# Prevalence of Risk Factors for Thyroid Hormone Imbalance

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## Abstract

This study was aimed to assess the frequency of thyroid hormone imbalance risk factors. A cross-sectional survey was conducted using convenience sampling technique, from July-2018 to September-2018 in different cities of Punjab, Pakistan. A total of 150 patients, having thyroid hormone imbalance with or without any comorbidity were included and the subjects having normal thyroid levels were excluded. Thyroid hormone imbalance was more frequent in females having 40-60 years of age. Gender was significantly associated with 'pregnancy or delivery in last six months' (p=0.029) and iodine deficiency (p=0.036). Marital status was significantly associated with 'symptoms observed' (p=0.009), 'radioactive iodine exposure' (p=0.001), 'autoimmune disease' (p=0.050), 'smoking' (p=0.014) and 'stress' (p=0.040). Family income was significantly associated with 'family history of disease' (p=0.039) and 'iodine deficiency' (p=0.049). Residential area was significantly associated with 'autoimmune disease' (p=0.050), 'smoking' (p=0.036) and 'stress' (p=0.029). Use of iodized salt and stress were prevalent risk factors and disease was common among females, specially age group 40-60 years.

**Keywords**: Thyroid hormone, hypothyroidism, hyperthyroidism.
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## Introduction

Thyroid hormones (THs) play a vital role in differentiation, metabolism, development, and growth of all tissues in the body. They are required for normal functioning of all body tissues, with major effects on oxygen consumption and metabolic rate. The disorders of thyroid hormone are among the most common endocrine disorders[1]. The primary secretory product of thyroid gland is Thyroxine (T4) which is relatively inactive and is converted to an active form, Triiodothyronine (T3) by an enzyme thyroxine 5'-deiodinase. The actions of thyroid hormone are primarily due to the interaction of T3 with the specific receptors[1].

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Hypothyroidism ranks among the most common hormonal disturbances. The most common cause is damage to the thyroid gland from autoimmune thyroid disease in which the body's immune system attacks the thyroid. Common causes of hypothyroidism include surgical removal of the thyroid and radioactive iodine therapy, while less common causes include congenital hypothyroidism, transient hypothyroidism due to viral infections and pituitary gland disease. Hyperthyroidism refers to any condition in which there is too much thyroid hormone produced in the body. It is affecting approximately 2 percent of women and 0.2 percent of men[2]. The most common cause of hyperthyroidism is the autoimmune disorder, Graves' disease.

Hyperthyroidism also may be caused by a toxic nodular or multinodular goiter, which causes the thyroid to produce excessive amounts of thyroid hormones. Furthermore, some people who consume too much iodine or who take medications containing

iodine, may cause the thyroid gland to overproduce thyroid hormones. Finally, some women may develop hyperthyroidism during pregnancy or in the first year after giving birth[2].

Thyroid hormone is essential for normal brain development. TH exerts effects on the brain throughout development, but the specific effects are different as development proceeds. TH is essential for adequate development of very specific neuropsychological functions and, when TH is insufficient, these functions are impaired. The developmental timing of TH insufficiency is critical to the type of neurological deficit that occurs, and the source of TH insufficiency can be maternal, fetal or infant in origin[3-5].

Some of the key risk factors for thyroid disease include, gender, age, having a personal or family history of thyroid disease or autoimmune disease, surgery to remove all or part of the thyroid, radioactive iodine ablation (RAI) treatment, currently pregnant or in the first year after childbirth, being a current or former smoker, recent exposure to iodine in a medical procedure, taking iodine from herbs or supplements, living in an area that is iodine-deficient, various medical treatments and medications, overconsumption of raw foods in the goitrogen family, trauma or surgery to the neck, radiation exposure via medical treatments or nuclear accidents, having an autoimmune disease, environmental factors like stress[6].

Thyroid hormone deficiencies, as well as excess, are expected to result in profound changes in cardiac function regulation and cardiovascular hemodynamics. The hemodynamic effects of hypothyroidism are opposite to those of hyperthyroidism. It has been observed that in patients with a thyroid disease, the cardiac functions (heart rate, cardiac output etc.) are closely associated with thyroid status[7].

The goal of treatment for any thyroid disorder is to restore normal blood levels of thyroid hormone and the most popular treatment is radioactive iodine. Thyroid diseases are life-long conditions but with careful management, people can live healthy and normal lives[8].

Present study aimed to evaluate risk factors responsible for thyroid hormone imbalance and to assess the prevalence of risk factors.

**Methods and Results**

A cross-sectional study was conducted among general community in different cities of Punjab Pakistan. A questionnaire was distributed among 150 patients of thyroid hormone imbalance, using random with sampling technique, between July 2018 to September 2018.

Subjects having thyroid hormone imbalance, with or without any comorbidity were included while the subjects having normal thyroid levels with or without any comorbidity were excluded.

Data analysis was done using SPSS version 20. Statistical significance was determined using Chi square test. A 95% confidence level was used for the study and a p-value <0.05 was considered statistically significant.

The study was approved from the Institute of Pharmacy, Lahore College for Women University, Lahore. The verbal consent of patients was taken before collecting data. The data was recorded anonymously to ensure confidentiality and privacy of the participants.

Out of 150 patients, 30 (20%) were males and 120 (80%) were females, 9 (6%) were in age group of 10-20 years, 47 (31.3%) were in age group of 20-40 years, 68 (45.3%) were in age group of 40-60 years and 26 (17.3%) were in age group of 60-90 years, 117 (78%) were married and 33 (22%) were single, 38 (25.3%) had a family income equal to or less than Rs. 20,000, 62 (41.3%) had a family income equal to or less than Rs. 50,000, 35 (23.3%) had family income equal to or less than Rs. 100000 and 15 (10%) had a family income equal to or less than Rs. 200000. According to location, 114 (76%) lived in urban area and 36 (24%) belonged to rural areas.

Association of basic demographics with disease history of patients is shown in Table 1.

Marital status was found to be significantly associated with 'the symptoms observed (p=0.009).

**Table 1.** Association of basic demographics with disease history of patients

| | Age | Gender | Marital status | Family income | Residence area |
|---|---|---|---|---|---|
| | | | p-value | | |
| Patient of thyroid | 0.566 | 0.382 | 0.632 | 0.276 | 0.702 |
| Type of imbalance | 0.181 | 0.060 | 0.422 | 0.683 | 0.251 |
| Duration of disease | 0.815 | 0.584 | 0.111 | 0.554 | 0.728 |
| Change of medication therapy | 0.469 | 0.311 | 0.152 | 0.078 | 0.889 |
| Symptoms observed | 0.884 | 0.879 | 0.009 | 0.717 | 0.302 |
| Medicine used | 0.590 | 0.722 | 0.778 | 0.335 | 0.696 |
| Side effects | 0.427 | 0.129 | 0.187 | 0.660 | 0.870 |
| Medicine for any comorbidity | 0.261 | 0.984 | 0.872 | 0.054 | 0.117 |

Association of basic demographics with risk factors for thyroid hormone imbalance is shown in Table 2. Gender of patient was found to be significantly associated with iodine deficiency (p=0.036). Marital status was found to be significantly associated with exposure to radioactive iodine (p=0.001), any autoimmune disease (p=0.050), smoking (p=0.014) and stress (p=0.040). Family income was found to be significantly associated with family history of thyroid imbalance (p=0.039) and iodine deficiency (0.049). Residence area of patient was found to be significantly associated with autoimmune disease (p=0.050), smoking (p=0.036) and stress (p=0.029).

## Discussion

The objective of this study was to assess risk factors and their prevalence for thyroid hormone imbalance. Study found that patients suffering from thyroid hormone imbalance were mostly females. Various forms of thyroid dysfunction such as Graves' disease and Hashimoto's thyroiditis were more common in females. This data outcome was in accordance with the previous study[9].

A number of large surveys reported a high incidence of hypothyroidism in elderly patients. Again, gender appears to be a factor: high TSH levels were found among more women than men older than 75 years[10].

**Table 2.** Association of basic demographics with risk factors for thyroid hormone imbalance

| Risk Factors | Demographics | | | | |
|---|---|---|---|---|---|
| | Age | Gender | Marital status | Family income | Residence area |
| Family history | 0.853 | 0.401 | 0.600 | 0.039 * | 0.660 |
| Pregnancy or delivery in last 6 months | 0.276 | 0.029 * | 0.056 | 0.671 | 0.691 |
| Exposure to radioactive iodine | 0.294 | 0.280 | 0.001* | 0.438 | 0.442 |
| Thyroid surgery | 0.271 | 0.358 | 0.168 | 0.850 | 0.636 |
| Anti-thyroid medication | 0.242 | 0.069 | 0.108 | 0.511 | 0.853 |
| Radiation exposure | 0.502 | 0.850 | 0.118 | 0.260 | 0.738 |
| Any autoimmune disease | 0.132 | 0.723 | 0.050 * | 0.719 | 0.050 * |
| Smoking | 0.394 | 0.186 | 0.014 * | 0.864 | 0.036 * |
| Goitrogenic food | 0.533 | 0.276 | 0.190 | 0.449 | 0.124 |
| Iodine deficiency | 0.73 | 0.036 * | 0.864 | 0.049 * | 0.852 |
| Use of Iodized salt | 0.575 | 0.290 | 0.433 | 0.302 | 0.597 |
| Stress | 0.969 | 0.906 | 0.040 ? | 0.82 | 0.029 * |

* p is significant Thyroid disorders were prevalent in women of childbearing age. The data outcome was in accordance with a recent study which stated that hypothyroidism is common in pregnancy[3].

Study found enough prevalence of thyroid imbalance in patients with history of thyroid surgery, which is supported by other studies[4]. Present study found patients who had thyroid imbalances because of radiation exposure to the chest. This result was in concordance to previous studies[5].

According to the data obtained by this survey the prevalence of thyroid hormone imbalance due to autoimmune disease was more in women, and both genetic and environmental factors were involved in its pathogenesis, this is in line with other study[14]. Results showed that this disease was common in patients who intake high proportion of goitrogenic food as the part of their diet.

Study found that usage of iodized salts is one of the major risk factors responsible for thyroid imbalance. Study indicated that a number of people were iodine deficient and have developed thyroid imbalances. Iodine deficiency was found to be associated with family income as well.

## Conclusion

Study results showed that use of iodized salts and stress are prevalent risk factors for thyroid hormone imbalance among others. It is common among females of age group 40-60 years. It is common among those individuals whose diet contain high intake of goitrogenic foods.

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**Answer of Picture Quiz**

**Acute intestinal obstruction secondary to Trichobezoar**