: Pregnancy outcome in 48 women with endemic goiter.

Outcome	*n=48*	*%*
Still Births	12	25
Abortions	11	23
History of cretinism	5	10
Total	28	58

Thyroid functions tests showed that euthyroid status was seen in 53(72%) women, 18% had hypo and 10% hyperthyroid status. Urinary iodine deficiency was found in 99% cases with 82% having severe iodine deficiency and 17% with moderate deficiency and only 1% without deficiency.

Discussion

Iodine deficiency is still common in Pakistan and within Lahore the largest metropolis of Punjab there are pockets of iodine deficiency presenting as goiter endemic areas. Iodine deficiency is an important health problem in Latinn America, Africa Asia, and many European countries especially Turkey[13]. According to UNICEF 70% of total population in Pakistan is at risk of iodine deficiency disorder[14]. Endemic goiter due to iodine deficiency is reported in many parts of the Pakistan including Lahore, Karachi, Islamabad and Peshawar[15,16].

A nuclear medicine centre in Lahore (Cenum) showed palpable goiter in 53.7% and visible goiter in 46.2% cases with 56% being euthyroid, 23% hyperthyroid and 22% hypothroid[14,16]. The results of present study showed more euthyroid cases. A study from Chakar district Muzafarabad showed 14% cases as euthyroid, 64% as hypothyroid and 22% with sub clinical hypothyroid cases[17].

In the present study 77% had diffuse giotre, 10% had multinodular goiter and 12% had solitary nodules. Multinodular goiter is often diagnosed in up to 5% of the general population and can be classified as euthyroid (nontoxic), hypothyroid or hyperthyroid (toxic)[18]. Multinodular goiter is very common in cases having euthyroid goiter but other conditions such as diffuse goiter, thyroiditis and neoplasm can also be present in euthyroid state[19].

Present study showed severe urinary iodine deficiency in 82% and moderate iodine deficiency in 17% women of the endemic goiter area. Our results are comparable with a study conducted in three endemic areas indicating moderate to severe iodine deficiency. Same has been observed in Ankara and the Black Sea region of Turkey[20]. However, our findings differ from a study in

which iodine deficiency did not prevail in goiter cases and high fluoride levels in drinking water were reported as one of the etiological factors for goiter[21].

Present study indicated that thyroid dysfunction tests showed no association with low urinary iodine level, as majority of women were euthyroid. Our findings are in agreement with a study conducted in United States of America reporting that concentrations of serum T4 and thyroid-stimulating hormone of women with a low urinary iodine concentration did not indicate an iodine deficiency in majority of cases[22]. It is therefore, evident that enlargement of the thyroid gland is adaptive process to low iodine[23].

Iodine deficiency causes spontaneous abortion, still births and neonatal deaths and reproductive failure in women[24-26]. The present study showed that women of reproductive age were much effected in their delivery outcomes where 25% cases had still births, 23% had abortions and history of cretinism was seen in 10% of the children.

In the present study only a quarter of the affected women were taking thyroxin, but no significant regression in the size of goiter was noticed by them. Thyroxin use in goiter is questionable and puts the patient at considerable risk for developing hyperthyroidism, therefore, such patients need regular monitoring[27]. Although at best this treatment slows growth for a limited time period in a minority of patients at the cost of significant side effects related to bone and the cardiovascular system[28]. Surgery is the choice for large goiter especially if associated with pressure symptoms[29].

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