

# PREVALENCE AND CASE REPORTS OF GOITER AT DISTRICT BAHAWALPUR, PAKISTAN

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**ABSTRACT:** Goiter refers to any visible enlargement of the thyroid gland and it is one of the major health problems in human beings. The present study was conducted to determine the prevalence of goiter and its predisposing as well as precipitating factors among people of district Bahawalpur. The question based review chart was carried out at Bahawalpur Victoria Hospital, (Quaid-e-Azam Medical College) Bahawalpur, from the patients admitted in outdoor for suspected goiter during January, February, 2011. Case reports investigations i.e; age, body mass index(BMI), gender, serum hormonal levels, tobacco or alcohol use, diet, socioeconomic problems, family history and pregnancy were correlated with the prevalence of Goiter. It was concluded that there is direct relation of Iodine deficiency on the onset of Goiter; however, abovementioned factors aggravate the situation.

**KEY WORDS:** Goiter, risk factors, prevalence, iodine deficiency.

## INTRODUCTION

Over 1.9 billion people are estimated to be at the risk of Goiter world wide [1]. In all developing countries Iodine Deficiency Disorder (IDD) has been recognized as a public health problem where iodine intake was inadequate in their daily intake [2]. According to WHO, Iodine Deficiency Disorders is a major health problem among the pregnant and young women [3]. Low level of thyroid hormones in the body is responsible IDD that is associated to inadequate iodine in food and drinks. Goiter can be classified as toxic or nontoxic, endemic or non-endemic and diffuse or nodular. A nodular goiter may be of two types: multi-nodular or solitary nodule. Nodular goiter affected 500 to 600 million people worldwide are due to endocrine disorders [4] and it is the result of both genetic and environmental factors [2]. During 1999, Neumann et al, 1999, described a gene on chromosome 14q called MNG-1 that is associated with nontoxic nodular goiter [4]. Other genetic factors however, associated with further increase and development of nodular goiter. Several environmental factors called goitrogen substances are soy beans, tobacco or alcohol use, cigarette smoke, even emotional disturbance [2], diet and socioeconomic problems. The thyroid growth and function according to the history in patients with nodular goiter vary for each patient. The purpose of this study was to determine the prevalence of thyroid problem in district Bahawalpur and the associated epidemiological factors were discussed. Very few studies had been reported in the past at Bahawalpur related to thyroid problem and its prevalence.

## MATERIALS AND METHODS

A questionnaire was developed to carry out the epidemiological studies of goiter and its contributing factors from the patients admitted in surgical wards of Bahawal Victoria hospital, Bahawalpur during January, February, 2011. The data was collected and recorded from 80 patients in chronological order from randomly selected goiter patients on weekly basis. The study included interviewing of patients and their Physicians, review of their biochemical tests; serum T3, T4 and TSH and their radiological features (thyroid scan). Information recorded by the patients were related to age, gender, body mass index (BMI), common habits, living styles, dietary history (access to meat, fish, dairy products, either use iodized salt or not), working conditions, exposure to sun, in case of pregnancy, abortion,

irregular menstruation, cigarette smoke, alcohol use, emotional disturbance including family history.

Goiter assessment was done by a team of experts that included 3 medical experts. A complete lecture on assessment of goiter was given to the team by the professor before start of study. Several talks and meetings with doctors (physicians) present on duty made this study feasible. Enlargement of thyroid gland was analyzed by clinical examination and goiter was categorized as: **Thyrotoxicosis** (overactive thyroid): A toxic condition resulting from excessive amounts of thyroid hormones in the body, **Euthyroid** (underactive thyroid): Having normal gland thyroid function and **Hypothyroid** (Hypothyroidism): underactive thyroid develops when the thyroid gland fails to produce or secrete as much thyroxine (T<sub>4</sub>) as the body needs.

## STATISTICAL ANALYSIS

Data on goiter, clinical examination, biochemical findings and results were compiled and analyzed by using window, SPSS version 12 statistical package.

## RESULTS

Out of 80 patients examined the prevalence of goiter in females was 87.5% (70/80) and in males was 12.5% (10/80) (Table: 1).

**Table: 1: Sex wise prevalence of Goiter.**

Total sample population	Male	Female
80	10	70
Goiter percentage	87.5%	12.5%

## GOITER FREQUENCY ACCORDING TO GRADES:

Recorded severity of goiter was reported (Table: 2), it was shown that the prevalence of 0 grade in females was 35.71% (25/70), grade 1 was 42.85% (30/70) and grade 2 was 21.42% (15/70). However, the prevalence in males according to grade 0 was 40% (4/10), grade 1 was 60% (6/10) and grade 2 was 0% (0/10).

Table: 2: Sex wise severity of Goiter

Grades	Male	Female
0 (Thyrotoxicosis)	40% (4/10)	35.71% (25/70)
1 (Euthyroid)	60% (6/10).	42.85% (30/70)
2 (Hypothyroid)	0 % (0/10)	21.42% (15/70)

Prevalence of MNG was higher in females 35.71%, 68% (17/25) single lobe affected and 32% (8/25) double lobe affected) as compared to males, no male was affected by MNG. (Table: 3)

Table: 3 Prevalence of MNG:

MNG	Frequency	Single lobe	Double lobe
Male	Not present	---	----
Female	35.71%	68%( 17/25)	32%( 8/25)

Age wise prevalence was higher in age group 18 to 28 years was 50% (40/80), than 28 to 38 years of age was 31.25% (25/80) and the lowest was in 38 to 50 years of age 18.75% (15/80).

Table: 4 Age wise Prevalence of Goiter.

Age groups	Frequency	Percentage
18---28	40	50%
28---38	25	31.25%
38---50	15	18.7%

Present study showed that females are at more risk to be affected by goiter. No significant differences were observed in family history of thyroid disease, and tobacco or alcohol use either in male and female patients combined or female patients alone.

#### CASE REPORTS:

Out of 80 patients 2 were randomly selected for detail study of goiter.

**CASE 1:** 20 years young woman admitted in endocrine section for thyroid problem showing signs dysphagia, difficulty in swallowing solid food, voice discomfort and menstrual disturbance. The physician confirmed MNG biochemically however, the thyroid scan ordered showed increase uptake, reported as "multinodular goiter". Dietary history revealed that patient avoided iodized salt from the last 3 years. She never ate fish and rarely used dairy products and no past or family history of thyroid disease. Physical examination showed a thin lean woman with painful swelling around neck, her thyroid gland was enlarged to two times normal size, firm in consistency. Her clinical findings were reported in table 6, 7.

Table: 5 presented serum hormone levels: serum TSH level was 1.47mIU/L, T3 was 4.95pmol/L and T4 was 13.18pmol/L as in table 5. Thyroid scan showed thyroid uptake at 20 min 15.6% (0.4-4.0%), Fig. 1, (Bahawalpur institute of nuclear medicine division clinic). The patient was nonsmoker and had never used alcohol.

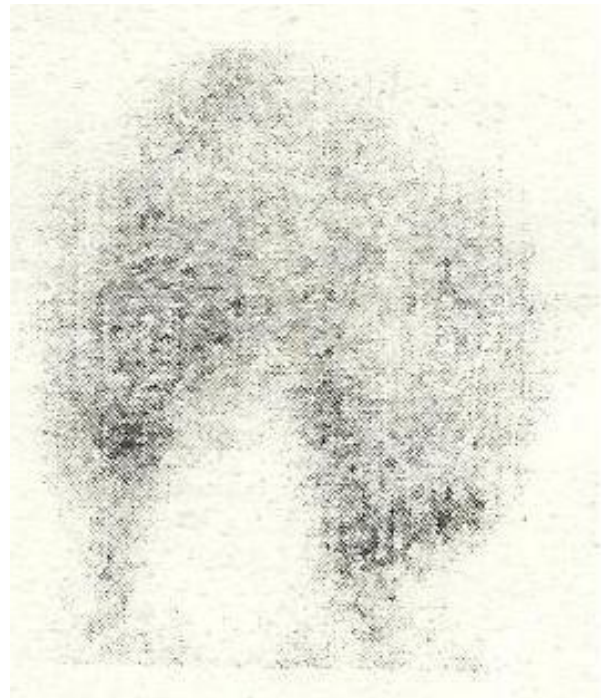


Figure: 1 99mTcO4- THYROID SCAN:

Table: 5: Biochemical Tests.

Parameters	Recorded Value	Reference range
T3	4.95pmol/L	3.0-7.50pmol/L
T4	13.18pmol/L	11.5-23.0pmol/L
TSH	1.47mIU/L	0.3-5.0mIU/L
Glucose (Random)	85mg/dl	<140
Urea	22mg/dl	10-50
Creatinine	0.1mg/dl	0.5-0.9
ALT(SGPT)	20U/L	<31
Sodium	136mEq/L	135-155
Potassium	3.4mEq/L	3.5-5.5

Table: 6 Haematological Values.

HAEMATOLOGY	Recorded Values	Reference range
TLC	6000/mm <sup>3</sup>	4000-11000/mm <sup>3</sup>
Haemoglobin	11.0g/dl	M 13.0-18g/dl F 11.5-16.5g/dl
Neutrophils	64%	40-75%
Lymphocytes	32%	20-45%
Monocytes	02%	2-10%
Eosinophils	02%	1-6%
Basophils	01%	0-1%

Table: 7 Ultra Sonographic Findings

Liver	Normal size
Gall bladder/Biliary passages	Normal
Right kidney	Normal size
Left kidney	No stone
Urinary bladder	Normal
Spleen	Normal
Pancreas	Normal
Lymph nodes	Not any
<b>Others</b>	No free fluid is seen.
Conclusion	Normal scan

**CASE 2:** A 40 years old woman referred to the endocrine section, for evaluation of goiter. The patient signs of tiredness, irregular menstrual cycle, abortion and chronic constipation. She had never used iodized salt and rarely consumed seafood and dairy products. She had no history of food allergies or family history of thyroid disease, and had not used any antithyroid agents previously. Her menstrual cycle wasn't normal. Thyroid gland was diffusely enlarged to three times normal size and it was firm in consistency. Table 8, showed that the serum TSH level was 2.47mIU/L, serum free T3 was 5.6pmol/L and serum free T4 was 22.7pmol/L. The patient had normal temperature, pulse and blood pressure at the time of examination. Thyroid scan showed enlarged thyroid gland with inhomogeneous tracer uptake in both lobes multiple areas of variable uptake are visible in thyroid gland. Thyroid uptake at 20 min was 5.3% (0.4-4.0). These findings concluded as: "multinodular goiter", (Figure 2).



Figure 2: 99mTcO4- THYROID SCAN:

Table: 8: Biochemical tests of Case 2.

Parameters	Recorded Value	Reference range
T3	5.6pmol/L	3.0-7.50pmol/L
T4	22.7pmol/L	11.5-23.0pmol/L
TSH	2.47mIU/L	0.3-5.0mIU/L
Glucose (Random)	88mg/dl	<140
Urea	18mg/dl	10-50
Creatinine	0.6mg/dl	0.5-0.9
ALT(SGPT)	20U/L	<31
Sodium	135mEq/L	135-155
Potassium	5.0mEq/L	3.5-5.5

Table: 9 Haematological Values of Case 2.

HAEMATOLOGY		Reference range
TLC	81000/mm3	4000-11000/mm3
Haemoglobin	10.2g/dl	M 13.0-18g/dl F 11.5-16.5g/dl
Neutrophils	63%	40-75%
Lymphocytes	32%	20-45%
Monocytes	04%	2-10%
Eosinophils	01%	1-6%
Basophils	-	0-1%

Table:10 Ultra Sonographic Findings of Case 2

Liver	Size 14cm no focal lesion
Gall bladder/Biliary passages	Normal
Right kidney	Size 98×36mm
Left kidney	Size 107×46mm ,no stone
Urinary bladder	Empty
Spleen	Normal
Pancreas	Normal
Lymph nodes	Not any
Others	No free fluid is seen.
Conclusion	Normal abdominal scan

**DISCUSSION**

The findings of our study are in agreement with the previous researches. The prevalence of goiter among general population was found to be 16.6% at Baltistan, North East Pakistan. The prevalence were: in the North in males 20.4%, in females 28.1% and in the south in males 13.9%, in females 21.2% [6]. Another retrospective study was carried out in Hyderabad (University Hospital i.e. Isra University Hospital) over a period of three years from April 2005 to March 2008. Out of 140 patients operated for different thyroid operations, 15 had thyroid carcinoma. Among them, 105 patients had multinodular goiter and eight (7.6%) had different thyroid cancers among these multinodular goiters [7]. Another study conducted at District Swat in NWFP to report the prevailing situation with regards to goiter and

results had shown the goiter rate 52 % and 45% in boys and girls of age 8-10 years respectively.

The prevalence of goiter in our present study was higher in the age group of 16 to 40 especially in women's due to continued demand of iodine for pregnancy and childbirth. Hence females and individuals of 16-40 years of age were independently associated with high prevalence of goiter. Female patients have greater risk of developing MNG.

It was reported from our studies that patients with obesity have greater risk of developing nodular goiter. The explanation for this relationship may be: patients with large BMI have more space in their chest and neck for large nodular goiter so goiter can grow to a large size as we observe in many patients. Another possibility may be the hormone production from the adipose tissues, the endogenous hormone that can stimulate thyroid growth. Estrogen is a known goitrogenic compound. Estrogen is the most important endogenous hormone for thyroid growth. The conversion of androstenedione secreted by adrenal gland into estrone by adipose tissues this is a most important source of estrogen in obese patients [2].

The relationship between thyroid function, puberty, menstruation, and menopause had long been studied [8]. During the menstrual cycle the thyroid gland enlarges [9] and it had been shown that the estrogen 17 $\beta$ -estradiol has a growth-promoting effect on thyroid tumor cells, mainly via estrogen receptors present in thyroid tissue [10], [11]. High levels of TSH, human chorionic gonadotropin (hCG), and estrogens during pregnancy are the responsible factors for direct thyroid stimulation and may promote thyroid growth [10], [12]. This mechanism may be compatible with our observation of an increased risk in women of reproductive age [13]. Nodular goiter is a lifelong medical condition that begins at the onset of puberty in adolescence in iodine replete environment. However, goiter will grow gradually for many years then becomes stable [2].

It was found that female patients were not directly associated with tobacco or alcohol use, while some present as passive smokers. Tobacco use was not associated with nodular goiter [2]. Higher goiter prevalence was noted by many studies and higher thyroid volumes as measured among smokers and nonsmokers by ultrasound in iodine-deficient areas. Chemicals present in tobacco such as "benzopyrene" may act as goitrogenic substance by stimulating sympathetic nervous system [2]. Therefore concluded, tobacco use does not appear to be associated with the development of large nodular goiter, it may initiate goiter formation by increasing the overall size of thyroid gland in iodine replete areas.

In our study 80 patients were belonging to poor families and they were not well educated, illiteracy can be considered as a major factor, most of the patients were not familiar with iodized salt and they had never used it in their life and not access to nutritious food because of poor background. Working conditions were very hard both for male and female most of the time they spent in stress condition. Many patients were affected from goiter 10-20 years back they were not aware of proper treatment and diagnose at initial stages of goiter and preventive measures. Many patients were emotionally disturbed and spending their lives under severe stress conditions this may influence to disturb their serum hormonal levels that lead to goiter.

About a third of the world's population live in iodine deficient areas where they are at the risk of IDD including, goiter, mental retardation, increased perinatal mortality and retarded physical development [14], [15], [16]. Our two case report patients were young women, aged 20 and 40 years, who had goiter and in both cases MNG was confirmed and result showed the prevalence of MNG in district Bahawalpur is very high. This may be a leading cause of thyroid cancer in Pakistan. Multinodular goiter is the commonest indication for thyroidectomy in endemic iodine-deficient regions [7].

During pregnancy and lactation the iodine requirement increases many folds (200 $\mu$ g/day vs. 150  $\mu$ g/day in other adults), in order to meet the needs of the growing fetus or baby [17]. Milk is a third of the recommended daily intake and it is important to note that 8 Oz of cow's milk provides 50  $\mu$ g of iodine [17]. Urinary iodine excretion level could not be estimated in the present study. Serum TSH and thyroid hormones correlate very poorly with UI concentration [18], therefore measurement of UI is the only reliable way to establish a definitive diagnosis of iodine deficiency.

#### CONCLUSION:

In present study we discussed many factors that had contributed to the occurrence of goiter in any human population. Goiter can be cured/prevented by educating people about the contributing factors of the disease.

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