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RESEARCH ARTICLE

# Relationship of Symptoms with Demographic Features in Case of Thyroid Disorders in Pakistani Population

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**ABSTRACT**

Thyroid disorders are common all around the world, predominantly in females. A similar situation exists in Pakistan. Present case control study was designed to analyze the relevance of various symptoms with the disease and how their occurrence varies in normal population. For this purpose data of 400 patients suffering from any of thyroid related disease was collected. The controls were age and sex matched to make sure that results are not misleading in case if they are age and sex dependent. In the present study female to male ratio in both types of thyroidism i.e. hypothyroidism and hyperthyroidism was 3:1. Various symptoms like menstrual cycle, still birth, lactation problems in patients showed significant differences from controls. While some others being similar in both like dry hair showed that these symptoms are not disease specific. In addition the incidence being high in specific areas showed the relevance of the disease with environment.

**Keywords:** Thyroid, TSH, Hypothalamus, Demographic features, Hypothyroidism, Hyperthyroidism, Pakistan.

## 1. INTRODUCTION

Thyroid gland is one of the chief endocrine glands. Its job is to produce hormones which regulate body functions. These hormones are essential for generating energy in the body, regulating body temperature and providing assistance to various organs of body for proper functioning. [1] It performs these functions by producing two hormones i.e. T3 and T4. This activity of thyroid is monitored by TSH produced by pituitary gland which itself is regulated by TRH produced by the hypothalamus. [7]

Many people face problems related to thyroid every year all around the world. In America alone 27 million people suffer from various forms of thyroid diseases. [2] In Africa, according to UNICEF estimates, 8% of neonates suffer learning disabilities due to iodine deficiency. [4] Goiter prevails in 28.3% of African population and the incidence of Grave's disease is increasing in regions where iodine consumption has increased. [5] Similarly in India, 42 million people suffer from various types of thyroid disorders. [6]

A number of studies have also been conducted in the past in Pakistan. A clinical presentation of hypothyroidism by Irfan M Khurram has been conducted in Faisalabad in 2003. [9] Similarly a case study regarding the frequency of malignancy in solitary thyroid nodules was done at CMH Rawalpindi in the year 2002-2003. [10] Apart from this, another descriptive study was carried out by Rubina Mansoor and her team to determine the occurrence of thyroid diseases in association with age and sex. [11]

Thyroid gland is incredibly elusive in its symtomatology. Since its role in metabolism is of supreme importance and it influences every organ of the body, one concentrates on diseases of organs entirely forgetting that it could be a problem of thyroid. [13] The symptoms of thyroid imitate symptoms of many other diseases such as cancer, skin diseases and cardiovascular diseases etc[3] and therefore; misdiagnosis and misunderstanding of thyroid diseases disturbs most aspects of health. Most disorders of thyroid persist to be undiagnosed due to lack of proper assessment of the disease itself. [8] Thus it was very important to establish the relation of various thyroid symptoms with demographic features.



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## 2. MATERIAL AND METHODS

### 2.1. Study Design and Sample Size

This case control study has been conducted at COMSATS Institute of Information Technology Islamabad, Pakistan. Individuals who had undergone thyroid tests were collected from different laboratories in all the major cities of the country. Sample size was not taken into account while collecting these samples from various cities. The cities included Islamabad, Lahore, Sialkot, Quetta, Karachi, Muzaffarabad, Hayatabad and Peshawar. Name, age, sex, contact number and blood test results for 600 individuals were provided from various laboratories and hospitals. All these individuals were personally contacted via telephone and in person questionnaires were filled. A total of 400 individuals confirmed they are suffering from thyroid and answered every domain of the questionnaire. The questionnaire was adapted from Thyroid Foundation of Canada with slight modifications. [12] It was divided into four domains i.e. personal information, potential symptoms of thyroid disorder, blood tests and family history, and medical history. The same questionnaire was also filled for 400 healthy individuals. These individuals were treated as controls in the case study.

### 2.2. Statistical Analysis

Data entry was done using Microsoft excel 2007. Data was also stratified into 6 age groups with an interval of 10 years. The overall percentages of every symptom for patients and controls were also calculated in Microsoft excel 2007. Analysis was done using the Statistical Package for Social Sciences, version 17. A chi square goodness of fit test for independence was applied since data was of qualitative nature. This test compares observed and expected results. This test was performed in order to determine dependence of a particular symptom with demographic features. Likewise paired sample t test was also applied to analyze the comparative means of various symptoms in patients and controls.

## 3. RESULTS

### 3.1. Overview of Patients and Controls

A net total of 800 individuals participated in this study. Out of these 800 individuals, 400 individuals were thyroid patients and the rest of 400 individuals were treated as controls. Table 1 summarizes the patients and controls overview of sociodemographic characteristics and occurrence of symptoms. The participants were 299 females and 101 males for both patients and controls. The youngest and oldest patients were 11 and 82 years respectively. Majority of individuals included in this study were married and using iodized salt. Maximum patients were observed to be suffering from depression and weakness, whereas in controls dry hair and unusual hair loss were the most common problems.

### 3.2. Symptoms vs. Demographic Features Cross Tabulation

Table 2 shows the symptoms vs. demographic features i.e. age, area and sex cross tabulation. This was done using chi- square goodness of fit test. The findings showed that of all the thirty five symptoms poor concentration, memory loss, sore muscles, dry skin, itchy skin, hard stools, weight gain, eye pain/double vision, high blood pressure, high cholesterol, irregular periods and excessive periods were dependent on age.

| Variables | Patients Frequency (%) | Controls Frequency (%) |
|---|---|---|
| Sex | | |
| Male | 101 (25.50) | 101 (25.50) |
| Female | 299 (74.50) | 299 (74.50) |
| Area | | |
| Hilly | 125 (31.25) | 209 (52.25) |
| Plain | 275 (68.75) | 191 (47.75) |
| Salt Intake | | |
| Iodine | 204 (51) | 351 (87) |
| Non iodine | 196 (49) | 49 (13) |
| Relationship Status | | |
| Married | 335 (83.74) | 287 (71.50) |
| Unmarried | 65 (16.25) | 113 (28.50) |
| Symptoms | | |
| Palpitations | 203 (50.75) | 106 (26.50) |
| Poor concentration | 180 (45) | 52 (12.75) |
| Memory loss | 156 (39) | 69 (17) |
| Difficulty sleeping | 160 (40) | 103 (25) |
| Excessive need for sleep | 146 (36.50) | 89 (22) |
| Hand Tremor | 122 (30.50) | 71 (17.50) |
| Weakness | 263 (65.75) | 115 (29) |
| Sore muscles | 209 (52.25) | 82 (20.50) |
| Agitation/Anxiety | 200 (50) | 68 (17) |
| Depression | 284 (71) | 117 (29) |
| Dry skin | 201 (50.25) | 136 (33.25) |
| Itchy skin | 95 (23.75) | 73 (18) |
| Unusual hair loss | 250 (62.50) | 146 (36.25) |
| Dry hair | 191 (47.75) | 158 (39.25) |
| Infrequent bowel movements | 151 (37.75) | 81 (20) |
| or hard stools | 124 (31) | 54 (13.25) |
| Frequent bowel movements | 153 (38.25) | 49 (14) |
| or loose stools | 176 (44) | 26 (6.25) |
| Unexplained weight gain | 225 (56.25) | 16 (3.75) |
| Unexplained weight loss | 166 (41.50) | 30 (7.25) |
| Pain or swelling of neck | 98 (24.50) | 47 (11.75) |
| Hoarseness | 59 (14.75) | 41 (10) |
| Eye pain or double vision | 110 (27.50) | 33 (8) |
| Swelling or protrusion of eyes | 185 (46.25) | 120 (29.75) |
| Change in facial appearance | 250 (62.50) | 136 (33.75) |
| Sweating | 186 (46.50) | 109 (27) |
| Difficulty tolerating cold | | |
| Difficulty tolerating heat | | |
| Medical History | | |
| High blood pressure | 182 (45.50) | 116 (29.25) |
| High cholesterol | 120 (30) | 67 (17.25) |
| Heart disease or Angina | 116 (29) | 48 (11.75) |
| Female Specific Symptoms | | |
| Suffer low milk production | 35 (8.75) | 23 (7.33) |
| Suffer increased milk | 3 (0.75) | 18 (5.67) |
| production | 78 (19.50) | 28 (9) |
| Loss of periods | 160 (40) | 85 (28) |
| Irregular periods | 48 (12) | 83 (27.33) |
| Excessive periods | | |

**Table 1: Sociodemographic characteristics and symptoms frequency of patients and controls**

Poor concentration, sore muscles, dry skin, dry hair, weight loss, hoarseness, sweating and heart disease or



 

angina were dependent on area. Only two symptoms i.e. Heart disease or angina and dry hair were found to be dependent on sex. Since the P value of all these symptoms was less then $\alpha = 0.001$, therefore it was concluded that these symptoms were dependent on demographic features.

| Symptoms | Overall % | Females % | Males % | Age Group | Sex dependent | Age dependent | Area dependent |
|---|---|---|---|---|---|---|---|
| Poor concentration | 45 | 78.89 | 21.11 | 31-40 | No | Yes | Yes |
| Memory loss | 39 | 70.51 | 29.49 | 41-50 | No | Yes | No |
| Sore muscles | 52.25 | 72.25 | 27.75 | 41-50 | No | Yes | Yes |
| Dry skin | 50.25 | 74.62 | 25.37 | 31-40,41-50 | No | Yes | Yes |
| Itchy skin | 23.75 | 69.47 | 30.52 | 41-50 | No | Yes | No |
| Hard stools | 37.75 | 72.18 | 27.81 | 41-50 | No | Yes | No |
| Weight gain | 38.25 | 75.81 | 24.18 | 41-50 | No | Yes | No |
| Eye pain/ double vision | 24.5 | 63.26 | 36.73 | 41-50 | No | Yes | No |
| High blood pressure | 45.5 | 69.78 | 30.21 | 41-50 | No | Yes | No |
| High cholesterol | 30 | 70.83 | 29.16 | 41-50 | No | Yes | No |
| Irregular periods | 53.51 | 53.51 | - | 31-40 | No | Yes | No |
| Excessive periods | 16.05 | 16.05 | - | 41-50 | No | Yes | No |
| Dry hair | 47.75 | 81.67 | 18.32 | 31-40,41-50 | Yes | No | Yes |
| Weight loss | 44 | 76.13 | 23.86 | 31-40 | No | No | Yes |
| Hoarseness | 41.5 | 74.69 | 22.28 | 31-40 | No | No | Yes |
| Sweating | 46.25 | 77.83 | 22.16 | 31-40 | No | No | Yes |
| Heart disease or angina | 29 | 63.79 | 36.02 | 41-50 | Yes | No | Yes |

**Table 2: Symptoms vs. demographic features cross tabulation results.**

### 3.3. Patients vs. Control Comparison (t Test)

Patients and controls data was compared to observed the occurrences of every symptom and hence analyze if a particular symptom was disease specific or not. Paired sample t test was applied to assess whether the means of patients and controls were statistically different from each other. Only four of the symptoms i.e. dry hair, itchy skin, suffers low milk production and swelling or protrusion of eyes showed that there was no significant difference between the patients and controls as shown in table 3.

| Patient vs. control symptom | Mean | Standard deviation | Standard error mean | 99.99% confidence interval | t Value | P value |
|---|---|---|---|---|---|---|
| Itchy skin | .057 | .583 | .029 | .057-.172 | 1.972 | .049 |
| Dry hair | .085 | .724 | .036 | 057-.227 | 2.348 | .019 |
| Swelling or protrusion of eyes | .050 | .456 | .023 | .040-.140 | 2.193 | .029 |
| Suffer low milk production | .43 | .309 | .018 | .027-.114 | 2.434 | .016 |

**Table 3: Paired sample t test for comparative means between patients and controls.**

## 4. DISCUSSION

The basic purpose of the current study was to determine the relation of various thyroid symptoms with demographic features i.e. age, area and sex. Such work has not been conducted in Pakistan before. Therefore, the case study under consideration is unique. This would play beneficial role for researchers to evaluate the causes responsible for prevalence of various symptoms of thyroid in association with age, area and sex. Patient control comparative means were also calculated to ascertain the occurrence of every symptom and hence analyze if a particular symptom was disease specific or not. Since the present case study comprised of 400 patients and 400 controls, its statistical results can be treated as valid for further investigation.

In the present study some of the symptoms like memory loss, weight gain, high blood pressure, high cholesterol, weakness, poor concentration and itchy skin showed significant relation with age. All these symptoms were observed in the age bracket of 31-50 years. Incidence of coronary heart diseases increases with age. [14] This verifies the fact that mostly patients were in the age range of 41-50 years. Increasing age reduces the mass of skeletal muscles and hence cause muscle weakness. [15] In the current study, patients in the age group of 31-40 years were observed to be suffering from weakness.

The current work revealed that a very few symptoms showed significant relation with sex. These included heart disease/angina, dry hair and poor concentration. Present study showed that more female patients were affected with dry hair problem as compared to males with a ratio of 1:4.Various environmental factors could be responsible for the prevalence of this problem in thyroid patients.

The study under consideration also showed that symptoms like dry skin, weakness, weight loss, sweating



 

and hoarseness were also significantly related with area. From a total of 400 patients, 275 belonged to plain areas. All these symptoms were found to be prevalent in patients residing in plain areas of Pakistan. Results of such nature could have been observed since majority of data was collected from plain areas of the country.

Symptoms which showed no significant difference in patients and controls included dry hair, itchy skin, swelling or protrusion of eye and suffer low milk production. Environmental issues and various other problems could be responsible for such results.

## 5. CONCLUSION

In conclusion, the results of this study indicate that more females were affected as compared to males with a ratio of 3:1. Prevalence of most of the symptoms of thyroid was observed in females of age range 31-40 years. Many symptoms of thyroid showed demographic dependence. Some symptoms of thyroid in controls showed that they are not disease specific and tend to occur at a greater or equal percentage in healthy population.

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**Conflict of Interest: None Declared**



 